

Therapeutic Interventions for Suicide Attempts and Self-Harm in Adolescents: Systematic Review and Meta-Analysis

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Objective: Suicidal behavior and self-harm are common in adolescents and are associated with elevated psychopathology, risk of suicide, and demand for clinical services. Despite recent advances in the understanding and treatment of self-harm and links between self-harm and suicide and risk of suicide attempt, progress in reducing suicide death rates has been elusive, with no substantive reduction in suicide death rates over the past 60 years. Extending prior reviews of the literature on treatments for suicidal behavior and repetitive self-harm in youth, this article provides a meta-analysis of randomized controlled trials (RCTs) reporting efficacy of specific pharmacological, social, or psychological therapeutic interventions (TIs) in reducing both suicidal and nonsuicidal self-harm in adolescents.

Method: Data sources were identified by searching the Cochrane, Medline, PsychINFO, EMBASE, and PubMed databases as of May 2014. RCTs comparing specific therapeutic interventions versus treatment as usual (TAU) or placebo in adolescents (through age 18 years) with self-harm were included.

Results: Nineteen RCTs including 2,176 youth were analyzed. TIs included psychological and social interventions and no pharmacological interventions. The proportion of the adolescents who self-harmed over the follow-up period was lower in the intervention groups (28%) than in controls (33%) (test for overall effect $z = 2.31$; $p = .02$). TIs with the largest effect sizes were dialectical behavior therapy (DBT), cognitive-behavioral therapy (CBT), and mentalization-based therapy (MBT). There were no independent replications of efficacy of any TI. The pooled risk difference between TIs and TAU for suicide attempts and nonsuicidal self-harm considered separately was not statistically significant.

Conclusion: TIs to prevent self-harm appear to be effective. Independent replication of the results achieved by DBT, MBT, and CBT is a research priority.

Key Words: self-harm, randomized controlled trials, meta-analysis

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Self-harm is a global health problem and a major public health concern.^{1,2} It is the second or the third leading cause of death in adolescents in the West and an important cause of death in developing countries.² In the United States, the research literature tends to distinguish between suicide attempts (defined as self-harm with some non-zero intent to die), non-suicidal self-injury (NSSI), and self-harm with undetermined intent.³ In contrast, researchers in the United Kingdom and Europe frequently use the broader term “self-harm” to refer to self-poisoning or self-injury, irrespective of the intent.⁴ Both suicide attempts and the broader self-harm category have been shown to be among the strongest predictors of death by suicide in adolescence, increasing the risk approximately 10-fold.^{5,6}

The critical need for clinical guidance regarding optimal clinical intervention strategies for youths engaging in

self-harm is underscored by research indicating the following: prior suicide attempts and self-harm broadly are strong predictors of suicide deaths^{5,7}; among depressed adolescents and those at risk for depression, NSSI is a strong predictor of future suicide attempts⁸⁻¹⁰; and a substantial subgroup of youths who attempt suicide also engage in NSSI.⁹ Self-harm, defined broadly, is also a common phenomenon: a systematic review of 128 studies reported a pooled lifetime prevalence of 13.2% (95% CI = 8.1–18.3).¹¹ Rates for self-harm (which include suicide attempts and NSSI) are higher than those for suicide attempts, currently estimated at an annual rate of 7.8%.¹²

This review and meta-analysis seek to extend and update a number of previous notable reviews of suicidal behavior and self-harm in adolescents that did not include meta-analyses^{6,13} and were specifically focused on suicidal behavior^{7,14,15}; non-suicidal self-harm only^{16,17}; social factors linked with self-harm¹⁸; emergency management of self-harm¹⁹ studies with mixed adult and adolescent samples²⁰; or the etiological factors of self-harm.²¹

To our knowledge, this is the first published meta-analysis of randomized controlled trials (RCTs) evaluating therapeutic interventions (TIs) in reducing both suicidal behavior and nonsuicidal self-harm in adolescents.



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Supplemental material cited in this article is available online.

Consistent with recommendations from prior reviews, we examine effects for suicide attempts, NSSI, and undetermined self-harm separately, as well as report effects for self-harm as a broad category and explore potential moderators of treatment effects, including treatment dose and family involvement in treatment.

METHOD

For clarity, we state whether the results of the studies reviewed in this article apply to adolescents with self-harm, suicide attempts, or NSSI where these distinctions are clear. When we refer to “self-harm,” we are referring to the broad definition used in the United Kingdom and Europe that includes NSSI, suicide attempts, and self-harm with undetermined intent. Self-harm is the primary outcome measure in this meta-analysis.

Inclusion Criteria

Inclusion criteria for the meta-analysis stipulated RCTs of specific TIs, defined as a theoretically coherent, manualized (or otherwise replicable) psychological, social, or pharmacological intervention, versus control treatment or placebo, in adolescents through age 18 years who have self-harmed at least once. A wide range of interventions was considered, independent of the theoretical underpinnings, including interventions focusing on young people, family-centered interventions, and interventions targeting wider social networks of the young people.

Exclusion Criteria

Exclusion criteria eliminated studies in which participants with self-harm were a minority of the study population (<50%); studies with self-harm occurring exclusively in the context of neurodevelopmental disorders (e.g., autism); or studies that did not conform to current criteria for evaluating methodological features of RCTs (Jadad score <2, an indicator of methodological quality/rigor, including blinding, allocation concealment, and accountability of all patients including withdrawals).²²

Identification and Selection of Studies

We searched The Cochrane Central Register of Controlled Trials (4th edition, 2010), OVID Medline (Subject headings “Self-injurious Behavior,” “Suicide, Attempted,” “Self-Mutilation,” “Suicide,” “Overdose”), and then searched PsychINFO, EMBASE, and PubMed databases using equivalent subject headings. All databases were searched to May 2014.

Reference lists of the retrieved articles were examined for additional relevant publications, and cited articles were also searched. In addition, we searched clinical trials databases and contacted key investigators in the United Kingdom, United States, Norway, the Netherlands (Holland), and Australia, to obtain the results of any unpublished studies and to clarify details of the published ones.

No limits were applied to the search apart from study type (treatment studies, RCTs) and the age of participants (children and adolescents 0–18 years old).

The retrieved articles from each database were downloaded into EndNote (version X5), and all duplicates were removed.

The methodological quality of the studies was assessed using allocation concealment as a proxy.^{23,24} Allocation concealment is a procedure for protecting the randomization process so that the treatment to be allocated is not known before the patient is entered into the study. We used the following quality ratings: 1 = adequate concealment (e.g., using opaque sealed envelopes); 2 = unclear concealment; and 3 = inadequate concealment (e.g., using open

random number tables). We also calculated the Jadad score for each of the included studies.²² In calculating the Jadad score, each study is evaluated according to the quality of randomization, blinding procedures, and description of withdrawals and dropouts. Jadad scores range from 0 to 5, with trials scoring 3 or greater considered good quality trials.

One of the authors (D.O.) screened the titles, abstracts, and full texts to assess the eligibility of the studies. The results were confirmed by an independent search performed by the second author (T.T.). Disagreements were resolved by consensus. A standardized data extraction sheet was used to collect data from eligible studies on the bibliographic details, self-harm definition, type of intervention, setting, and sociodemographic characteristics of the young persons and their families. The data were entered into a dedicated electronic database and checked for inconsistencies.

Statistical Analysis

In the calculation of pooled risk differences, we used the outcome of the proportion of the young persons who self-harmed at least once during the follow-up period of each study. We dichotomized young persons in each eligible study into 2 groups: those who self-harmed at least once, and those who never self-harmed for the duration of the longest follow-up period available. To calculate the pooled mean effect size, we used RevMan (Version 5.2), a computer program developed to support Cochrane reviews and meta-analyses. Each study was weighted in proportion to its sample size and tau² (the estimated variance of the true effect sizes). Sensitivity and meta-regression analyses were done using STATA 13.²⁵

We calculated the I²-statistic to estimate heterogeneity.²⁶ I² describes the percentage of total variation across studies that is due to heterogeneity rather than sampling error and ranges between 0% (no inconsistency) and 100% (high heterogeneity) with values of 25%, 50%, and 75% suggesting low, moderate, and high heterogeneity. As there was evidence of significant heterogeneity between studies, we calculated pooled risk difference with random effect model only.²⁷ A random effect analysis model makes the assumption that individual studies are estimating different treatment effects due to the diversity of clinical interventions and methodological factors. We then repeated the meta-analysis for those studies targeting self-harm excluding suicide attempts and for the studies targeting suicide attempts alone. Sensitivity analyses were conducted to weigh up the relative influence of each individual study on the pooled effect size using STATA’s user-written function “metainf.”²⁸

Finally, meta-regression was performed to assess the influence of the number of sessions (single/multiple), lengths of follow-up periods (months), family involvement (more than 50% of the total number of sessions/fewer than 50%), proportion of females, proportion of patients taking psychotropic medication, mean age (years), characterization of the control group (yes/no), quality of the study (high/low), and outcome measure (suicide only/suicide and self-harm) on the effect size using the user-written STATA function “metareg.”²⁹

The presence of publication bias for the main experimental hypothesis of therapeutic intervention effects on suicide attempts and self-harm was assessed informally by a funnel plot and formally by its direct statistical analogues Begg’s adjusted rank correlation test³⁰ and Egger’s test,³¹ which are implemented in STATA “metabias.”

RESULTS

Included Studies

The original search resulted in the retrieval of 389 articles (Figure 1), and 23 of these were RCTs of TIs in children and

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