Efficacy of synchronous remote-based interventions on suicidal behaviours: A systematic review and meta-analysis protocol

Laura Comendador
Universitat Autònoma de Barcelona: Universitat Autonoma de Barcelona

María P. Jiménez-Villamizar
Universitat Autònoma de Barcelona: Universitat Autonoma de Barcelona

Juan P. Sanabria-Mazo
Universitat Autònoma de Barcelona: Universitat Autonoma de Barcelona

Corel Mateo-Canedo
Universitat Autònoma de Barcelona: Universitat Autonoma de Barcelona

Ana Isabel Cebrià
Fundació Parc Taulí-Institut Universitari UAB: Fundacio Parc Tauli

Antoni Sanz (antonio.sanz@uab.cat)
Universitat Autònoma de Barcelona: Universitat Autonoma de Barcelona

Diego Palao
Fundació Parc Taulí-Institut Universitari UAB: Fundacio Parc Tauli

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Abstract

Background

Suicide is among the leading causes of preventable death worldwide. The impact of suicide affects personal, social, and economic level. Therefore, its prevention is a priority for public health systems. Previous studies seem to support the efficacy of providing active contact to persons who have made a suicide attempt. The current systematic review and meta-analysis aims to investigate the efficacy of distance suicide prevention strategies implemented through synchronous technology-based interventions.

Methods

This protocol is designed according to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P). The bibliographic searches will be conducted in the databases MEDLINE/PubMed, PsycInfo, Scopus, and Web of Science until April 2022, with no restrictions on the publication period and limited to publications in English or Spanish. Two reviewers will independently conduct study screening, selection process, data extraction, risk of bias (RoB), and methodological quality assessment.

Conclusions

Telematics suicide prevention has been an emergent field for years, although there is currently no evidence that synthesises the efficacy of synchronous remote-based interventions. This protocol outlines the methods of a planned research that will extend knowledge derived from the current available evidence. It will provide guidance to clinical practice and encourage further research.

Systematic review registration

This protocol has been registered at the International Prospective Register of Systematic Reviews (PROSPERO), under the identification number CRD42021275044.

Background

Suicide is a universal, complex, and multifaceted public health problem which is among the leading causes of preventable death worldwide. More than 700,000 people die by suicide each year [1], becoming the seventeenth leading cause of death in 2019 [2]. Annual numbers of completed suicide account for 1.4% of all deaths worldwide [3]. For each completed suicide, there are twenty suicide attempts [4], constituting one of the leading causes of disease burden in the world [5, 6]. Moreover, suicide is one of the leading causes of death among young people [3], representing the fourth leading cause of death among people aged 15–29 years [1]. The number of adolescent deaths due to suicide has increased dramatically, with data reflecting that suicide represents a rate of 0.19/100,000 in persons under 15 years of age and a rate of 2.23/100,000 in the 15–19 age group [7].

Suicide prevention is an emerging priority for the public health system due to its high social burden [8]. Evidence suggests that an increased risk of recidivism is directly related to a previous history of suicidal behaviour [9, 10]. It is estimated that 20% of people who had engaged in suicidal behaviour showed a subsequent episode, and that 88% of these reattempts occurred within two years of the initial episode [11]. Furthermore, lack of monitoring of healthcare has been identified as a risk factor for repeat suicide attempts [12].
Over the last decades, the relevance of developing evidence-based prevention strategies focused on reducing the likelihood of suicide attempts in high-risk patients has become evident [13]. Since the 2013 commitment of the World Health Organisation member states to work towards suicide prevention [14–16], diverse national strategies and suicide prevention interventions have been developed. Suicide prevention programmes include a wide range of follow-up actions that promote connectivity between the patient and the mental health provider (sending letters, conducting telephone calls, texting via SMS, providing follow-up visits in specialised healthcare centres, or implementing 24/7 hotlines) [17, 18]. The development of Information and Communication Technologies (ICTs) has created new opportunities and challenges in prevention, research, and clinical practice. eHealth interventions have emerged as promising tools for reaching a greater number of people at risk, facilitating proactive follow-up compared to traditional face-to-face treatments [19].

Considering that distance programmes are able to reach affected people regardless of their location, it is reasonable to expect that these interventions could be part of future suicide prevention efforts. Promising results seem to be reported in studies that conduct telephone follow-up interventions for individuals at risk as a suicide prevention strategy [20–27]. Telephone management in a clinical-practice setting could be a useful and not expensive programme to implement in mental health centres [20, 28]. Brief contact-based interventions can be a cost-effective strategy for suicide prevention in healthcare settings [29–31]. In a recent meta-analysis, Inagaki et al. [12] found that secondary prevention programmes involving active contact and follow-up can be effective in reducing the risk of a repeat suicide attempt within six months of admission to an emergency department for suicidal behaviour.

Although there is no clear consensus on the effect of these programmes in previous systematic reviews and meta-analyses [32, 33], there are data that appear to support the efficacy of providing active contact to individuals who have made a suicide attempt [12, 17, 34]. Receiving early specialised assistance appears to decrease the relative risk of recurrence. The reduction could be attributed to better detection of patients at higher risk and appropriate referral to emergency services, despite more research is needed to determine what specific factors might improve the effectiveness of follow-up contact methods [34].

Overall, there are studies with promising results [20, 23, 26–28] and others that have found conflicting or inconclusive evidence [22, 35, 36], suggesting the suitability of conducting a systematic review with meta-analysis of the current scientific literature. Despite evidence describing a broad range of telecommunications-based suicide prevention approaches [30, 37], we are not aware of available publications that provide a synthesis of the literature on interventions that develop the use of synchronous strategies in suicide prevention.

**Objectives**

This study aims to describe the protocol of a systematic review and meta-analysis of studies evaluating the efficacy of distance suicide prevention strategies implemented through technology-based synchronous interventions (i.e., via digital tools that allow interactive and immediate real-time communication conducted remotely). These results are intended to contribute to the updating of public health policies by generalising the evidence on prevention programmes and their impact on suicide attempts and completed suicide.

**Systematic Review Question**

The research question was built according to PICO criteria (Population, Intervention, Comparison, and Outcomes) [38]. In adolescents (12–17 years of age) and adults (≥ 18 years of age) with suicidal ideation or prior suicide attempts (P), what is the efficacy of synchronous remote-based interventions (I) in the prevention of non-fatal suicide attempts and completed suicide (O) compared to active or inactive control group (C), at any follow-up period?
The primary source used to describe the methods of this protocol was the Cochrane Handbook for Systematic Reviews of Interventions (version 6.2) [39]. The protocol was constructed according to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) [40, 41] (see Additional file 1). A version of the protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO), under identification number CRD42021275044.

**Eligibility Criteria**

**Population (P)**

The population of interest will include adolescents (12 to 17 years) and adults (≥ 18 years) that reported suicidal ideation or prior suicide attempts. No restriction will be placed on gender, geographical provenance, or diagnosis. Patients with non-suicidal self-injury will be excluded.

**Intervention (I)**

Synchronous remote based interventions will be defined as programmes delivered through a technology device that is featured by (a) ensuring interactive and immediate communication, and (b) not requiring the patient to be at the same physical location as the mental health provider. Interventions should aim to reduce suicide risk by communicating with patients through telephone follow-up or active contact (e.g., phone call or hotline), instant text messaging (e.g., WhatsApp, SMS, or online chat), or videoconference (e.g., Skype, Zoom, Google Meet, or Microsoft Teams). The synchronous remote communication should include some, but not necessarily all, of the following elements: improving compliance with medication and follow-up appointments, addressing any problems, stressors, or risk factors, and reducing re-attempts. No restriction will be placed on the intensity or duration of the intervention.

We will include interventions delivered via remote-communication synchronous technologies only or multicomponent interventions, employing minimal face-to-face contact (one session) or multimedia-delivered materials. The contacts must be provided for a pre-determined number and period of time or through active contact by patients at elevated risk for suicidal behaviour. The outcome variables should be measured before, during, or immediately after the intervention using quantitative measures.

Studies using asynchronous telecommunication devices such online forums and communities, social networking sites/apps (e.g., Facebook, Instagram, or Twitter), video sharing sites (e.g., YouTube), automated one-way text or voice messages, and self-directed web-based will be excluded. Articles in which the definition of self-harm is used to include suicidal behaviour will be considered; however, the treatments focus on the prevention of non-suicidal self-injury will be excluded. The interventions for issues such as psychosis, eating disorders, and depression that the aim is not to address the suicidal behaviour specifically, are out-with the scope of this review.

**Comparator (C)**

All comparisons identified in the eligible studies will be included, such as treatment as usual (TAU), enhanced treatment as usual, no treatment, placebo, waiting list, and historical control. Therefore, the review will include active (i.e., participants engaged in some tasks during the study period) or inactive control groups. The control group or period may involve a combination of strategies: visits to mental health services, non-psychological therapies (e.g., pharmacotherapy), and other expected interventions. Studies that do not include a control group will be excluded (e.g., crossover trials).

**Outcomes (O) and prioritisation**

The main outcomes will include suicide ideation, recurrence of suicide attempts, and completed suicide. Suicide is defined as a self-inflicted and potentially injurious behaviour that is performed as a deliberate method to die [42]. Suicide attempts are defined as any non-fatal intentional suicidal behaviour [3]. In addition, suicidal ideation is described by thoughts, ideas, or ruminations about the possibility of ending one's life [43].
The assessment can be conducted at any time (baseline, during, and after the intervention) with no limit on the length of follow-up, employing quantitative measurement of suicidal-related outcomes. The suicidal ideation outcome may be measured using different validated instruments, such as the Columbia Suicide Severity Rating Scale (C-SSRS) [44]. The non-fatal suicide attempts outcome will be measured by the number of suicide attempts a person has made within a certain timeframe. The suicide death outcome will be measured by the count of the number of people who have died by suicide.

The additional outcomes include mental health-related variables (e.g., psychiatric symptoms, quality of life, and global functioning as a proxy for psychological well-being), outcomes related to treatment attendance and follow-up compliance, number of contacts, and factors associated with the success of intervention implementation.

**Study design**

The review will consider published empirical research. Primary data from observational, case–control, and qualitative studies and secondary sources (e.g., systematic reviews, meta-analyses) will be excluded.

**Setting**

There will be no restrictions by type of setting or geographical location.

**Information Sources**

Literature searches will be conducted in the following electronic databases: MEDLINE (PubMed), PsycInfo (ProQuest), Scopus (ELSEVIER), and Web of Science (Core Collection; FECYT Innovación). The drafted electronic search strategy for PubMed/MEDLINE database is included in the Additional file 2.

Authors of published articles will be contacted to retrieve relevant information about their study that was either not reported or unclear. The references cited in the included articles will be considered for data collection. We will also examine the reference lists of existing systematic reviews on similar topics to identify other relevant articles. In addition, the personnel files of the workgroup members will be checked and experts in the field of suicide will be consulted regarding relevant publications.

**Search Strategy**

The search strategy will be performed using relevant subject headings and search syntax appropriate to each database, including variations and combinations of free-text terms and Medical Subject Headings (MeSH) terms, combining with appropriate Boolean operators: suicide, suicide attempt, non-fatal suicide attempt, suicidal behaviour, prevention, intervention, brief contact intervention, contact, follow-up, brief intervention, synchronous, remote, non-presential, non-face-to-face, distance, digital, online, technology, telemedicine, teleconsultation, telecommunication, teleassistance, telehealth, eHealth, mHealth, telephone, phone call, hotline, helpline, suicide line, crisis line phone, chat centre, web chat, video chat, videoconference, App, text messaging, instant message, SMS, efficacy, effectiveness, patient discharged, clinical trial, randomized controlled trial.

The search is planned to be from April 15th 2022 to April 20th 2022. All searches will be re-run close to publication if the initial search date is greater than 12 months. The search will be limited to English or Spanish language, performed with no restrictions on the publication period.

The search strategy was developed by the research team in collaboration with an experienced health science librarian (GC) adhering to the Peer Review of Electronic Search Strategies (PRESS) [45]. Sensitivity and precision criteria were considered; however, sensitivity was prioritised.
Study Records

Data management

Results from the literature search will be imported into Rayyan Systems Inc. [46], an Internet based software programme that facilitates collaboration and pursuit accelerated screening process. During the review process, other tools will be used to identify duplicate records and to extract or manage data, Mendeley (version 1.19.8) will be employed as a reference management software.

Selection process

The literature search will be conducted by two reviewers (LC and MPJ) according to the eligibility criteria. After identifying studies from database searching and additional sources, duplicate records will be removed automatically. Eligibility of the studies will be conducted independently and in duplicate by two authors (LC and MPJ) and will be based on the titles, abstracts, and keywords captured by the search. If necessary, a third reviewer (AS) will be requested to review the selection process. Articles selected for full-text screening will be assessed independently by two reviewers (LC and MPJ). If both reviewers determine that an article does not meet the inclusion criteria, it will be excluded. The reasons for excluding trials will be recorded. Interrater agreement will be calculated by Cohen's Kappa and after any disagreements will be consulted, discussed, and resolved with a third blind review (AC or DJP). The consultant will be chosen based on the expertise in the area in which the divergence emerged. The article selection process will be described in a PRISMA flow diagram [47].

Data collection process

Data extraction will be conducted independently by two authors (LC and MPJ), using a standard extraction form in line with the template from The Cochrane Collaboration [48]. Data will be managed using Microsoft Excel (16.56 version). Disagreements will be resolved by consensus, and unresolved disagreements will be adjudicated by a third reviewer (AS). For missing information or data that needs to be clarified, first or corresponding authors of primary studies will be contacted by email; one follow-up email will be sent if no response is received to the first email. To ensure consistency across reviewers, calibration exercises will be conducted before starting the review.

Data Items

Data will be extracted from the following categories (see Table 1): (a) participants, (b) interventions, (c) comparison, (d) outcomes, and (e) study design. Data expected to be extracted may include: (i) title; (ii) author(s); (iii) date of publication; (iv) setting and geographic location; (v) study design and methodology; (vi) sample size; (vii) participant sociodemographic and baseline characteristics; (viii) intervention and control group details; (ix) outcomes; (x) assessment measures; (xi) follow-up period; (xii) moderators (i.e., type of treatment, duration of treatment, modality of treatment, treatment engagement); (xiii) effect of the interventions on suicidal behaviours; (xiv) limitations (i.e., selection bias, response bias, information bias, limitations reported by study authors); (xv) recommendations.
Table 1
Data extraction and risk of bias evaluation

<table>
<thead>
<tr>
<th>Characteristics of included studies</th>
<th>Data</th>
<th>Risk of bias</th>
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<tbody>
<tr>
<td>Description</td>
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<td>Intervention</td>
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<td>Authors</td>
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[Include approximately here Table 1]

Risk Of Bias Of Individual Studies

The risk of bias assessment will be conducted independently by two reviewers (LC and MPJ), employing the Cochrane risk-of-bias tool for randomised trials (RoB II) [49], and the Cochrane risk-of-bias tool for non-randomized studies (RoB I) [50]. RoB II will consider the following domains: random sequence generation, allocation of concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data (e.g., dropouts and withdrawals), selective reporting, and other sources of bias. RoB I will consider: bias due to confounding, bias in selection of participants into the study, bias in classification of interventions, bias due to deviations from intended interventions, bias due to missing data, bias in measurement of outcomes, bias in selection of the reported result, and overall bias.

Disagreements will be resolved by consensus with a third blind reviewer (AS). Ratings of bias for each study will be classified as low, high, or unclear risk of bias, according to standardised methodology. Intra-methodological quality evaluation will be synthesised in tables that will comprise the summary of each study individually, identifying their risk of bias. We expect to retain studies of any level of risk of bias.

Meta-bias
Publication bias will be evaluated using Egger's test \([51]\) and funnel plots \([52]\), if \(\geq 10\) studies are available. To determine whether selective reporting bias is present, reviewers will compare outcomes reported in the published article with the protocol, if this last is available. Comparing the outcomes reported in the methods, results, and supplementary material sections of the published report is an option when a protocol is unavailable.

**Data Synthesis**

A narrative (systematic review) and quantitative (meta-analysis) synthesis are planned, with no minimum number of studies required for data synthesis. Eligible studies will be reported using a previous classification by type of intervention, according to a process of (a) description of the intervention strategies adopted by each study, and (b) categorization of interventions by type.

To collect and summarise all empirical evidence that fits the eligibility criteria, a systematic review will be conducted. A descriptive summary and explanation of the characteristics and findings of all included studies will be displayed in a comprehensive table. If meta-analysis is deemed appropriate, it will be conducted. A pairwise meta-analysis will be computed when an outcome is reported in at least three studies. Heterogeneity will be quantified using the \(I^2\) statistic. The choice of random-effects model will be based on clinical and methodological diversity across the included studies. According to the GRADE handbook \([53]\), if \(I^2 > 50\%\) a random effects model will be performed, in case of \(I^2 < 50\%\) a fixed effect model will be conducted.

Each outcome will be combined and calculated using the statistical software RevMan 5.4.1 \([54]\). Statistically significant results will be interpreted regarding the clinical significance of each scale, using T-scores if these are available for all scales. Dichotomous data will be presented by relative risk (RR), with 95% confidence intervals (95% CI). Continuous data will be presented through the standardised mean difference (SMD) Hedge's \(g\), with 95% confidence intervals (95% CI). Statistical significance will be indicated by a \(p < .05\). Results will be presented for each comparison as forest plots when appropriate.

If heterogeneity is substantial, we will not perform a meta-analysis; a narrative synthesis will be provided, with information presented in text and tables to summarise and explain the characteristics and findings of the included studies. A narrative synthesis of remaining outcome variables not used in the meta-analysis will be performed. Special issues in the analysis of studies with multiple treatment groups will be addressed. When a study has more than two treatment groups, the additional treatment arms will be presented; where the additional treatment arms are not relevant, they will not be considered.

**Sensitivity analysis**

A heterogeneity with \(I^2 > 50\%\) will be investigated through sensitivity analysis, exploring the impact on the overall treatment effects of inclusion trials with different methodological quality.

**Analysis of subgroups or subsets**

Subgroup and subsets analyses will be carried out if feasible and warranted, to examine potential effects modifiers based on sociodemographic characteristics of participants, length, and type of treatment. Meta-regression will be performed to analyse potential effect modifiers or covariates that might influence the size of intervention effect (e.g., patient age, gender). We plan to summarise and categorise the below subgroups or subsets analyses.

1. Patient age: adolescents (12 to 17 years of age), adults (18 to 65 years of age), and older adults (over 65 years of age).
2. Patient gender: male, female, and non-binary (this last category only if the studies report sufficient sample).
3. Type of interventions: telephone-based interventions through telephone follow-up or active contact employing hotlines.
4. Number of follow-up contacts: hotline (24-hour consultation with non-standardized number of follow-up contacts), 1–3 contacts, 3–6 contacts, and more than 6 contacts.
5. Follow-up contact period: hotlines (24-hour consultation with non-standardized period of follow-up contacts), up to 1 month follow-up, 1–3-month follow-up, 3–6 month follow-up, and longer than 6 month follow-up.

6. Multi-component intervention: remote communication via synchronous technologies as the main intervention or as a supplementary intervention.

The feasibility of undertaking these analyses will depend upon the number, quality, and heterogeneity of included studies. For the sake of transparency, a detailed description of the subgroups and subsets will be recorded and reported in the resulting publication.

Confidence In Cumulative Evidence

The quality of evidence for the primary outcomes will be evaluated according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) [55] by two independent researchers (LC and MPJ). Discrepancies will be resolved in a discussion with a third researcher (AS). Dimensions of the GRADE rating will be risk of bias, consistency, directness, precision, and publication bias.

Discussion

Suicidal ideation is a highly prevalent phenomenon [56]. Considering that many individuals with suicide ideation and prior suicide attempts will transit to suicidal behaviour [9], effective prevention options are required. There is some emerging evidence that telematic suicide prevention might be effective in reducing suicidal ideation and behaviours [20, 23, 26–28]. The present protocol outlines the methods of a planned research that will extend knowledge derived from the current available evidence. The wide variety of documented suicide prevention interventions and the current lack of guidance on their implementation warrants further investigation to improve and standardise patient care. The absence of consensus demonstrates that more knowledge is required in this area to address the needs of high-risk patients.

To the best of the researchers’ knowledge, no systematic review and meta-analysis has been reported that examined the efficacy of synchronous and remote telepsychiatry interventions, assessing suicide-specific outcomes. We aim to address a gap in research by examining the efficacy of synchronous remote-based interventions that are specifically designed for suicide prevention. The proposed approach is pertinent given the recent increase in the development and usage of technology communication devices for this purpose [19]. Specifically, we aim to identify and report on suicide prevention interventions delivered via telephone, text messaging, videoconferencing, and other synchronous communication-based distance technological devices.

It has been anticipated that the systematic review has predicted limitations that should be considered. The inconsistency of terms used in suicidology is a limiting factor regarding the search for articles and the subsequent eligibility of studies. Furthermore, the availability and quality of data on suicide and suicide attempts is probably insufficient at the global level. Differences between countries regarding patterns, rates, characteristics of suicides, and methods, highlight the need to improve data completeness and quality. In addition, suicide is a rare event, making the design of studies with high statistical power particularly challenging. Furthermore, people who attempt suicide are typified by poor treatment-seeking and limited adherence to treatment [57], making it important to provide individuals at risk of suicide with appropriate and cost-effectiveness treatment options.

A limited number of available studies is expected; this explains why the search strategy has prioritised sensitivity over specificity. Moreover, randomised controlled trials (RCT) may not provide sufficient evidence to exclude data from non-randomised studies. Including studies examining a broad range of remote-communication synchronous technologies as opposed to specific intervention intends to address this. Similarly, including no restriction on the mental health condition should allow for the collection of comprehensive and relevant data. Research studies that meet eligibility criteria may have
a substantial degree of heterogeneity, occasionally involving brief interventions that are not standardised in content or frequency. It is advisable to exercise caution in assessing results and making clinical decisions. In response, we initially planned subgroups and subsets analyses. However, the categorisation of interventions into different typologies may be difficult since multiple research studies combine several interventions simultaneously.

Aside from several limitations, there are potential strengths. The objective is contributed to the body of evidence on suicide. We pretend to provide recommendations to address this major public health problem based on the current available evidence. The expected results will provide guidance for further research, valuable information to healthcare professionals, and support the standardization of practice and policy in relation to the use of synchronous communication-based distance technological devices in suicide prevention, contributing to globally suicide prevention efforts, helping to prevent the chronification of suicidal ideation, transition to suicide attempts, and premature deaths by suicide.

The current registration of the protocol for this review at PROSPERO may undergo changes, approved by all authors. Any changes to the protocol will be described and explained in the final manuscript.

Abbreviations

C-SSRS: Columbia Suicide Severity Rating Scale; CI: Confidence interval; GRADE: Grading of Recommendations, Assessment, Development, and Evaluation; I²: Index of heterogeneity; ICTs: Information and Communication Technologies; MEDLINE: Medical Literature Analysis and Retrieval System Online; MesH: Medical Subject Headings; PICO: Population, Intervention, Comparator, and Outcomes; PRESS: Peer Review of Electronic Search Strategies; PRISMA-P: Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols; PRISMA: Preferred Reporting Items for Systematic Review and Meta-Analysis; PROSPERO: International Prospective Register of Systematic Reviews; RCTs: Randomized clinical trials; RoB I: Cochrane risk-of-bias tool for non-randomized studies; RoB II: Cochrane risk-of-bias tool for randomized trials; RoB: Risk of Bias; RR: Relative risk; SMS: Short Message Service.

Declarations

Supplementary Information

Additional file 1. PRISMA-P 2015 Checklist (DOCX 35 KB)

Additional file 2. MEDLINE (PubMed interface) proposed search strategy (DOCX 14 KB)

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Amendments of the protocol
In the event of protocol amendments, the reasons for the amendment will be explicitly described.

Availability of data and materials

We will provide the software employed to carry out the meta-analysis and meta-regressions.

Authors’ contributions

AS is the guarantor. LC, DP, AC, and AS: Writing - Original Draft. LC, AS, MPJ, JPS, and CM: Software. DP, AS, and LC: Project administration, Supervision. All authors: Conceptualization, Methodology, Writing - Review & Editing. AS, JPS, and CM provided statistical expertise. DP and AC provided expertise on suicidal behaviours. All authors approved the final manuscript.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Availability of data and materials

All the technical information of the study described in this protocol (search strategy, data extraction table, data exploitation syntax) will be included as supplementary material in the empirical article of results that will be published at the end of the study.

Competing interests

DP has received grants and served as consultant or advisor for Angelini, Janssen, Lundbeck and Servier. The other authors declare that they have no competing interests.

Authors’ information

1Department of Psychiatry and Forensic Medicine, Faculty of Medicine, Universitat Autònoma de Barcelona. Bellaterra, Cerdanyola del Vallès, Spain. 2Mental Health Service. Hospital Universitari Parc Taulí. Unitat Mixta de Neurociència Translacional I3PT-INc-UAB. Sabadell, Barcelona, Spain. 3Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM). Madrid, Spain. 4Department of Basics, Developmental and Educational Psychology, Faculty of Psychology, Universitat Autònoma de Barcelona. Bellaterra, Cerdanyola del Vallès, Spain. 5Teaching, Research & Innovation Unit, Parc Sanitari Sant Joan de Déu, St. Boi de Llobregat, Spain. 6Department of Clinical and Health Psychology, Faculty of Psychology, Universitat Autònoma de Barcelona. Bellaterra, Cerdanyola del Vallès, Spain. 7Stress and Health Research Group (GIES). Universitat Autònoma de Barcelona. Bellaterra, Cerdanyola del Vallès, Spain.

Additional files

File name: additional file 1

File format: Microsoft Word (.docx)

Title of data: PRISMA-P-15 checklist

File name: additional file 2
References


Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

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