



A META-ANALYSIS OF RCTS ON TRADITIONAL AND TECHNOLOGY-BASED PSYCHOLOGICAL INTERVENTIONS FOR DELIBERATE SELF-HARM IN ADOLESCENTS AND YOUNG ADULTS: IMPLICATIONS FOR INDIA

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ABSTRACT Deliberate self-harm (DSH) among adolescents is a global phenomenon, yet its expression, meaning-making, prevalence, intervention-design, and acceptance of intervention are heavily shaped by cultural contexts. Female gender, childhood trauma, mental health problems, high-risk behaviours, emotional dysregulation, and impulsivity are well-established prominent risk factors. An electronic search of PubMed, Scopus, Embase, and Web of Science between January 1995-2026 yielded 56,502 results. After the initial search and screening of articles based on titles and abstracts, full-text articles were retrieved for further evaluation. Fourteen studies met the inclusion/exclusion criteria for the meta-analysis. The studies had 2310 participants (treatment group= 1155, control group= 1155) with a mean sample size of 82.5. The number of sessions ranged from 3 to 64. 50% of studies delivered the sessions on a weekly basis. Reduction of DSH behaviours were assessed through validated scales or frequency of DSH. Pooled effect size ($d=-0.21$) indicates small treatment benefit compared to controls. Interventions in hospital settings had a higher effect size. The heterogeneity (Cochran $Q=19.53$, $p=0.10$; $I^2=32.73\%$), 95% CI = 0 - 81.23%) among studies indicates some variability in true effect sizes across studies. Traumatic experiences, key risk factors, and protective factors were not targeted in any of the studies.

KEYWORDS : Deliberate Self Harm (DSH), Meta-analysis, Psychotherapy, Randomised Controlled Trial (RCT), Adolescents, Young Adults

INTRODUCTION

Deliberate self-harm (DSH) is a complex behaviour and a leading public health concern that is most prevalent among adolescents and young adults (Stallard et al., 2013). While the lifetime pooled prevalence is reported as 17.7% in a multi-country study (Moloney et al., 2024), the point prevalence of DSH is as high as >30% with an increasing trend (Patra et al., 2022; Bhola et al., 2017; Kharasati et al., 2015). The onset of behaviour is generally between 12-14 years of age, however, it peaks around 15-17 years and remits in young to middle adulthood (Cipriano et al., 2017; Plener et al., 2015). Previous meta-analyses generally include samples of children and adolescents together (Bahji, 2021), thus limiting the implications of findings for the most vulnerable age group i.e. adolescents and young adults.

A single episode of DSH is a significant predictor of repeated DSH and suicidal behaviours. There is 50-100 times increased risk of suicide within the 1st year following DSH (Favril et al., 2022; Patra et al., 2022). At least 10% of individuals repeat DSH during the following year, with a likelihood of repetition in 1-3 months (Hawton et al., 2012; Ribeiro et al., 2016). The repetition of DSH is significantly more among those who were hospitalized for DSH, particularly during the first year (Goueslard et al., 2024). Although DSH results from a variety of risk factors (Estévez et al., 2018), poor emotional regulation and aggression are the key drivers (Brausch and Woods, 2019; Paul, 2019; Bucur et al., 2020; Connor et al., 2019). DSH is used as a form of maladaptive coping for acute/chronic stress like trauma, bullying (Heerde and Hemphill, 2019), and family conflicts/violence (Sinha et al., 2021; Holland et al., 2017). DSH is often present with other psychiatric disorders like depression, anxiety, borderline personality disorder, post-traumatic stress disorder among others (Sinha et al., 2021; Cipriano et al., 2017; Plener et al., 2015; Jacobson et al., 2008). Due to the transdiagnostic nature, the frequency of behaviour, increased risk of suicide, and its impact on others, effective treatments options are vital.

DSH requires early and intensive psychotherapy, however, lack of clear indication regarding the efficacy of any specific form of psychotherapy limits its scope in clinical/research use. The research on DSH interventions is on the rise globally after DSM-5 proposed criteria for assessing Nonsuicidal Self-Injury (NSSI) (American Psychiatric Association, 2013). Previous meta-analyses reported largest effect sizes for dialectical behaviour therapy (DBT), mentalization-based therapy (MBT), and cognitive behaviour therapy (CBT) (Brent et al., 2013; Ougrin et al., 2015; Iyengar et al., 2018;

Glenn et al., 2019). Although DBT is considered as the only “well-established” treatment of DSH (Clarke et al., 2019), the evidence is bleak in terms of study design, sample, modification and customization of therapy components in these studies.

Majority of previous meta-analyses have included all types of interventions and research methodology, which resulted in higher heterogeneity of included studies, therefore, limiting the scope of clear indication regarding selection of intervention. Also, a majority of interventions are focused on suicide reduction in in-patient settings, hence extrapolating the findings to DSH is not justified (Yiu et al., 2021). This meta-analysis includes all original RCTs on psychological interventions that aimed to reduce DSH. Also, this meta-analysis includes RCTs with only adolescents and young adults, the group with highest prevalence of DSH (Stallard et al., 2013).

METHODS

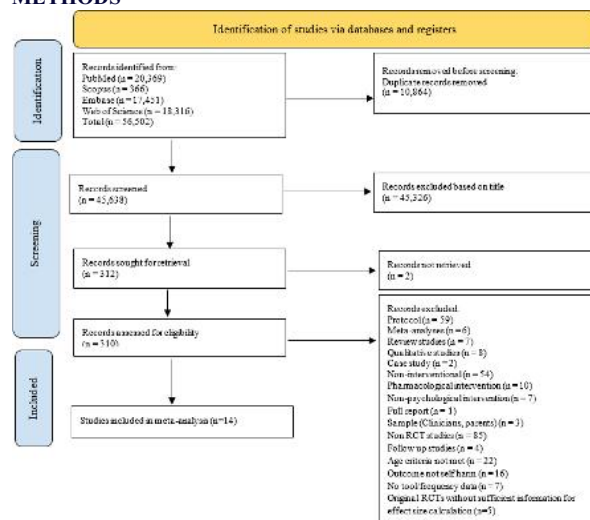


Figure 1 PRISMA Flowchart for Study Selection

Literature Search and Identification of Studies

An electronic search was conducted across four databases—PubMed,

Scopus, Embase, and Web of Science—for publications dated between January 1, 1995, and January 4, 2026. An example of search string in PubMed is: (((((((self harm) OR (non suicidal self injury)) OR (self injury)) OR (DSH)) OR (NSSI)) OR (self mutilation)) OR (deliberate self harm)) AND (intervention)) OR (therapy)) OR (psychotherapy)) OR (psychological intervention)) AND (adolesc*) OR (young adult). Filters were used for English language and full access articles. The initial search and screening of articles based on titles and abstracts were performed by the first author. Subsequently, full-text articles were retrieved for further evaluation. The final selection of studies that met the inclusion criteria was undertaken collaboratively by the first, second, and third authors. In cases of disagreement, consensus was reached by agreement between 2 authors. The PRISMA guidelines were followed (Figure 1).

This article is part of a larger study registered with CTRI (CTRI/2024/08/072474) for designing intervention for Indian adolescents and youth.

Eligibility Criteria

Inclusion Criteria: as per PICOT guidelines

Population- adolescents & young adults (12 - 35 years)

Intervention- intervention targeting DSH behaviour

Comparison- any type of control group like treatment as usual, waitlist, assessment only, etc

Outcome- frequency of DSH

Timeframe- pre and post-intervention

Randomised Controlled Trials (RCT)

English Language

Exclusion Criteria:

DSH is not outcome variable

Table 1 Characteristics of Included Studies for DSH

S. No.	Author, Year, Country	Treatment group (number, gender, age)	Type of control group (number, gender, age)	Blinding & Allocation	Mean age of intervention group, Intervention format (group/ individual), Delivery setting (home/hospital/ school/community)	Intervention details (sessions no. and frequency, duration of each session, total duration of intervention)	Components of intervention	Outcome, follow up
1.	Wood et al., 2001, UK	n= 32; Gender- 25(F), 7(M); Age- 12- 16 years	TAU; n= 31; Gender- 24(F), 7(M); Age- 12- 16 years	Blinding- Single (outcome assessor); Allocation- N/A	Mean age- 14.2; Group; CAMHS (Setting not specified)	Sessions- 6 "acute" group sessions + "long term group" until the participant feels ready to leave (weekly); Sessions median- 8 sessions; Duration- N/A; Total- max. 7 months	DGT. It integrates techniques from various therapeutic approaches, including problem-solving, CBT, DBT, and psychodynamic group psychotherapy. "Acute" sessions cover six themes: relationships, school and peer problems, family issues, anger management, depression and self-harm, and hopelessness regarding the future. The "long-term group" phase, places greater emphasis on group dynamics and processes.	Frequency of DSH, no follow up
2.	Slee et al., 2008, Netherlands	n= 40; Gender- 39(F), 1(M); Age- 15- 35 years	TAU; n= 42; Gender- 38(F), 4(M); Age- 15- 35 years	Blinding- Single (baseline assessment); Allocation- N/A	Mean age- 23.9; Individual; Hospital	Sessions- 12 (weekly); Duration- N/A; Total- 3 months	CBT. Focused on identifying and modifying mechanisms sustaining self-harm. Begins with assessing the most recent self-harm episode, examining its circumstances, motives, and associated cognitions, emotions, and behaviours. Addressed maintenance factors such as dysfunctional cognitions, emotion regulation difficulties, and poor problem-solving. Relapse prevention was emphasized.	Frequency of DSH, follow up at 6 and 9 months
3.	Green et al., 2011, UK	n= 183; Gender- 162(F), 21(M); Age- 12- 17 years	TAU; n= 183; Gender- 162(F), 21(M); Age- 12- 17 years	Blinding- Single (assessor); Allocation- minimisation controlling for baseline frequency of self harm, presence of conduct disorder, depressive disorder, and severity of psycho-social stress	Mean age- N/A; Group; CAMHS (Setting not specified)	Sessions- 6 + booster phase until the participant feels ready to leave (weekly); Average no. of sessions- 10.2; Duration- N/A; Total- max. 1 year	The intervention integrated techniques from CBT, DBT, and group psychotherapy. The group's goals focused on improving peer relationships, addressing bullying, and resolving family issues.	Frequency of DSH, no follow up

Pharmacological intervention

Alternative medicine like acupuncture, ayurveda, homoeopathy, etc

Full length article not accessible

Quality Assessment

The risk of bias assessment was done using the version 2 of Cochrane risk-of-bias tool for randomised trials (RoB 2) (Higgins et al., 2019a). The assessment was done separately by three authors. Overall rating on each domain was given on the basis of the consensus of 2 reviewers. Wherever all three reviewers were not in agreement, the domain was rated as unclear. A traffic light plot depicted the risk bias analysis.

Statistical Analysis

Statistical analysis was done using *RStudio metafor package* (Shamim et al., 2023). For each study, the post-intervention between-group effect size (Cohen's *d*) was either extracted directly from the article or calculated using the data provided. The mean, standard deviation (SD), and sample size were extracted for effect size calculation using the formula $d = (M_{\text{Intervention}} - M_{\text{Control}}) / SD_{\text{Pooled}}$. Where SD was unavailable, it was derived from the standard error (SE) using the formula $SD = SE \times \sqrt{n}$ (King & Minium, 2008). Where mean and SD were unavailable, the SE was calculated from the confidence interval (CI) (Higgins et al., 2019b) and Cohen's *d* was calculated using odds ratio (Chinn, 2000) and chi-square (Rosenthal & DiMatteo, 2001). Cochrane Q and *I*² statistics were used to report heterogeneity across study outcomes. Forest plot was constructed using a random effects model due to heterogeneity between studies (Deeks et al., 2024). A funnel plot was made to assess the publication bias.

RESULTS

4.	Rossouw and Fonagy, 2012, UK	n= 40; Gender- 33(F), 7(M); Age- 12-17 years	TAU; n= 40; Gender- 35(F), 5(M); Age- 12-17 years	Blinding- Double (assessors and participants); Allocation- minimisation controlling for past hospital admissions, gender, and age	Mean age- 14.7; Individual and Family; Hospital	Sessions- 52 (weekly MBT-A) + 12 (monthly MBT-F); Duration- 50 mins; Total- 1 year	MBT-A & MBT-F. The program emphasizes improving impulsivity control and affect regulation. Its primary objective is to enhance patients' ability to accurately recognize and represent both their own and others' emotions in emotionally challenging contexts.	Frequency of DSH using RTSHI, no follow up
5.	Mehlum et al., 2014, Norway	n= 39; Gender- 34(F), 5(M); Age- 12-18 years	EUC; n= 38; Gender- 34(F), 4(M); Age- 12-18 years	Blinding- Single (assessor); Allocation- 1:1	Mean age- 15.9; Individual; Hospital	Sessions- 19; Duration- weekly individual session (60 mins) + multi family skills training (120 mins); Total- 19 weeks (~5 months)	DBT-A	Frequency of DSH, no follow up
6.	Andover et al., 2017, USA	n= 15; Gender- 14(F), 1(M); Age- 18-29 years	TAU; n= 18; Gender- 17(F), 1(M); Age- 18-29 years	Blinding- Single (assessor); Allocation- N/A	Mean age- 22; Individual; Community	Sessions- 9 (weekly); Duration- 60 mins; Total- 9 weeks (~2 months)	T-SIB. The approach includes psychoeducation and functional assessment to identify alternative behaviours to NSSI. It implements differential reinforcement procedures to reduce NSSI behaviours and promote the use of alternative behaviours. The program also addresses interpersonal communication, cognitive distortions, and distress tolerance.	Frequency of DSH using TLFB, no follow up
7.	Cottrell et al., 2018, UK	n= 415; Gender- 368(F), 47(M); Age- 11-17 years	TAU; n= 417; Gender- 369(F), 48(M); Age- 11-18 years	Blinding- Single (researcher); Allocation- 1:1	Mean age- 14.3; Individual and Family; NHS, CAMHS (Setting not specified)	Sessions- 6-8 (monthly); Duration- 75 mins; Total- 6-8 months	The intervention is based on systemic family therapy.	Frequency of DSH, follow up at 12 and 18 months
8.	Kaess et al., 2020, Germany	n= 37; Gender- 37(F), 0(M); Age- 12-17 years	TAU; n= 37; Gender- 34(F), 3(M); Age- 12-17 years	Blinding- Double (assessors and psychotherapist); Allocation- 1:1	Mean age- 14.6; Individual; Outpatient clinic	Sessions- 8-12 (weekly); Duration- N/A; Total- 2-3 months	CDP. The intervention is a manualized, short-term psychotherapy that integrates elements of CBT and DBT. It has four main modules: enhancing therapy motivation and compliance, identifying the underlying reasons for the existing behaviour, testing alternative behaviours to replace NSSI, and stabilizing these alternatives to reduce the aversive stressors that often trigger NSSI.	Frequency of DSH using SITBI-G, follow up at 6 months
9.	Kruzan et al., 2022, USA	n= 67; Gender- 42(F), 13(M); Age- 16-25 years	Psychoeducation; n= 64; Gender- 47(F), 11(M); Age- 16-25 years	Blinding- N/A; Allocation- N/A	Mean age- 20.04; Individual; Home (mobile app)	Sessions- 24 (thrice/week); Duration- N/A; Total- 2 months	TalkLife. It is a peer-to-peer support app that provides a safe space for people to discuss their mental health and well-being.	Frequency of DSH using NSSI- AT, follow up at 1 and 2 months
10.	Morthorst et al., 2022, Denmark	n= 15; Gender- 15(F), 0(M); Age- 13-17 years	TAU; n= 15; Gender- 14(F), 1(M); Age- 13-17 years	Blinding- Single (assessor); Allocation- 1:1	Mean age- 15.20; Individual + 6 Parent module, Conjoint therapy; CAMHS, Home (internet based)	Sessions- 12 (weekly); Duration- N/A; Total- 3 months	ERITA. The program includes psychoeducation and skills training focused on impulse control, emotion awareness, acceptance, and validation. The parent module provides psychoeducation on NSSI and other destructive behaviours, exploring the functions of NSSI, enhancing emotional awareness, teaching effective communication skills, and strategies for parents to constructively manage their child's negative emotions.	Frequency of DSH using DSHI-Y, no follow up
11.	Bjureberg et al., 2023, Sweden	n= 84; Gender- 77(F), 5(M), 2(NB); Age- 13-17 years	TAU; n= 82; Gender- 77(F), 2(M), 3(NB); Age- 13-17 years	Blinding- Single (assessor); Allocation- based on a true random number service (Random.org) conducted by an independent researcher	Mean age- 15.04; Individual + 6 Parent module, Conjoint therapy; CAMHS, Home (mobile app)	Sessions- 12 (weekly); Duration- N/A; Total- 3 months	IERITA. The intervention is a web-based, acceptance-based behavioural treatment. The program is specifically designed to address NSSI by targeting emotion dysregulation.	Frequency of DSH using DSHI-Y, no follow up

12.	Li et al., 2025, China	n= 110; Gender- 51(F), 59(M); Class- 7th	General health education lectures; n= 110; Gender- 52(F), 58(M); Class- 7th	Blinding- N/A; Allocation- N/A	Mean age- 13.73; Group; School	Sessions- 6 (monthly); Duration- 30-40 mins; Total- 6 months	DBT. Modules on mindfulness, distress tolerance, emotion regulation, and interpersonal effectiveness	Frequency of DSH using ASIBS, no follow up
13.	Yin et al., 2025, China	n= 24; Gender- 17 (F), 7 (M); Age- 12-17 years	TAU; n= 24; Gender- 14 (F), 10 (M); Age- 12-17 years	Blinding- single (allocator); Allocation- done in accordance to the table of randomized numbers	Mean age- N/A; Group; Hospital	Sessions- 12 (weekly); Duration- 90 mins; Total- 3 months	G-IPT + TAU. Session 1-2- familiarisation of group members. Session 3-11- understanding own interpersonal problems, exploring group's interpersonal dilemmas, clarifying the relationship between interpersonal crises and NSSI, establishing link between recently experienced events and NSSI behaviors using group activities, focus on 4 categories of interpersonal problems (grief, role reversal, role conflict, and interpersonal relationship deficits).	Frequency of DSH using OSI, follow up at 3 months
14.	Tan et al., 2025, China	n= 57; Gender- 39 (F), 18 (M); Age- 12-25 years	TAU; n= 57; Gender- 34 (F), 23 (M); Age- 12-25 years	Blinding- N/A; Allocation- done in accordance to online randomisation system	Mean age- 16.11; Group + Individual; Hospital	Sessions- 8 (twice a week)+ incomplete information; Duration- 40-60 mins; Total- 2 months	IKAP model. Aims of the model are information, knowledge, attitude modification and behaviour change.	Frequency of DSH, no follow up

Note: AO-C- Assessment only Control; ASIBS- Adolescent Self-Injurious Behavior Scale; CAMHS- Child and Adolescent Mental Health Services; CBT- Cognitive Behavioural Therapy; CDP- Cutting Down Programme; DBT- Dialectical Behaviour Therapy; DGT- Developmental Group Therapy; DSHI-Y- Deliberate Self-Harm Inventory-Youth; ERITA- Emotion Regulation Individual Therapy for Adolescents; EUC- Enhanced Usual Care; F- Female; G-IPT- Group Interpersonal Psychotherapy; IERITA- Internet-delivered Emotion Regulation Individual Therapy for Adolescents; IKAP- Information-Knowledge-Attitude-Practice; M- Male; MBT-A- Mentalization Based Treatment for Adolescents; MBT-F- Mentalization Based Family Therapy; NB- Non-Binary; NHS- National Health Service; NSSI-AT- The Non-Suicidal Self-Injury Assessment Tool; OSI- Ottawa Self-Injury Inventory; RTSI- Risk-Taking and Self-Harm Inventory; SASII- Suicide Attempt Self-Injury Interview; SC-SP- Stratified steppedCare for Suicide Prevention; SITBI 2.0-SF- Self-Injurious Thoughts and Behaviour Interview 2.0 - Short Form; SITBI-G- Self-Injurious Thoughts and Behaviours Interview-German; SSGT- Social Support Group Training; TAU- Treatment As Usual; TLFB- Time Line Follow Back; T-SIB- Treatment for Self-Injurious Behaviours; WL- Waitlist

Study Characteristics: Fourteen RCTs were included in this meta-analysis (Table 1). 64.28% (n=9) studies were conducted in Europe (four in the UK), 21.42% (n=3) in China, and 14.28% (n=2) in the USA. 71.42% (n=10) studies focused on adolescents, 7.14% (n=1) on young adults, and 21.42% (n=3) included a mixed-age sample. 64.28% (n=9) studies reported single blinding, 14.28% (n=2) used double blinding, and 21.42% (n=3) did not specify the blinding methodology. 28.57% (n=4) studies allocated participants following randomization in a 1:1 ratio, 21.42% (n=3) studies used some randomisation strategy but did not provide details regarding allocation, 14.28% (n=2) studies utilized various stratification strategies for participant allocation. Allocation details were not provided in 35.71% (n=5) studies.

Sample Characteristics: The total sample was 2310 participants (treatment group: n=1155, control group: n=1155). The intervention group sizes ranged from 15-415 participants, with mean sample size 82.5 and median 40. The control group sizes ranged from 15-417 participants, with mean sample size 82.5 and median 38.5. Mean age for the intervention participants in 11 studies (not available in 3 studies) was 16.64 ± 3.39 years. The gender distribution of samples in the treatment group was females-953: males-200: non-binary-2, and females-951: males-201: non-binary-3 in the control group. Kaess et al. (2020) had only female participants.

Intervention Characteristics: In 78.57% (n=11) studies, the control group received treatment as usual (TAU). 35.71% (n=5) studies

delivered individual sessions, 28.57% (n=4) used group-based formats, 7.14% (n=1) combined individual and group sessions, and 21.42% (n=3) incorporated both individual and family sessions. The number of sessions ranged from 3 to 64, with 35.71% (n=5) studies delivering 12 sessions. 50% (n=7) studies delivered these sessions on a weekly basis. Overall duration of the interventions ranged from 2 months to one year. Follow up assessment was undertaken in 35.71% (n=5) studies with the shortest follow up at 1 month and longest follow up at 18 months. 57.14% (n=8) studies used specific self-harm assessment scales (except two studies which used DSHI-Y, the remaining 6 studies used different scales), while 42.85% (n=6) measured the frequency of DSH pre-and-post-treatment as the primary outcome. The theoretical framework of the intervention were as followed: CBT+DBT- 3 (Wood et al., 2001, Green et al., 2011, & Kaess et al., 2020), CBT- 1 (Slee et al., 2008), DBT- 2 (Mehlum et al., 2014 & Li et al., 2025), MBT- 1 (Rossouw and Fonagy, 2012), IPT- 1 (Yin et al., 2025), Family therapy- 1 (Cottrell et al., 2018), Technology based interventions- 3 (Kruzan et al., 2022, Morthorst et al., 2022, & Bjureberg et al., 2023), and others- 2 (Andover et al., 2017 & Tan et al., 2025). Notably, there is an emerging trend towards technology-based interventions, including internet, SMS, and mobile app-based modalities; and other forms of therapies addressing DSH; however, the theoretical foundation of evidence-based interventions in these studies was not clear.

Risk of Bias Analysis

A summary of risk of bias analysis is depicted in Figure 2.

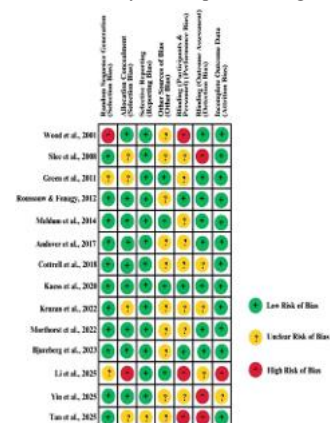


Figure 2 Traffic Light Plot Demonstrating Summary of Risk of Bias Analysis

Efficacy of Therapeutic Intervention on DSH

The heterogeneity between studies was assessed using I^2 statistics. Cochran Q for the studies is 19.53 ($df=13$, $p=0.10$) and $I^2=32.73\%$ (95% CI = 0 - 81.23%). Cochran's Q is not statistically significant. I^2 value of 32.72% with confidence interval of 0 - 81.23% suggests imprecise estimation of heterogeneity. Therefore, the pooled effect size was calculated using the random effects model. The pooled effect size ($d=-0.21$) indicates that the difference between treatment group and control group is small and the treatment has minimal benefits over the control conditions (Figure 3).

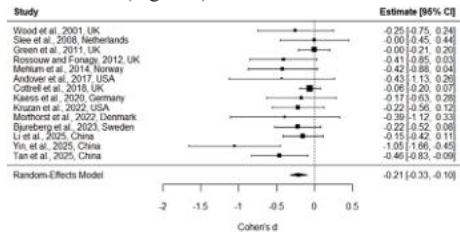


Figure 3 Forest Plot Demonstrating Effect Size

Publication Bias

The funnel plot is mostly symmetrical with a few outliers indicating minimal publication bias (Figure 4)

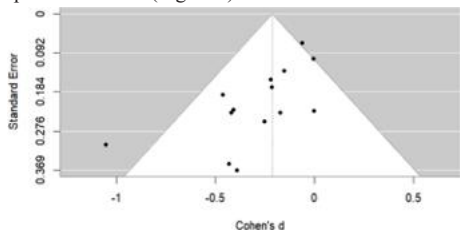


Figure 4 Funnel Plot Illustrating Publication Bias

DISCUSSION

This meta-analysis evaluates the efficacy of fourteen RCTs of psychological intervention on DSH with a particular focus on adolescents and young adults. Most studies focus on adolescents (mean age as mentioned in the studies) which reflects the high prevalence rates amongst this population. The included studies are primarily from Europe and the USA, although there is an increasing trend of publications from Asian countries, particularly China. The studies delivered a variety of interventions, with CBT and DBT being the most popular. The interventions were delivered in a variety of settings like hospital, community, although internet and mobile based apps are becoming more common.

The risk of bias analysis done using RoB 2 reflects that sound methodology was followed for RCTs. Although some level of performance bias is observed across studies, it can be due the very nature of psychotherapeutic intervention studies that pose a difficulty in blinding the participant and the therapist. Other biases such as poor clarity of procedural methods, allocation process are reflected through the analysis.

The pooled effect size ($d=-0.21$) indicates minimal benefits of interventions over the control group. The heterogeneity (Cochran $Q=19.53$, $p=0.10$; $I^2=32.73\%$, 95% CI = 0 - 81.23%) among studies indicates some variability in true effect sizes across studies. Furthermore, few outliers seen in the funnel plot indicates minimal publication bias signifying that the results of these studies were influenced by selective reporting. This suggests that the pooled effect size is not a reflection of true effect size (Huedo-Medina et al., 2006).

The small pooled effect size can be explained by multiple factors. First, the heterogeneity between studies along with publication bias suggests that the pooled effect size is not true effect size. So the actual effect size may actually be greater or smaller than -0.21. The variability in the study setting can contribute to the overall efficacy of an intervention. Four of the five studies (Rossouw & Fonagy, 2012; Mehlum et al., 2014; Li et al., 2025; Tan et al., 2025) with effect size greater than 0.40 delivered the intervention in the hospital setting suggesting that interventions delivered in community may not yield very good results. The variability in intervention components itself might have led to variable effects, especially when interventions are not replicated. The high weightage due to relatively good sample size but very small effect

size of Green et al. (2011) and Cottrell et al. (2018) brings down the pooled effect size. Yin et al. (2025), using components of interpersonal therapy reported a large effect size of 1.05. Although due to small sample size it has less impact on overall pooled effect size. Interpersonal therapy for DSH reflects the role of interpersonal conflicts and strategies to impact DSH which should be further explored. Further, the cultural components of all interventions can also explain the findings of specific focus of the interventions.

Outlining Missing Components and Emerging Needs

When planning psychotherapeutic interventions for DSH, the approach may go beyond the traditional by taking into cognizance the most prominent causative factors, for example, childhood maltreatment, parental physical abuse, and childhood sexual abuse are closely linked to DSH (Cipriano et al., 2017; Sinha, 2021). Wood et al. (2001) mentioned that approximately half of the sample had evidence of definite or probable sexual or physical abuse in the past, however none of the other included studies had any information on trauma exposure. Thus, none of the interventions had any component on addressing trauma exposure. Higher family functioning, better peer relations, emotional intelligence and other factors act as protective factors against DSH (Aggarwal et al., 2017; Halicka-Maslowska et al., 2020), however, the included studies lack therapeutic components to enhance these factors.

Limitations

This meta-analysis has some limitations. The small sample sizes of individual studies may have reduced the statistical power to detect significant effects. The studies with participants older than 35 years were excluded from this meta-analysis resulting in losing data of adolescents/young adults from these studies as data of population of interest could not be extracted. Most of the studies compare interventions to TAU which might already include substantial therapeutic elements, demonstrating a need for standardising control group protocol. The details of each session have not been provided in all studies. The studies followed various methods for randomization, blinding, and allocation of participants while failing to clearly specify the procedure followed.

Implications

This study has important implications for research in the field of mental health in India. DSH is a significant public health concern with highest prevalence seen in young adults, the largest demographic of India, the absence of RCTs in this area highlights the need for high quality research in this area. The small effect size may be an indicator of missing components of the existing psychological interventions with the majority of the interventions focussing on emotional dysregulation, cognitive restructuring, mentalisation, and family systems. Researchers may explore other components of intervention that go beyond these and focus intensively on DSH, risk factors, and protective factors.

CONCLUSION

This meta-analysis reveals that routine psychological interventions provide minimal additional benefit over control conditions for reducing DSH. The etiology of DSH is complex and multifactorial, including acute and chronic stressors and trauma. Future research should focus on robust study designs, larger sample size, intervention modules that address mechanisms underlying DSH along with intervention components specifically addressing DSH.

REFERENCES

- Aggarwal, S., Patton, G., Reavley, N., Sreenivasan, S. A., & Berk, M. (2017). Youth self-harm in low- and middle-income countries: Systematic review of the risk and protective factors. *International Journal of Social Psychiatry*, 63(4), 1–17. <https://doi.org/10.1177/0020764017700175>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing.
- Andover, M. S., Schatten, H. T., Morris, B. W., Holman, C. S., & Miller, I. W. (2017). An intervention for nonsuicidal self-injury in young adults: A pilot randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 85(6), 620–631. <https://doi.org/10.1037/ccp0000206>
- Bahji, A., Pierce, M., Wong, J., Roberge, J. N., Ortega, I., & Patten, S. (2021). Comparative efficacy and acceptability of psychotherapies for self-harm and suicidal behavior among children and adolescents: A systematic review and network meta-analysis. *JAMA Network Open*, 4(4), e216614. <https://doi.org/10.1001/jamanetworkopen.2021.6614>
- Bhola, P., Manjula, M., Rajappa, V., & Phillip, M. (2017). Predictors of non-suicidal and suicidal self-injurious behaviours among adolescents and young adults in urban India. *Asian Journal of Psychiatry*, 29, 123–128. <https://doi.org/10.1016/j.ajp.2017.04.024>
- Bjureberg, J., Ojala, O., Hesser, H., et al. (2023). Effect of internet-delivered emotion regulation individual therapy for adolescents with nonsuicidal self-injury disorder: A randomized clinical trial. *JAMA Network Open*, 6(7), e2322069. <https://doi.org/10.1001/jamanetworkopen.2023.22069>
- Brausch, A. M., & Woods, S. E. (2019). Emotion regulation deficits and nonsuicidal self-injury prospectively predict suicide ideation in adolescents. *Suicide and Life-Threatening Behavior*, 49(3), 868–880. <https://doi.org/10.1111/sltb.12478>

8. Brent, D. A., McMakin, D. L., Kennard, B. D., Goldstein, T. R., Mayes, T. L., & Douaihy, A. B. (2013). Protecting adolescents from self-harm: A critical review of intervention studies. *Journal of the American Academy of Child and Adolescent Psychiatry*, 52(12), 1260–1271. <https://doi.org/10.1016/j.jaac.2013.09.009>
9. Bucur, A., Ursoniu, S., Caraiion-Buzdea, C., Ciobanu, V., Florescu, S., & Vladescu, C. (2020). Aggressive behaviors among 15–16-year-old Romanian high school students: Results from two consecutive surveys related to alcohol and other drug use at the European level. *International Journal of Environmental Research and Public Health*, 17(10), 3670. <https://doi.org/10.3390/ijerph17103670>
10. Chinn, S. (2000). A simple method for converting an odds ratio to effect size for use in meta-analysis. *Statistics in Medicine*, 19(22), 3127–3131. [https://doi.org/10.1002/1097-0258\(20001130\)19:22<3127::AID-SIM784>3.0.CO;2-M](https://doi.org/10.1002/1097-0258(20001130)19:22<3127::AID-SIM784>3.0.CO;2-M)
11. Cipriano, A., Cella, S., & Cotrufo, P. (2017). Nonsuicidal self-injury: A systematic review. *Frontiers in Psychology*, 8, 1946. <https://doi.org/10.3389/fpsyg.2017.01946>
12. Clarke, S., Allerhand, L. A., & Berk, M. S. (2019). Recent advances in understanding and managing self-harm in adolescents. *F1000Research*, 8, F1000 Faculty Rev–1794. <https://doi.org/10.12688/f1000research.19868.1>
13. Connor, D. F., Newcorn, J. H., Saylor, K. E., et al. (2019). Maladaptive aggression: With a focus on impulsive aggression in children and adolescents. *Journal of Child and Adolescent Psychopharmacology*, 29(8), 576–591. <https://doi.org/10.1089/cap.2019.0039>
14. Cottrell, D. J., Wright-Hughes, A., Collinson, M., et al. (2018). Effectiveness of systemic family therapy versus treatment as usual for young people after self-harm: A pragmatic, phase 3, multicentre, randomized controlled trial. *The Lancet Psychiatry*, 5(3), 203–216. [https://doi.org/10.1016/S2215-0366\(18\)30058-0](https://doi.org/10.1016/S2215-0366(18)30058-0)
15. Deeks, J. J., Higgins, J. P. T., Altman, D. G., McKenzie, J. E., & Veroniki, A. A. (2019). Chapter 10: Analysing data and undertaking meta-analyses. In J. P. T. Higgins et al. (Eds.), *Cochrane handbook for systematic reviews of interventions* (2nd ed.). John Wiley & Sons.
16. Estévez, E., Jiménez, T. I., & Moreno, D. (2018). Aggressive behavior in adolescence as a predictor of personal, family, and school adjustment problems. *Psicothema*, 30(1), 66–73. <https://doi.org/10.7334/psicothema2016.294>
17. Favril, L., Yu, R., Uyar, A., Sharpe, M., & Fazel, S. (2022). Risk factors for suicide in adults: Systematic review and meta-analysis of psychological autopsy studies. *Evidence-Based Mental Health*, 25(4), 148–155. <https://doi.org/10.1136/ebmental-2022-300549>
18. Glenn, C. R., Esposito, E. C., Porter, A. C., & Robinson, D. J. (2019). Evidence base update of psychosocial treatments for self-injurious thoughts and behaviors in youth. *Journal of Clinical Child & Adolescent Psychology*, 48(3), 357–392. <https://doi.org/10.1080/1537446.2019.1591281>
19. Goueslard, K., Quantin, C., & Jollant, F. (2024). Self-harm and suicide death in the three years following hospitalization for intentional self-harm in adolescents and young adults: A nationwide study. *Psychiatry Research*, 334, 115807. <https://doi.org/10.1016/j.psychres.2024.115807>
20. Green, J. M., Wood, A. J., Kerfoot, M. J., Trainor, G., Roberts, C., Rothwell, J., et al. (2011). Group therapy for adolescents with repeated self-harm: Randomised controlled trial with economic evaluation. *BMJ*, 342, d682. <https://doi.org/10.1136/bmj.d682>
21. Halicka-Maslowska, J., Szewczuk-Bogusławska, M., Adamska, A., & Misiaik, B. (2020). Neurobiology of the association between non-suicidal self-injury, suicidal behavior and emotional intelligence: A review. *Archives of Psychiatry and Psychotherapy*, 2, 25–35. <https://doi.org/10.12740/APP/117705>
22. Hawton, K., Bergen, H., Waters, K., et al. (2012). Epidemiology and nature of self-harm in children and adolescents: Findings from the multicentre study of self-harm in England. *European Child & Adolescent Psychiatry*, 21(7), 369–377. <https://doi.org/10.1007/s00787-012-0269-6>
23. Heerde, J. A., & Hemphill, S. A. (2019). Are bullying perpetration and victimization associated with adolescent deliberate self-harm? A meta-analysis. *Archives of Suicide Research*, 23(3), 353–381. <https://doi.org/10.1080/13811118.2018.1472690>
24. Higgins, J. P. T., Li, T., & Deeks, J. J. (2019). Chapter 6: Choosing effect measures and computing estimates of effect. In J. P. T. Higgins et al. (Eds.), *Cochrane handbook for systematic reviews of interventions* (2nd ed.). John Wiley & Sons.
25. Higgins, J. P. T., Savović, J., Page, M. J., Elbers, R. G., & Sterne, J. A. C. (2019). Chapter 8: Assessing risk of bias in a randomized trial. In J. P. T. Higgins et al. (Eds.), *Cochrane handbook for systematic reviews of interventions* (2nd ed.). John Wiley & Sons.
26. Holland, K. M., Vivolo-Kantor, A. M., Logan, J. E., & Leemis, R. W. (2017). Antecedents of suicide among youth aged 11–15: A multistate mixed methods analysis. *Journal of Youth and Adolescence*, 46, 1598–1610. <https://doi.org/10.1007/s10964-016-0610-3>
27. Huedo-Medina, T. B., Sánchez-Meca, J., Marín-Martínez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: Q statistic or I² index? *Psychological Methods*, 11(2), 193–206. <https://doi.org/10.1037/1082-989X.11.2.193>
28. Iyengar, U., Snowden, N., Asarnow, J. R., Moran, P., Tranah, T., & Ougrin, D. (2018). A further look at therapeutic interventions for suicide attempts and self-harm in adolescents: An updated systematic review of randomized controlled trials. *Frontiers in Psychiatry*, 9, 583. <https://doi.org/10.3389/fpsyg.2018.00583>
29. Jacobson, C. M., Muehlenkamp, J. J., Miller, A. L., & Turner, J. B. (2008). Psychiatric impairment among adolescents engaging in different types of deliberate self-harm. *Journal of Clinical Child & Adolescent Psychology*, 37(2), 363–375. <https://doi.org/10.1080/15374410801955771>
30. Kaess, M., Edinger, A., Fischer-Waldschmidt, G., Parzer, P., Brunner, R., & Resch, F. (2020). Effectiveness of a brief psychotherapeutic intervention compared with treatment as usual for adolescent nonsuicidal self-injury: A single-centre, randomised controlled trial. *European Child & Adolescent Psychiatry*, 29(7), 881–891. <https://doi.org/10.1007/s00787-019-01399-1>
31. Kharasati, N., & Bhola, P. (2015). Patterns of non-suicidal self-injurious behaviours among college students in India. *International Journal of Social Psychiatry*, 61(1), 39–49. <https://doi.org/10.1177/0020764014535755>
32. King, B. M., & Minium, E. W. (2008). *Statistical reasoning in the behavioral sciences* (5th ed.). John Wiley & Sons.
33. Klimstra, T. (2013). Adolescent personality development and identity formation. *Child Development Perspectives*, 7(2), 80–84. <https://doi.org/10.1111/cdep.12017>
34. Kruzan, K. P., Whitlock, J., Bazarova, N. N., Bhandari, A., & Chapman, J. (2022). Use of a mobile peer support app among young people with nonsuicidal self-injury: Small-scale randomized controlled trial. *JMIR Formative Research*, 6(7), e26526. <https://doi.org/10.2196/26526>
35. Li, J., Wen, P., Zhou, J., Zhong, Z., & Li, L. (2025). Dialectical behavioral therapy–based prevention of non-suicidal self-harm among secondary students in China: A randomized controlled trial. *BMC Public Health*, 25(1), 4392. <https://doi.org/10.1186/s12889-025-24978-1>
36. Mehlum, L., Tørmoen, A. J., Ramberg, M., et al. (2014). Dialectical behavior therapy for adolescents with repeated suicidal and self-harming behavior: A randomized trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, 53(10), 1082–1091. <https://doi.org/10.1016/j.jaac.2014.07.003>
37. Moloney, F., Amini, J., Sinyor, M., Schaffer, A., Lancôt, K. L., & Mitchell, R. H. B. (2024). Sex differences in the global prevalence of nonsuicidal self-injury in adolescents: A meta-analysis. *JAMA Network Open*, 7(6), e2415436. <https://doi.org/10.1001/jamanetworkopen.2024.15436>
38. Morthorst, B., Olsen, M. H., Jakobsen, J. C., et al. (2022). Internet-based intervention (Emotion Regulation Individual Therapy for Adolescents) as add-on to treatment as usual versus treatment as usual for non-suicidal self-injury in adolescent outpatients: The TEENS randomised feasibility trial. *JCPP Advances*, 2(4), e12115. <https://doi.org/10.1002/jcv2.12115>
39. Ougrin, D., Tranah, T., Stahl, D., Moran, P., & Asarnow, J. R. (2015). Therapeutic interventions for suicide attempts and self-harm in adolescents: Systematic review and meta-analysis. *Journal of the American Academy of Child and Adolescent Psychiatry*, 54(2), 97–107.e2. <https://doi.org/10.1016/j.jaac.2014.10.009>
40. Patra, B. N., Sen, M. S., Sagar, R., & Bhargava, R. (2023). Deliberate self-harm in adolescents: A review of literature. *Indian Psychiatry Journal*, 32(1), 9–14. <https://doi.org/10.4103/ipj.ipj.215.21>
41. Paul, H. (2019). Handbook of child and adolescent aggression. *Child & Family Behavior Therapy*, 41(1), 53–60. <https://doi.org/10.1080/07317107.2019.1571777>
42. Pfeifer, J. H., & Berkman, E. T. (2018). The development of self and identity in adolescence: Neural evidence and implications for a value-based choice perspective on motivated behavior. *Child Development Perspectives*, 12(3), 158–164. <https://doi.org/10.1111/cdep.12279>
43. Plener, P. L., Schumacher, T. S., Munz, L. M., & Groschwitz, R. C. (2015). The longitudinal course of non-suicidal self-injury and deliberate self-harm: A systematic review of the literature. *Borderline Personality Disorder and Emotion Dysregulation*, 2(1), 2. <https://doi.org/10.1186/s40479-014-0024-3>
44. Ribeiro, J. D., Franklin, J. C., Fox, K. R., et al. (2016). Self-injurious thoughts and behaviors as risk factors for future suicide ideation, attempts, and death: A meta-analysis of longitudinal studies. *Psychological Medicine*, 46(2), 225–236. <https://doi.org/10.1017/S0033291715001804>
45. Rosenthal, R., & DiMatteo, M. R. (2001). Meta-analysis: Recent developments in quantitative methods for literature reviews. *Annual Review of Psychology*, 52, 59–82. <https://doi.org/10.1146/annurev.psych.52.1.59>
46. Rossouw, T. I., & Fonagy, P. (2012). Mentalization-based treatment for self-harm in adolescents: A randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(12), 1304–1313. <https://doi.org/10.1016/j.jaac.2012.09.018>
47. Shamim, M. A., Gandhi, A. P., Dwivedi, P., & Padhi, B. K. (2023). How to perform meta-analysis in R: A simple yet comprehensive guide. *The Evidence*, 1, 93–113. <https://doi.org/10.61505/evidence.2023.1.1.6>
48. Sinha, D., Srivastava, S., Mishra, P. S., & Kumar, P. (2021). Predictors of deliberate self-harm among adolescents: Answers from a cross-sectional study on India. *BMC Psychology*, 9(1), 1–10. <https://doi.org/10.1186/s40359-021-00705-4>
49. Slee, N., Garneski, N., Van der Leeden, R., Arensman, E., & Spinhoven, P. (2008). Cognitive-behavioural intervention for self-harm: Randomised controlled trial. *British Journal of Psychiatry*, 192(3), 202–211. <https://doi.org/10.1192/bjp.bp.107.037564>
50. Stallard, P., Spears, M., Montgomery, A. A., Phillips, R., & Sayal, K. (2013). Self-harm in young adolescents (12–16 years): Onset and short-term continuation in a community sample. *BMC Psychiatry*, 13, 328. <https://doi.org/10.1186/1471-244X-13-328>
51. Tan, L., Lin, Z., Zhang, Y., Sun, N., Ding, Q., Feng, H., Jiang, W., & Yuan, Y. (2025). Information-Knowledge-Attitude-Practice model in non-suicidal self-injury behaviours of adolescences and young adults with major depressive disorder: Randomised controlled trials. *Journal of Psychiatric and Mental Health Nursing*, 32(3), 766–773. <https://doi.org/10.1111/jpm.13154>
52. Wood, A., Trainor, G., Rothwell, J., Moore, A., & Harrington, R. (2001). Randomized trial of group therapy for repeated deliberate self-harm in adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(11), 1246–1253. <https://doi.org/10.1097/00004583-200111000-00003>
53. Yin, Y., Zhang, S., Yu, L., Shi, F., & Yu, G. (2025). Group interpersonal psychotherapy for adolescents with non-suicidal self-injury: A randomized controlled study. *Journal of Psychiatric Practice*, 31(2), 65–73. <https://doi.org/10.1097/PRA.0000000000000846>
54. Yiu, H. W., Rowe, S., & Wood, L. (2021). A systematic review and meta-analysis of psychosocial interventions aiming to reduce risks of suicide and self-harm in psychiatric inpatients. *Psychiatry Research*, 305, 114175. <https://doi.org/10.1016/j.psychres.2021.114175>