

SAMIT, a randomized controlled trial of a multicomponent intervention for patients after a medically serious suicide attempt: Psychological variables

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Research Article

Keywords: gender differences, medically serious suicide attempts (MSSA), psychotherapeutic intervention, randomized controlled trial (RCT), substance use disorders, suicide prevention

Posted Date: September 20th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10737342/v1>

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Additional Declarations: Competing interest reported. J.A.R.Q. was on the speakers' bureau and/or acted as consultant for Biogen, Idorsia, Casen-Recordati, Johnson&Johnson, Lilly, Novartis, Takeda, Bial, Sincrolab, Neuraxpharm, Novartis, BMS, Medice, Rubió, Uriach, Technofarma and Raffo in the last 3 years. He also received travel awards (air tickets and hotel accomodations) for participating in psychiatric meetings from Biogen, Idorsia, Johnson & Johnson, Lilly, Rubió, Takeda, Bial and Medice. The Department of Psychiatry, chaired by him, received unrestricted educational and research support from the following companies over the last three years: Exeltis, Idorsia, Casen-Recordati, Takeda, Neuraxpharm, Oryzon, Roche, Probitas and Rubió. Johnson&Johnson. The other authors declare no competing interest.

Abstract

Background

Suicide attempt survivors have higher risk of reattempt in the weeks following hospitalization, yet evidence-based psychological interventions targeting this acute phase remain scarce. The Suicide Attempt Multi-Component Intervention Treatment (SAMIT) was designed to intervene immediately after hospitalization for a medically serious suicide attempt (MSSA). This study aims to evaluate the effect of SAMIT on psychopathological symptoms related to suicidal behaviour.

Methods

We conducted a randomized controlled trial involving patients hospitalized after an MSSA at two tertiary hospitals in Barcelona. Participants were assigned to an eight-session psychological intervention (SAMIT) or treatment-as-usual. Of 189 patients assessed for eligibility, 75 were randomized, and 54 completed the study. Outcomes were self-reported affective symptoms, suicidality-related measures, and impulsivity. Treatment effects were estimated with linear mixed-effects models on an intention-to-treat basis.

Results

Results showed significant differences in the SAMIT group, observing a decrease of depression symptomatology (β , -2.80; 95% CI -4.93 to -0.68; p = 0.011), psychache (β , -9.01; 95% CI -15.95 to -2.08; p = 0.012) and motor impulsivity (β , -2.79; 95% CI -5.36 to -0.23; p = 0.034). In all cases, participants who received SAMIT treatment showed a decrease in symptom scores. In exploratory subgroup analyses, women showed better responses to SAMIT than men, while in patients with comorbid substance use disorders only depressive symptoms improved significantly.

Conclusions

These findings highlight the importance of psychotherapeutic interventions in patients with MSSA during hospitalization or recent hospital discharge period, as they may help reduce psychological symptom severity. Future research should replicate these results in larger samples, explore longer-term trajectories of clinical responses, and examine personalized intervention approaches.

Trial registration

The trial was prospectively registered on the U.S. National Institutes of Health ClinicalTrials.gov registry NCT06238414 (<https://clinicaltrials.gov/study/NCT06238414>). Date of registration November 20th, 2023.

Background

Suicide is one of the leading causes of death worldwide and has become a first-order public health concern, with 727,000 deaths every year [1]. Death by suicide remains a major clinical challenge [2], and intervention and prevention programs are crucial for decreasing suicide risk, suicide attempts (SAs), and suicide-related mortality. Differences by gender are relevant, with suicide deaths rates being twice as high in men compared to women, and this ratio is wider in high-income countries (3.2:1) [1]. The leading risk factor for a suicide attempt is having one or more prior attempts, and it is estimated that 40% of individuals who die by suicide have a history of SAs [3]. The first year after the attempt is the most significant period of risk [4, 5, 6, 7], and a recent, robust meta-analysis conducted with 248,829 participants stressed that one in five people with history of SA will engage in another suicide attempt later in life [8].

A medically serious suicide attempt (MSSA) is defined by Beautrais [9, 10] as a SA that involves hospitalization for more than 24 hours and requires treatment by specialized medical units, surgery under general anesthesia, extensive medical treatment, or the use of a highly lethal method [9, 11]. MSSA research holds clinical relevance, as these patients are phenotypically closer to those who die by suicide, making them an important group of study [3, 12, 13, 14]. Corbé et al. [3] found, in the most extensive study focused on MSSAs ($N = 81,959$), that individuals with MSSAs are older, have a history of SAs, and make more lethal attempts than those who have never had an MSSA. The prevalence of diagnosis of MSSAs is related to affective disorders (i.e., depression or bipolar disorders), personality disorders, and substance use disorders (SUD), while non-affective psychosis is more frequent in those who die by suicide [3, 10, 15, 16].

Psychological interventions for suicidal behaviour are crucial for patients who have experienced SAs or have made an MSSA. Many patients continue to exhibit symptomatology such as anxiety, depressive symptoms, impulsivity, or hopelessness even after receiving pharmacological treatment [17, 18]. As a result, pharmacological interventions alone may not be sufficient to treat suicidal behaviour and the underlying causes that contributed to it. The most prescribed pharmacotherapy is antidepressants, including Selective Serotonin Reuptake Inhibitors (SSRIs), antipsychotics, and emerging options like glutamatergic antidepressants that show promising results [17, 19].

Effective psychological interventions for suicidality are available [20, 21, 22], but many patients do not receive them due to implementation efforts that are often time-limited and unsystematic [2]. However, few studies examine the effects of early psychotherapy intervention in people who have attempted suicide [20], and even fewer focus on those who have made an MSSA [21].

Research indicates that psychological treatments can be effective for addressing suicidal behaviour, with psychotherapy shown to reduce suicidal ideation and attempts [22, 23, 24]. Different approaches such as cognitive behavioural therapy (CBT), dialectical behavioural therapy (DBT), mentalization-based treatment (MBT), problem-solving therapy, and intensive outpatient care, have demonstrated positive outcomes [18, 25]; however, these approaches have received insufficient support from randomized controlled trials (RCTs) or meta-analyses.

Psychological Factors for Suicide

Suicidal behaviour is associated with various risk factors, many of which are well-documented in clinical assessments of psychopathology, such as suicidal ideation, depressive symptoms, anxiety symptoms, impulsivity, and substance use [26, 27]. One emerging factor that recently garnered attention is psychache (an unbearable and intolerable mental state characterized by an internal experience of negative emotions) [28, 29, 30], which has been consistently established as a strong predictor of suicidal ideation and behavior. High levels of emotional suffering are closely linked to increased suicide risk [28]. Additionally, exposure to severe trauma significantly raises the likelihood of suicidal behaviour by causing emotional dysregulation, which is closely linked to impulsivity, and a well-established vulnerability factor for suicidal behaviour [31]. Adults with such traumatic histories are two to three times more likely to attempt suicide compared to those without trauma history [32, 33, 34]. These adverse experiences may lead to long-term neurodevelopmental and neurobiological disruptions, further exacerbating the risk of suicide in adulthood [32, 35, 36]. Attachment theory also offers a valuable framework for understanding vulnerability to suicide. Bowlby [37], described attachment as the emotional bond formed in early life, noting that insecure attachment styles (fearful, preoccupied, dismissing) are linked to suicidal behaviour [38, 39]. Specifically, Levi-Belz et al. [40] suggested that the psychological mechanisms underlying MSSAs involve high levels of psychache, aggravated by insecure attachment patterns and interpersonal difficulties.

A further critical gap is that little research has centered on gender differences in response to suicide preventive interventions [41]. A systematic review of RCTs was performed [42], and it was evidenced that only 18% of the studies examined gender differences in subgroups. When differences were reported, psychosocial interventions tended to be more effective for women [42]. Another matter of concern is comorbid SUDs, which are commonly associated with patients who have attempted suicide and have been hospitalized after a SA [43, 44, 45].

Based on this framework, we carried out the first RCT focused on MSSA, and we hypothesized that the SAMIT program, designed for individuals following an MSSA, could reduce further psychopathological symptoms (i.e., depression, anxiety, psychache, impulsivity, etc). Thus, the primary aim of this study is to evaluate the effectiveness of SAMIT [21], a structured psychotherapy intervention consisting of eight sessions, integrating MBT, DBT, and narrative therapy, in reducing psychopathological symptoms related to suicidal behavior. Secondary objectives are to analyse gender differences and comorbid SUD status, as both are known as suicide risk factors, and how they can influence treatment response. In this study, we will assess the impact on psychological variables and compare the effect of treatment in both groups in patients who have recently experienced an MSSA and are receiving early psychological intervention.

Methods

Design

This two-arm, parallel-group randomized controlled trial aimed to evaluate the effectiveness of a multicomponent psychological intervention for patients hospitalized after an MSSA. The study was funded by La Marató de TV3 Foundation (grant 202208-30-31) and conducted at *Vall d'Hebron University Hospital* and *Hospital Clínic*, both in Barcelona (Catalonia, Spain). The detailed study protocol has been published [21]. The trial registration (NCT06238414) covers the full project; the present report is restricted to the pre–post psychological measures, and the remaining primary and secondary outcomes (i.e., biological variables and follow-up assessments) will be reported separately. After completing a baseline assessment, participants were randomly allocated to one of two treatment groups, with outcomes assessed before and after the intervention period.

Participants

The inclusion criteria for the study were patients older than 16 years who were hospitalized 24 hours or more after an MSSA and required specialized care units, surgical treatment, or extensive medical treatment and observation (gastric lavage, activated charcoal, observation of neurological tests or other complementary tests), or were patients who had an MSSA with highly lethal methods (precipitation, hanging, firearm, or stabbing), regardless of the treatment unit [10]. The exclusion criteria comprised patients with SAs who were discharged in less than 24 hours, patients under 16 years of age, those with mild to severe cognitive impairment (i.e., scoring ≤ 16 on MOCA screening), patients unable to provide informed consent, critically ill patients at the time of assessment, individuals with a psychiatric or neurological disorder that hinders therapeutic commitment, and patients who did not speak Catalan, Spanish, or English. Participants were recruited between December 2023 and February 2026.

Measures

Outcome measures included depressive symptoms (Hospital Anxiety and Depression Scale - Depression subscale, HADS-D) [46, 47], anxiety (Hospital Anxiety and Depression Scale - Anxiety Subscale, HADS-A) [46, 47], hopelessness (Beck Hopelessness Scale, BHS) [48], suicidal ideation (Scale for Suicide Ideation, SSI) [49, 50], psychache (Psychache Scale, PSE) [29, 30], impulsivity (Barratt Impulsiveness Scale-11, BIS-11) [51, 52], and quality of life (QoL scale) [53]. A full description of the measures is provided in the published trial protocol [21].

Intervention and treatment

The SAMIT intervention was designed considering the main principles of the psychotherapy integration framework [54], including therapeutic aspects proven to be effective in suicidal patients [55] but also considered the clinical severity of the target population and the specific characteristics of the intervention context. One priority was placed on integrating

evidence-based approaches from the suicide prevention field and adapting them to the needs of individuals with MSSA during hospitalization and after discharge.

The intervention group received eight 60-minute sessions of psychological intervention (SAMIT), delivered at a frequency of two sessions per week over approximately four weeks, while the control group received treatment as usual (TAU) (eFigure 1, Supplement S1). The intervention consists of a narrative interview adapted from the ASSIP program (session 1) [56], where participants are asked to explain the activating event and how they reached the point of SA. In the second session, psychoeducational and introductory concepts of MBT are explained (session 2) [57]. The next session focuses on emotional regulation from MBT framework (session 3). In the fourth session, a functional analysis of the SA by the MBT framework is performed (session 4). Emotional regulation and techniques from DBT are introduced in the fifth session (session 5) [58]. The objective of the sixth session is to assess and introduce attachment and relationships concepts related specifically to the SA, and loss of mentalization capacity (session 6). Then, the conceptualization of suicide, attachment and mentalization from MBT perspective is done (session 7). Finally, a crisis and safety plan from a MBT conceptualization concludes the treatment (session 8) [21].

All patients from the TAU group were seen by a consultation-liaison psychiatrist, and 69.23% of them had at least one contact with the psychology service during hospital admission or at discharge, although this care was not standardized across sites, reflecting a naturalistic clinical practice. Randomization was computer-generated via Research Electronic Data Capture (REDCap) [59] to allocate participants to SAMIT ($n = 37$) or TAU ($n = 38$). Randomization was performed by an investigator not involved in outcome assessment. Assessments were administered via email using the REDCap [59] platform or in person at the outpatient hospital unit. Allocation was concealed and outcome assessors were blinded. Full details of the protocol and statistical analysis plan are reported elsewhere [21] according to the Consolidated Standards of Reporting Trials (CONSORT) 2025 guidelines.

Statistical Analyses

Descriptive analyses were performed for all variables. Categorical variables are shown as frequencies (total number and percentage in parentheses) and the exact 95% confidence intervals. For continuous variables, the mean and standard deviation [mean (SD)], the 95% confidence interval for the mean, and the median and interquartile range [median (IQR)] were calculated.

For categorical variables, differences between groups were performed using the Pearson Chi-square test. In cases where the expected frequency in a cell was < 5 , Fisher's exact test was performed instead. For the continuous variables, given the sample size ($N = 75$) and to ensure a consistent analytical approach across variables, non-parametric tests were used to compare the different categories of the variables of interest between groups. Statistical significance of differences between groups (SAMIT *versus* TAU) and between baseline- and post-treatment time points was assessed accordingly; specifically, when the outcome variable was quantitative, the Mann-Whitney U test (unpaired comparisons) and Wilcoxon signed-rank test (paired comparisons) were applied.

In addition, to explicitly account for repeated measurements within participants, linear mixed-effects (LME) models were fitted for each outcome (e.g., HADS-A anxiety score). Groups, visits, and their interaction were included as fixed-effects, while the patients were included as a random-effect to account for the non-independence of repeated measurements within individuals. The model can be expressed in vector-matrix notation as:

$$\mathbf{y} = \mathbf{X}\boldsymbol{\beta} + \mathbf{Z}\mathbf{u} + \boldsymbol{\varepsilon}$$

where $\mathbf{y}$ is the vector of outcome observations, $\mathbf{X}$ is the fixed-effects design matrix, $\boldsymbol{\beta}$ is the vector of fixed-effects coefficients, $\mathbf{Z}$ is the random-effects design matrix, $\mathbf{u}$ is the vector of random effects, and $\boldsymbol{\varepsilon}$ is the vector of residual errors. All

randomized participants were included in the LME models (intention-to-treat, $n = 75$), which use all available observations under a missing-at-random assumption; paired within-group tests include only participants with both assessments.

All statistical significance was set at $p < 0.05$. All analyses were performed in R (version 4.6.1) [60], and the LME models were implemented using the *nlme* package [61].

Deviations from the Registered Trial Protocol

One participant randomized to TAU had exhausted available therapeutic options and was offered compassionate treatment following a joint clinical and research decision; therefore, sensitivity analyses were performed according to the treatment received (as-treated) (Supplement S2).

In addition, unplanned interim analyses were performed within the framework of project funding requirements to allow the presentation of preliminary findings at the IASR/AFSP International Summit on Suicide Research. The trial registration was subsequently updated in ClinicalTrials.gov.

Declarations of Generative AI and AI-assisted technologies

During the preparation of this work the authors used Claude (Anthropic) in order to improve the readability and language of the manuscript. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Results

A total of 189 patients with MSSA were identified, and among them, 75 were randomized and 54 finished the treatment (SAMIT or TAU) (see Fig. 1). Retention rate from randomization to completion was 72.0% (54/75; 28.0% attrition), and 65.1% from consent to completion (54/83). The number of dropouts did not differ significantly between groups (SAMIT: 10 of 37; TAU: 11 of 38; Fisher’s exact test $p = 1.000$).

*****Figure 1*****

The acceptability rating was evaluated using an eight-item self-reported questionnaire. Seven of these items employed a 10-point Likert scale ranging from 0 to 10, assessing satisfaction with various aspects of treatment (duration, utility, strategies or crisis plan, etc.). The eighth item was dichotomous (yes/no), assessing the decreased risk of suicide ideation or a future SA after treatment. Mean scores were calculated to determine overall acceptability of the treatment. SAMIT showed high acceptability, with a mean satisfaction score of 9.23 out of 10 across treatment components, and 95.5% of participants reporting a perceived reduction in suicidal ideation following the intervention (eFigures 2 and 3, in Supplement S1).

Sociodemographic and Clinical Data

At baseline, no significant differences were observed between the two groups in terms of sociodemographic and clinical characteristics. The sample ($N = 75$) was balanced by gender (44% women) with a mean age of 39.9 years ($SD = 17.6$) (see Table 1). The most common diagnoses were affective disorders (22.7%), and personality disorders (22.7%), and half of the patients had a comorbid SUD (54.7%). The predominant method of suicide was deliberate self-poisoning (72%) while a smaller percentage used precipitation (20%). The majority of MSSA were not planned (76%). Most patients (89.3%) received psychopharmacological treatment during either the SAMIT or TAU treatment, with no significant differences noted between the groups regarding the use of antidepressants, anxiolytics, antipsychotics, or mood stabilizers (see Table 1).

Table 1
Baseline demographic and clinical characteristics of study participants

Variable	Total Sample (n = 75)	TAU (n = 38)	SAMIT intervention (n = 37)	P value
Demographic and clinical characteristics of the sample				
Gender (No, %)¹				0.551⁴
Women	33 (44%) CI [32.5; 55.9]	18 (47.4%) CI [31; 64.2]	15 (40.5%) CI [24.8; 57.9]	
Men	42 (56%) CI [44.1; 67.5]	20 (52.6%) CI [35.8; 69]	22 (59.5%) CI [42.1; 75.2]	
Age (mean, SD)²	39.9 (17.6) CI [35.9; 44]	39.2 (17.1) CI [33.5; 44.8]	40.7 (18.3) CI [34.6; 46.8]	0.712
Years of education (mean, SD)²	12 (3.4) CI [11.3; 12.8]	11.7 (2.6) CI [10.9; 12.6]	12.4 (4) CI [11; 13.7]	0.436
Hospital (No, %)¹				0.742⁴
Vall d'Hebron	46 (61.3%) CI [49.4; 72.4]	24 (63.2%) CI [46; 78.2]	22 (59.5%) CI [42.1; 75.2]	
Hospital Clínic	29 (38.7%) CI [27.6; 50.6]	14 (36.8%) CI [21.8; 54]	15 (40.5%) CI [24.8; 57.9]	
Economic difficulties (No, %)¹	38 (50.7%) CI [38.9; 62.4]	19 (50%) CI [33.4; 66.6]	19 (51.4%) CI [34.4; 68.1]	0.907⁴
Civil status (No, %)¹				0.906³
Single	39 (52%) CI [40.2; 63.7]	20 (52.6%) CI [35.8; 69]	19 (51.4%) CI [34.4; 68.1]	
Married/Stable partner	21 (28%) CI [18.2; 39.6]	10 (26.3%) CI [13.4; 43.1]	11 (29.7%) CI [15.9; 47]	
Separated/divorced	13 (17.3%) CI [9.6; 27.8]	7 (18.4%) CI [7.7; 34.3]	6 (16.2%) CI [6.2; 32]	
Widowed	2 (2.7%) CI [0.3; 9.3]	1 (2.6%) CI [0.1; 13.8]	1 (2.7%) CI [0.1; 14.2]	
Trauma history (No, %)¹	47 (62.7%) CI [50.7; 73.6]	25 (65.8%) CI [48.6; 80.4]	22 (59.5%) CI [42.1; 75.2]	0.571⁴
Primary diagnosis category (No, %)¹				0.892³

Variable	Total Sample (n = 75)	TAU (n = 38)	SAMIT intervention (n = 37)	P value
Demographic and clinical characteristics of the sample				
Gender (No, %)¹				0.551⁴
Neurodevelopmental disorders	9 (12%) CI [5.6; 21.6]	5 (13.2%) CI [4.4; 28.1]	4 (10.8%) CI [3; 25.4]	
Schizophrenia spectrum and other psychotic disorders	6 (8%) CI [3; 16.6]	3 (7.9%) CI [1.7; 21.4]	3 (8.1%) CI [1.7; 21.9]	
Bipolar and related disorders	4 (5.3%) CI [1.5; 13.1]	3 (7.9%) CI [1.7; 21.4]	1 (2.7%) CI [0.1; 14.2]	
Depressive disorders	13 (17.3%) CI [9.6; 27.8]	6 (15.8%) CI [6; 31.3]	7 (18.9%) CI [8; 35.2]	
Anxiety disorders	1 (1.3%) CI [0; 7.2]	0 (0%) CI [0; 9.3]	1 (2.7%) CI [0.1; 14.2]	
Obsessive-Compulsive and related disorders	1 (1.3%) CI [0; 7.2]	0 (0%) CI [0; 9.3]	1 (2.7%) CI [0.1; 14.2]	
Trauma- and stressor-related disorders	7 (9.3%) CI [3.8; 18.3]	4 (10.5%) CI [2.9; 24.8]	3 (8.1%) CI [1.7; 21.9]	
Feeding and eating disorders	1 (1.3%) CI [0; 7.2]	0 (0%) CI [0; 9.3]	1 (2.7%) CI [0.1; 14.2]	
Substance-related and addictive disorders	9 (12%) CI [5.6; 21.6]	5 (13.2%) CI [4.4; 28.1]	4 (10.8%) CI [3; 25.4]	
Personality disorders	17 (22.7%) CI [13.8; 33.8]	7 (18.4%) CI [7.7; 34.3]	10 (27%) CI [13.8; 44.1]	
Without diagnosis	7 (9.3%) CI [3.8; 18.3]	5 (13.2%) CI [4.4; 28.1]	2 (5.4%) CI [0.7; 18.2]	
Psychopharmacology (No, %)¹	67 (89.3%) CI [80.1; 95.3]	34 (89.5%) CI [75.2; 97.1]	33 (89.2%) CI [74.6; 97]	
Antidepressant	51 (68%) CI [56.2; 78.3]	28 (73.7%) CI [56.9; 86.6]	23 (62.2%) CI [44.8; 77.5]	0.285⁴
Anxiolytic	42 (56%) CI [44.1; 67.5]	20 (52.6%) CI [35.8; 69]	22 (59.5%) CI [42.1; 75.2]	0.551⁴
Antipsychotic	44 (58.7%) CI [46.7; 69.9]	22 (57.9%) CI [40.8; 73.7]	22 (59.5%) CI [42.1; 75.2]	0.891⁴

Variable	Total Sample (n = 75)	TAU (n = 38)	SAMIT intervention (n = 37)	P value
Demographic and clinical characteristics of the sample				
Gender (No, %)¹				0.551⁴
Stabilizer	28 (37.3%) CI [26.4; 49.3]	15 (39.5%) CI [24; 56.6]	13 (35.1%) CI [20.2; 52.5]	0.698⁴
Comorbid Substance Use (No, %)¹	41 (54.7%) CI [42.7; 66.2]	23 (60.5%) CI [43.4; 76]	18 (48.6%) CI [31.9; 65.6]	0.302⁴
Suicidal Behaviour				
Previous SA (No, %)¹	44 (58.7%) CI [46.7; 69.9]	23 (60.5%) CI [43.4; 76]	21 (56.8%) CI [39.5; 72.9]	0.744⁴
Number of previous SA (No, %)¹				0.668³
0	31 (41.3%) CI [30.1; 53.3]	15 (39.5%) CI [24; 56.6]	16 (43.2%) CI [27.1; 60.5]	
1	10 (13.3%) CI [6.6; 23.2]	6 (15.8%) CI [6; 31.3]	4 (10.8%) CI [3; 25.4]	
2	5 (6.7%) CI [2.2; 14.9]	1 (2.6%) CI [0.1; 13.8]	4 (10.8%) CI [3; 25.4]	
3	7 (9.3%) CI [3.8; 18.3]	4 (10.5%) CI [2.9; 24.8]	3 (8.1%) CI [1.7; 21.9]	
4 or more	22 (29.3%) CI [19.4; 41]	12 (31.6%) CI [17.5; 48.7]	10 (27%) CI [13.8; 44.1]	
Stressors related to SA (No, %)¹	50 (67.6%) CI [55.7; 78]	23 (60.5%) CI [43.4; 76]	27 (75%) CI [57.8; 87.9]	0.184⁴
Method SA (No, %)¹				0.747³
Self-poisoning	54 (72%) CI [60.4; 81.8]	28 (73.7%) CI [56.9; 86.6]	26 (70.3%) CI [53; 84.1]	
Precipitation	15 (20%) CI [11.6; 30.8]	8 (21.1%) CI [9.6; 37.3]	7 (18.9%) CI [8; 35.2]	
Hanging	2 (2.7%) CI [0.3; 9.3]	0 (0%) CI [0; 9.3]	2 (5.4%) CI [0.7; 18.2]	
Cutting	2 (2.7%) CI [0.3; 9.3]	1 (2.6%) CI [0.1; 13.8]	1 (2.7%) CI [0.1; 14.2]	

Variable	Total Sample (n = 75)	TAU (n = 38)	SAMIT intervention (n = 37)	P value
Demographic and clinical characteristics of the sample				
Gender (No, %)¹				0.551⁴
Weapon	1 (1.3%) CI [0; 7.2]	0 (0%) CI [0; 9.3]	1 (2.7%) CI [0.1; 14.2]	
Others	1 (1.3%) CI [0; 7.2]	1 (2.6%) CI [0.1; 13.8]	0 (0%) CI [0; 9.5]	
Planning or impulsive SA (No, %)¹				0.948⁴
Planning	18 (24%) CI [14.9; 35.3]	9 (23.7%) CI [11.4; 40.2]	9 (24.3%) CI [11.8; 41.2]	
Impulsive	57 (76%) CI [64.7; 85.1]	29 (76.3%) CI [59.8; 88.6]	28 (75.7%) CI [58.8; 88.2]	

*****Table 1*****

Differences Between Intervention Conditions and Treatment Effect

Results indicated significant differences pre-post treatment condition in the SAMIT group, showing a reduction in depression symptomatology ($p < 0.001$), hopelessness ($p = 0.041$), suicide ideation ($p = 0.018$), psychache ($p < 0.001$) and motor impulsivity ($p = 0.014$). In contrast, non-significant changes were observed in the TAU group (see Table 2).

Table 2

Psychological differences between groups (Intention-to-Treat analysis) Median [IQR]: median and interquartile range. Baseline vs. final differences within each group were assessed with the Wilcoxon signed-rank test (paired, non-parametric). β and 95% CI: visit $\times$ group interaction coefficient from the linear mixed model (intention-to-treat), which includes all randomized participants with at least one available observation. The n shown within each group column is the number of participants with both baseline and final assessments.

Variable	SAMIT (n = 37 randomized)				TAU (n = 38 randomized)				Mixed model – visit $\times$ group interaction (ITT)		
	n	Baseline Median [IQR]	Final Median [IQR]	p	n	Baseline Median [IQR]	Final Median [IQR]	p	β	95% CI	p
HADS-A (Anxiety)	27	10 [6, 14.5]	9 [5, 14]	0.443	27	11 [8, 13.5]	9 [6.5, 11.5]	0.065	0.59	-1.85–3.04	0.628
HADS-D (Depression)	27	11 [8, 16]	6 [3.5, 10]	< 0.001	27	10 [4.5, 12.5]	8 [6.5, 12]	0.788	-2.80	-4.93 – -0.68	0.011
BHS (Hopelessness)	27	13 [4, 17]	6 [4.5, 11]	0.041	26	12 [3.8, 14]	11 [6, 14]	0.731	-2.36	-4.91–0.20	0.070
SSI (Suicidal ideation)	27	5 [0, 23.5]	4 [0, 13]	0.018	26	10.5 [0.2, 21.8]	11.5 [0, 18.5]	0.916	-5.06	-10.53–0.40	0.069
PSE (Psychache)	27	48 [41, 53]	37 [23, 42.5]	< 0.001	27	47 [38, 56]	42 [37, 57.5]	0.683	-9.01	-15.95 – -2.08	0.012
Total impulsivity (BIS-11)	27	50 [39, 64]	47 [37, 53.5]	0.167	27	57 [46.5, 66]	59 [47.5, 65]	0.781	–	–	–
Cognitive impulsivity	27	19 [13, 21]	16 [12, 19.5]	0.149	27	17 [13, 21.5]	17 [13, 22.5]	0.948	–	–	–
Motor impulsivity	27	17 [13.5, 21]	13 [10.5, 19.5]	0.014	27	20 [15, 25]	20 [15.5, 24]	0.517	-2.79	-5.36 – -0.23	0.034
Non-planning imp.	27	16 [11.5, 22]	16 [13, 20.5]	0.835	27	20 [13.5, 26.5]	17 [13.5, 22.5]	0.216	–	–	–
QoL (Quality of life)	24	58 [36.5, 82.5]	58 [46.5, 80.8]	0.468	22	65 [48, 78.5]	66 [57.2, 74]	0.842	–	–	–

Abbreviations: SAMIT, Suicide Attempt Multicomponent Intervention Treatment (intervention group); TAU, treatment as usual; ITT, intention-to-treat; IQR, interquartile range; CI, confidence interval; HADS-A, Hospital Anxiety and Depression Scale – Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale – Depression subscale; BIS-11, Barratt Impulsivity Scale-11; BHS, Beck Hopelessness Scale; SSI, Scale for Suicide Ideation; PSE, Psychache Scale; QoL, Quality of Life.

After conducting linear mixed models, significant effects of treatment were found for depression (β , -2.80; 95% CI -4.93 to -0.68; p = 0.011), psychache (β , -9.01; 95% CI -15.95 to -2.08; p = 0.012), and motor impulsivity (β , -2.79; 95% CI -5.36 to -0.23; p = 0.034), and with a non-significant trend toward reduced hopelessness (β , -2.36; 95% CI -4.91 to 0.20; p = 0.070) and suicidal ideation (β , -5.06; 95% CI -10.53 to 0.40; p = 0.069). In all cases, participants who received SAMIT treatment showed a decrease in symptom scores (see Table 2).

*****Table 2*****

Gender Differences Analyses

A gender-stratified analysis (men n = 28; women n = 26) revealed differential treatment effects within each intervention group. In the SAMIT group, men showed significant reductions in depressive symptomatology (p < 0.001) and psychache (p

= 0.012), whereas women showed significant reductions in depressive symptomatology ($p = 0.008$), hopelessness ($p = 0.035$), suicidal ideation ($p = 0.002$), and psychache ($p = 0.012$). In the TAU group, men showed significant reductions in anxiety ($p = 0.030$), while no significant changes were observed in women (see Table 3).

Table 3

a. Psychological differences between groups – Men (complete-case analysis) Median [IQR]: median and interquartile range. Baseline vs. final differences within each group were assessed with the Wilcoxon signed-rank test (paired, non-parametric), used due to small subgroup sizes. Exploratory, hypothesis-generating analysis given the reduced statistical power within this subsample.

Variable	SAMIT (n = 16)				TAU (n = 12)			
	n	Baseline Median [IQR]	Final Median [IQR]	p	n	Baseline Median [IQR]	Final Median [IQR]	p
HADS-A (Anxiety)	16	7.5 [4.5, 12.5]	6 [5, 10.5]	0.879	12	11.5 [9, 13.2]	8 [5, 10]	0.030
HADS-D (Depression)	16	9.5 [5.5, 16]	5.5 [3.5, 8.5]	< 0.001	12	9 [4, 11.8]	7 [2.8, 8.5]	0.376
BHS (Hopelessness)	16	7 [2.8, 13.2]	6 [2.8, 9]	0.412	11	10 [2.5, 14]	8 [5, 11.5]	0.578
SSI (Suicidal ideation)	16	1.5 [0, 7]	2 [0, 6]	0.732	11	6 [1.5, 19.5]	7 [1.5, 14]	0.561
PSE (Psychache)	16	45.5 [33.8, 50.5]	33.5 [20.5, 39.2]	0.012	12	44 [29.8, 54.2]	39 [30.5, 44.5]	0.291
Total impulsivity (BIS-11)	16	48 [39, 64.5]	49 [37.8, 59.5]	0.828	12	57.5 [38, 64]	53.5 [40, 63.8]	0.096
Cognitive impulsivity	16	19 [13, 22]	16.5 [12, 21.5]	0.424	12	15.5 [11.5, 20.8]	14 [12.5, 16.2]	0.055
Motor impulsivity	16	16.5 [13.8, 22]	13 [10.8, 21.2]	0.070	12	17 [14.5, 25.2]	20.5 [13.8, 24]	0.634
Non-planning imp.	16	16.5 [11.8, 20]	17 [13.8, 22.2]	0.438	12	22 [13, 28.2]	17 [12, 25.2]	0.136
QoL (Quality of life)	15	67 [40.5, 88.5]	59 [50, 83.5]	0.462	10	57.5 [47.2, 72.8]	68 [58.2, 74]	0.184
Abbreviations: SAMIT, Suicide Attempt Multicomponent Intervention Treatment (intervention group); TAU, treatment as usual; IQR, interquartile range; HADS-A, Hospital Anxiety and Depression Scale – Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale – Depression subscale; BIS-11, Barratt Impulsivity Scale-11; BHS, Beck Hopelessness Scale; SSI, Scale for Suicide Ideation; PSE, Psychache Scale; QoL, Quality of Life.								

Table 3

b. Psychological differences between groups – Women (complete-case analysis) Median [IQR]: median and interquartile range. Baseline vs. final differences within each group were assessed with the Wilcoxon signed-rank test (paired, non-parametric), used due to small subgroup sizes. Exploratory, hypothesis-generating analysis given the reduced statistical power within this subsample.

Variable	SAMIT (n = 11)				TAU (n = 15)			
	n	Baseline Median [IQR]	Final Median [IQR]	p	n	Baseline Median [IQR]	Final Median [IQR]	p
HADS-A (Anxiety)	11	13 [10.5, 17]	12 [8, 14]	0.133	15	10 [8, 13]	11 [8, 12]	0.841
HADS-D (Depression)	11	13 [10, 15]	7 [4.5, 13]	0.008	15	10 [7, 12.5]	11 [8, 12]	0.596
BHS (Hopelessness)	11	16 [11, 18]	8 [5.5, 15]	0.035	15	13 [6.5, 14]	12 [6.5, 16.5]	0.538
SSI (Suicidal ideation)	11	23 [10.5, 25.5]	13 [2, 14]	0.002	15	16 [0.5, 21.5]	17 [0, 22]	0.402
PSE (Psychache)	11	50 [48, 59]	41 [34, 48.5]	0.012	15	54 [41.5, 56]	53 [42, 59]	0.689
Total impulsivity (BIS-11)	11	53 [40, 61.5]	45 [33.5, 48]	0.078	15	53 [47, 66]	60 [52.5, 65.5]	0.258
Cognitive impulsivity	11	19 [14, 19.5]	13 [11.5, 17.5]	0.216	15	20 [15.5, 21.5]	21 [17, 25.5]	0.099
Motor impulsivity	11	17 [12.5, 20]	13 [10.5, 16]	0.146	15	21 [15, 24.5]	20 [18.5, 24]	0.732
Non-planning imp.		15 [12, 22]	14 [8, 18]	0.228	15	19 [15, 20.5]	16 [14, 21]	0.821
QoL (Quality of life)	9	52 [37, 67]	48 [37, 80]	0.898	12	70 [56, 83]	65 [56.2, 72]	0.583
Abbreviations: SAMIT, Suicide Attempt Multicomponent Intervention Treatment (intervention group); TAU, treatment as usual; IQR, interquartile range; HADS-A, Hospital Anxiety and Depression Scale – Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale – Depression subscale; BIS-11, Barratt Impulsivity Scale-11; BHS, Beck Hopelessness Scale; SSI, Scale for Suicide Ideation; PSE, Psychache Scale; QoL, Quality of Life.								

*****Table 3a*****

*****Table 3b*****

SUD's Subgroup Analyses

The SUD and non-SUD groups did not show any differences between treatment conditions in demographic and clinical characteristics (see Table 1). We conducted a subgroup analysis to explore how this subsample responded to each treatment condition. Specifically, within the SAMIT treatment condition, the SUD subgroup showed a significant decrease in clinical depression ($p = 0.008$) and a non-significant reduction in psychache ($p = 0.078$). In contrast, the SUD subsample in the TAU condition showed that levels of hopelessness, suicide ideation and quality of life worsened, although these changes were not statistically significant (see Table 4).

Table 4

Psychological differences between groups – SUD subgroup (complete-case analysis) Median [IQR]: median and interquartile range. Baseline vs. final differences within each group were assessed with the Wilcoxon signed-rank test (paired, non-parametric), used due to small subgroup sizes, restricted to participants with comorbid substance use disorder (SUD). Exploratory, hypothesis-generating analysis given the reduced statistical power within this subsample.

Variable	SAMIT (n = 8)				TAU (n = 11)			
	n	Baseline Median [IQR]	Final Median [IQR]	p	n	Baseline Median [IQR]	Final Median [IQR]	p
HADS-A (Anxiety)	8	7 [5.2, 14.2]	6.5 [5.8, 12.5]	1.000	11	11 [8, 12.5]	8 [4.5, 11]	0.082
HADS-D (Depression)	8	11.5 [8.8, 13.8]	6.5 [5.5, 10]	0.008	11	9 [5, 12.5]	7 [5, 10]	0.715
BHS (Hopelessness)	8	7 [3.5, 13.2]	5.5 [4.2, 9]	0.703	10	6.5 [2, 13.5]	7.5 [3.8, 11.8]	0.219
SSI (Suicidal ideation)	8	2 [0, 7.8]	0.5 [0, 3.8]	0.375	10	3.5 [0, 21.2]	6 [0, 18.2]	0.809
PSE (Psychache)	8	48.5 [43.5, 53.2]	36.5 [30.2, 40.5]	0.078	10	54.5 [36.5, 57.8]	50 [22.2, 59.8]	0.742
Total impulsivity (BIS-11)	8	44.5 [38.5, 55.5]	45.5 [37.8, 52.2]	0.547	11	57 [46.5, 73]	59 [45, 70.5]	0.915
Cognitive impulsivity	8	17 [12.8, 19.2]	16 [10.8, 21.5]	0.609	11	17 [11.5, 21.5]	15 [12, 18.5]	0.434
Motor impulsivity	8	16 [13.2, 18.2]	12.5 [11, 13.2]	0.125	11	22 [16.5, 26.5]	22 [18, 26]	1.000
Non-planning imp.								
	8	15 [13, 18]	17.5 [15.8, 19.2]	0.094	11	23 [14.5, 29]	22 [13, 28.5]	0.859
QoL (Quality of life)	7	46 [35, 62]	50 [43.5, 70]	0.562	7	69 [50.5, 78.5]	67 [49, 84]	0.937

Abbreviations: SAMIT, Suicide Attempt Multicomponent Intervention Treatment (intervention group); TAU, treatment as usual; SUD, substance use disorder; IQR, interquartile range; HADS-A, Hospital Anxiety and Depression Scale – Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale – Depression subscale; BIS-11, Barratt Impulsivity Scale-11; BHS, Beck Hopelessness Scale; SSI, Scale for Suicide Ideation; PSE, Psychache Scale; QoL, Quality of Life.

*****Table 4*****

During intervention/TAU period, no suicide reattempts occurred in either group, and there were no deaths by suicide or other causes.

Discussion

The results support the effectiveness of SAMIT treatment compared to TAU across various clinical variables, particularly in reducing symptoms of depression, psychache, and motor impulsivity. Depression is highly prevalent among individuals with suicidal behaviour [62], while psychache is a construct strongly linked to both the frequency and lethality of SAs, and is also a known risk factor for depression and hopelessness [63]. In turn, both depression and hopelessness are established risk factors for suicidal ideation, SAs, and death by suicide [64]. Additionally, motor impulsivity has been associated with the transition from single to multiple SAs, which is especially relevant given that MSSA patients have a high percentage of reattempts [10]; this suggests motor impulsivity as a target for treatment and a potential mechanism of change to explore in psychological interventions focused on suicide [65].

Our results are consistent with Hofstra et al.'s [66] systematic review and meta-analysis, which included 15 RCTs with 29,071 participants and demonstrated the effectiveness of suicide prevention interventions in reducing completed and attempted suicides. There was a larger effect size observed for completed suicides compared to attempted ones. A recent systematic review and meta-analysis [55] pooling 36 trials evaluated brief interventions and contacts finding a significant reduction on suicide re-attempts in the intervention groups compared to controls ($OR = 0.72$, 95% CI 0.54–0.95) and reduction in suicidal ideation were also observed, although with low-certainty evidence ($SMD = -0.20$, 95% CI $-0.36, -0.05$). Moreover, O'Connor et al. [67] found that a brief intervention for medically admitted SA survivors could be effectively delivered and was associated with high satisfaction rates with the treatment. A recent study proved that a brief CBT administered during inpatient treatment could reduce the occurrence of SA by 60% over six months post-discharge ($OR = 0.40$; 95% CI: 0.20–0.80) [68]. Finally, Bahlmann et al. [63] designed a brief psychotherapeutic intervention centered on patients after a SA in an acute psychiatric inpatient and reported a reduction in suicidal ideation, psychache, hopelessness, and depressive symptoms.

In our subgroup analyses, findings showed differences in treatment responses by gender, with women showing better responses to SAMIT than men. The literature shows mixed evidence related to gender differences in psychotherapy, with some studies indicating variations based on specific diagnosis [69, 70, 71, 72]. Our results concur with Matias et al.'s [42] systematic review and meta-analysis, performed to assess the effectiveness of psychosocial interventions for suicide behaviour compared by gender. They found these interventions developed for self-harm were more effective for females, with more repeated self-harm in males and a higher risk to die by suicide. These can be related to different factors, like higher lethality methods used in men, less engagement to psychotherapeutic treatments, more difficulties to express emotions, or for seeking for help [73, 74]. Two Cochrane reviews, conducted by Witt et al. [75, 76] reported benefits in effectiveness after psychosocial treatments in females, but not in males. Moreover, Rattel et al. [77] examined arousal physiology and the concordance between valence and behaviour, finding that women exhibited higher concordance than men, demonstrating stronger psychophysiological responses. Therefore, these results can be associated with enhanced emotional awareness and greater arousal and sensitivity in women to adverse and stressful events, in line with known functional brain differences at the level of limbic and paralimbic structures between men and women [78].

Subgroup analyses were performed for participants with comorbid SUDs, and indicated a more complex clinical presentation for this population. While participants with comorbid SUD improved in depression symptoms with treatment, changes in the remaining variables were non-significant. Moreover, patients with SUD in the TAU group experienced a non-significant worsening of hopelessness, suicide ideation and quality of life. These findings are congruent with Diefenbach's study [68, 79], which indicated that individuals with SUD have lower response rates in their SA treatment. Unfortunately, individuals with co-occurring substance use issues are often excluded from clinical trials and prevention research, even though they report a higher number of lifetime SAs compared to those without SUD diagnosis, and have a poorer prognosis [68, 79]. Our results highlight not only the complexities of this subgroup but also the need to include them in clinical trials, as they exhibit higher risk factors and severe symptoms. Therefore, it is crucial to assess the moderate effects of SUDs on treatment responses in suicide prevention trials, better understand the role substance use plays in suicide behaviour, and develop tailored treatment approaches that address the specific needs of individuals with SUD [43, 68, 79].

This evidence, alongside our findings, underscores the urgent need for research on acute psychotherapeutic intervention for SAs, more specifically for MSSA, which constitutes a particularly severe subgroup with greater comorbidity and a higher risk of reattempts and death by suicide. Notably, psychological interventions have demonstrated effects on clinical symptomatology, helping us move to a more integrative paradigm for suicidal behaviour treatment. This highlights the importance of conducting RCTs on psychological interventions targeting severe clinical cases during the acute period following an MSSA, as well as the need for personalized treatment approaches that account for gender differences and comorbid SUD status.

Strengths and Limitations

This is the first RCT that focused on MSSA, and the first to support that a novel psychological treatment (SAMIT) improves psychopathological symptoms. These findings suggest that integrating psychotherapeutic approaches during the acute phase after an MSSA may deepen our understanding of mechanisms underlying effective suicide-prevention strategies.

Nevertheless, these findings should be interpreted cautiously and considered preliminary given the limited sample size; therefore, replication is strongly recommended. Future research should replicate these results in larger samples and explore longer-term trajectories of clinical responses. Similarly, when subgroup analyses are performed, the sample decreases, and statistical findings can be less representative. Although the protocol targeted a sample of 120 participants, only 75 of the 189 identified patients could be randomized (39.7% recruitment rate), reflecting the inherent difficulty of recruiting and retaining a severely unwell, high-risk population. The original power calculation was based on effect sizes from the general suicide attempter literature, as no prior studies had estimated this parameter specifically in MSSA populations—a group with distinct clinical severity.

Conclusions

These findings provide preliminary but promising evidence that psychological interventions such as SAMIT treatment can be effective for MSSA, an understudied and severe clinical condition. They represent a relevant approach that could contribute to more comprehensive and efficacious interventions in this critical area of mental health. Future analyses will provide a clearer understanding of the potential impact of this treatment in terms of psychological effect.

Abbreviations

BHS: Beck hopelessness scale

BIS: Barratt impulsiveness scale

CBT: cognitive behavioral therapy

CI: confidence interval

CONSORT: consolidated standards of reporting trials

DBT: dialectical behavioral therapy

DSM-5-TR: diagnostic and statistical manual of mental disorders, fifth edition, text revision

HADS_A: hospital anxiety and depression scale_anxiety subscale

HADS_D: hospital anxiety and depression scale_depression subscale

IQR: interquartile range

ITT: intention-to-treat

LME: linear mixed-effects models

MBT: mentalization based treatment

MOCA: Montreal cognitive assessment

MSSA: medically serious suicide attempts

OR: odds ratio

PSE: psychic pain scale;

QoL: quality of life

REDCap: research electronic data capture

RCT: randomized controlled trial

SA: Suicide Attempts

SAMIT: suicide attempt multicomponent intervention treatment

SMD: standardised mean difference

SD: standard deviation

SSI: suicide scale ideation

SSRI: selective serotonin reuptake inhibitors

SUD: substance use disorder

TAU: treatment as usual

Declarations

Ethics Approval and Consent to Participate

The protocol was approved by the Vall d'Hebron University Hospital Ethical Research Committee PR(AG)463/2022 and Hospital Clinic Ethical Committee HCB/2022/0279. All methods were carried out in accordance with applicable guidelines and regulations. During the study, the national and international guidelines were followed (deontological code and Helsinki Declaration - version in force; currently the 75th General Assembly, Helsinki, Finland, October 2024). All patients gave written informed consent prior to entering the study. For subjects with ages between 16 and 18 years old, written informed consent was obtained from both the participant and the parents or legal guardian.

The study protocol is also registered in the Clinical Trials Registry (Trial Registration) at ClinicalTrials.gov with the identifier ID: NCT06238414 (<https://clinicaltrials.gov/study/NCT06238414>). Date of registration: November 20th, 2023.

Any protocol amendment that implies modification to the protocol will be communicated to the investigators, research institutes involved (VHIR and IDIBAPS), ethics committees, and the sponsor (La Marató de TV3 Foundation).

Consent for publication

Not applicable.

Availability of data and materials

The raw data generated in this study may be shared with natural or legal persons for non-profit scientific purposes. The raw data will be shared only on request and will be available for a period of 10 years. After this period, in compliance with the principles of 'data minimization' and 'storage limitation' as outlined in the RGPD 2016/679 and LOPD 3/2018, the data will be deleted.

The Research Electronic Data Capture (REDCap) platform has been utilised in the creation and development of the feasibility survey. This platform is an encrypted web application that conforms to 21 CFR Part 11, the Health Insurance Portability and

Accountability Act (HIPAA), and the General Data Protection Regulation (GDPR).

Competing Interests

J.A.R.Q. was on the speakers' bureau and/or acted as consultant for Biogen, Idorsia, Casen-Recordati, Johnson&Johnson, Lilly, Novartis, Takeda, Bial, Sincrolab, Neuraxpharm, Novartis, BMS, Medice, Rubió, Uriach, Technofarma and Raffo in the last 3 years. He also received travel awards (air tickets and hotel accommodations) for participating in psychiatric meetings from Biogen, Idorsia, Johnson & Johnson, Lilly, Rubió, Takeda, Bial and Medice. The Department of Psychiatry, chaired by him, received unrestricted educational and research support from the following companies over the last three years: Exeltis, Idorsia, Casen-Recordati, Takeda, Neuraxpharm, Oryzon, Roche, Probitas and Rubió. Johnson&Johnson. The other authors declare no competing interest.

Funding

This project was funded by La Marató de TV3 Foundation (202208-30-31 funds), a non-profit association from Catalonia (Spain). The panel has peer reviewed the study protocol as part of the funding process. The funding body was not involved in any part of the design, conduct, analysis, interpretation, or reporting of this trial. AM's research contract was funded by this grant.

JARQ thanks the support and funding by CIBER -Consorcio Centro de Investigación Biomédica en Red- (CB15/00154), Comissionat per a Universitats i Recerca del DIUE de la Generalitat de Catalunya to the Psychiatry, Mental Health and Addictions Group (2021 SGR 00840). The Instituto de Salud Carlos III and NEURON BIOPHARMA, S.A grant N° JTC2021.

Authors' Contributions

A.B. Conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, supervision, validation, writing original draft and writing - reviewing and editing.

A.M.A. Conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, writing original draft and writing – review editing. **M.Q.F.** Conceptualization, funding acquisition, investigation, methodology, supervision, and writing – review editing. **G.A.H.** Conceptualization, formal analysis, investigation, methodology, supervision, writing original draft and writing - reviewing and editing. **O.S.E.** Conceptualization, methodology, supervision and writing – review and editing. **E.B.** Formal analysis, supervision and writing – review and editing. **P.I.J.** Funding acquisition, methodology, validation, writing – review and editing. **G.P.P.** Funding acquisition, validation and writing – review and editing. **M.B.** data curation, validation and writing – review and editing. **M.P.O.** data curation, and validation and writing – review and editing. **P.S.C.** Conceptualization, supervision and writing – review and editing.

J.A.R.Q. Conceptualization, supervision, writing – review and editing. **L.P.** Conceptualization, funding acquisition, investigation and supervision and writing – review and editing. **P.B.** Conceptualization, funding acquisition, investigation, supervision, writing original draft and writing - reviewing and editing. **M.D.B.** Conceptualization, investigation, methodology, supervision, writing original draft and writing - review and editing. All authors read and approved the final manuscript.

Acknowledgments

The authors would like to express their gratitude to all the patients who collaborate with this research. Moreover, the research team for their collaboration, and the La Marató de TV3 Foundation (202208-30-31 funds) for the funding and support. We also appreciate the assistance received from the Consultation-Liaison Psychiatry Unit, Acute Psychiatry Unit, Child and Adolescent inpatient Unit, and PIR-MIR residents, from both hospitals (HUVH and HC), for their contributions during the recruitment phase. A special mention to Núria Blay, Maria Boix, Mercè Cámara, Eduardo Castrillo, Marta Gil, Raquel Ibarz, Antònia López, Patricia Sanazario, Rut Vila, for their contribution during the assessment process. Additionally, we want to extend our thanks to the Biomedical Network Research Center on Mental Health (HUVH), the Spinal Cord Injury Unit (HUVH), and Statistics and Bioinformatics Unit (UEB) Vall d'Hebron Research Institute (VHIR) for their technical support.

We also appreciate the contribution of the Health and Addictions Research Group (Grup de Recerca Emergent, 2021; SGR 01158, AGAUR).

References

1. World Health Organization. Suicide worldwide in 2021: global health estimates. Geneva: World Health Organization. 2025. 64 p. ISBN 978-92-4-011006-9. Available from: <https://www.who.int/publications/i/item/9789240110069>
2. Favril L, Yu R, Geddes JR, Fazel S. Individual-level risk factors for suicide mortality in the general population: an umbrella review. *Lancet Public Heal*. 2023;8(11):e868–77. [https://doi.org/10.1016/S2468-2667\(23\)00207-4](https://doi.org/10.1016/S2468-2667(23)00207-4).
3. Corbé J, Montout C, Fares A, Belhadj I, Boudemaghe T, Mura T, et al. A comprehensive study of medically serious suicide attempts in France: Incidence and associated factors. *Epidemiol Psychiatr Sci*. 2023;32. <https://doi.org/10.1017/S2045796022000774>.
4. Goñi-Sarriés A, Yáñez-Goñi N, López-Goñi JJ. Psychiatric Hospitalization for Attempted Suicide and Reattempt at the One-Year Follow-Up. *Psicothema*. 2022;34(3):375–82. <https://doi.org/10.7334/psicothema2021.455>.
5. Gunnell D, Hawton K, Ho D, Evans J, O'Connor S, Potokar J, et al. Hospital admissions for self harm after discharge from psychiatric inpatient care: cohort study. *BMJ*. 2008;337:a2278. <https://doi.org/10.1136/bmj.a2278>.
6. Gunnell D, Appleby L, Arensman E, Hawton K, John A, Kapur N, et al. Suicide risk and prevention during the COVID-19 pandemic. *Lancet Psychiatry*. 2020;7(6):468–71. [https://doi.org/10.1016/S2215-0366\(20\)30171-1](https://doi.org/10.1016/S2215-0366(20)30171-1).
7. Lin CC, Linscott RJ. Longitudinal mediation by perceived burden of the pathway from thwarted belonging to suicidal ideation. *Suicide Life Threat Behav*. 2022;52(6):1193–204. <https://doi.org/10.1111/sltb.12914>.
8. Pemau A, Marin-Martin C, Diaz-Marsa M, de la Torre-Luque A, Ayad-Ahmed W, Gonzalez-Pinto A, et al. Risk factors for suicide reattempt: a systematic review and meta-analysis. *Psychol Med*. 2024;54(9):1897–904. <https://doi.org/10.1017/S0033291724000904>.
9. Beautrais AL. Suicides and serious suicide attempts: two populations or one? *Psychol Med*. 2001;31(5):837–45. <https://doi.org/10.1017/s0033291701003889>.
10. Beautrais AL. Further suicidal behavior among medically serious suicide attempters. *Suicide Life Threat Behav*. 2004;34(1):1–11. <https://doi.org/10.1521/suli.34.1.1.27772>.
11. Beautrais AL, Joyce PR, Mulder RT. Risk factors for serious suicide attempts among youths aged 13 through 24 years. *J Am Acad Child Adolesc Psychiatry*. 1996;35(9):1174–82. <https://doi.org/10.1097/00004583-199609000-00015>.
12. Beautrais AL. Suicide and serious suicide attempts in youth: a multiple-group comparison study. *Am J Psychiatry*. 2003;160(6):1093–9. <https://doi.org/10.1176/appi.ajp.160.6.1093>.
13. Gvion Y, Levi-Belz Y. Serious Suicide Attempts: Systematic Review of Psychological Risk Factors. *Front Psychiatry*. 2018;9:56. <https://doi.org/10.3389/fpsy.2018.00056>.
14. Mościcki EK, O'Carroll P, Rae DS, Locke BZ, Roy A, Regier DA. Suicide attempts in the Epidemiologic Catchment Area Study. *Yale J Biol Med*. 1988;61(3):259–68.
15. Quesada-Franco M, Pintor-Pérez L, Daigre C, Baca-García E, Ramos-Quiroga JA, Braquehais MD. Medically serious suicide attempts in personality disorders. *J Clin Med*. 2021;10(18):4186. <https://doi.org/10.3390/jcm10184186>.
16. Temes CM, Frankenburg FR, Fitzmaurice GM, Zanarini MC. Deaths by Suicide and Other Causes Among Patients With Borderline Personality Disorder and Personality-Disordered Comparison Subjects Over 24 Years of Prospective Follow-Up. *J Clin Psychiatry*. 2019;80(1). <https://doi.org/10.4088/JCP.18m12436>.
17. Mann JJ, Apter A, Bertolote J, Beautrais A, Currier D, Haas A, et al. Suicide prevention strategies - A systematic review. *JAMA*. 2005;294:2064–74. <https://doi.org/10.1001/jama.294.16.2064>.
18. Mann JJ, Michel CA, Auerbach RP. Improving Suicide Prevention Through Evidence-Based Strategies: A Systematic Review. *Am J Psychiatry*. 2021;178(7):611–24. <https://doi.org/10.1176/appi.ajp.2020.20060864>.

19. Xiong J, Lipsitz O, Chen-Li D, Rosenblat JD, Rodrigues NB, Carvalho I, et al. The acute antisuicidal effects of single-dose intravenous ketamine and intranasal esketamine in individuals with major depression and bipolar disorders: A systematic review and meta-analysis. *J Psychiatr Res.* 2021;134:57–68. 10.1016/j.jpsychires.2020.12.038.
20. Hu FH, Xu J, Jia YJ, Ge MW, Zhang WQ, Tang W, et al. Non-pharmacological interventions for preventing suicide attempts: A systematic review and network meta-analysis. *Asian J Psychiatr.* 2024;93:103913. <https://doi.org/10.1016/j.ajp.2024.103913>.
21. Beneria A, Motger-Albertí A, Quesada-Franco M, Arteaga-Henríquez G, Santesteban-Echarri O, Ibáñez P, et al. A Suicide Attempt Multicomponent Intervention Treatment (SAMIT Program): study protocol for a multicentric randomised controlled trial. *BMC Psychiatry.* 2024;24(1). <https://doi.org/10.1186/s12888-024-06113-3>.
22. Fox KR, Huang X, Guzmán EM, Funsch KM, Cha CB, Ribeiro JD, et al. Interventions for suicide and self-injury: A meta-analysis of randomized controlled trials across nearly 50 years of research. *Psychol Bull.* 2020;146(12):1117–45. <https://doi.org/10.1037/bul0000305>.
23. Sobanski T, Josfeld S, Peikert G, Wagner G. Psychotherapeutic interventions for the prevention of suicide re-attempts: a systematic review. *Psychol Med.* 2021;51(15):2525–40. <https://doi.org/10.1017/S0033291721003081>.
24. Van Ballegooijen W, Rawee J, Palantza C, Miguel C, Harrer M, Cristea I, et al. Suicidal ideation and suicide attempts after direct or indirect psychotherapy: A systematic review and meta-analysis. *JAMA Psychiatry.* 2025;82(1):31–7. <https://doi.org/10.1001/jamapsychiatry.2024.2854>.
25. Zalsman G, Hawton K, Wasserman D, van Heeringen K, Arensman E, Sarchiapone M, et al. Suicide prevention strategies revisited: 10-year systematic review. *Lancet Psychiatry.* 2016;3:646–59. [https://doi.org/10.1016/S2215-0366\(16\)30030-X](https://doi.org/10.1016/S2215-0366(16)30030-X).
26. Escobedo-Aedo PJ, Porras-Segovia A, Barrigón ML, Courtet P, López-Castroman J, Baca-García E. Association Between Trauma, Impulsivity, and Functioning in Suicide Attempters. *Behav Sci (Basel).* 2025;15(9):1–16. <https://doi.org/10.3390/bs15091262>.
27. Park CHK, Lee JW, Lee SY, Moon J, Jeon DW, Shim SH, et al. Suicide risk factors across suicidal ideators, single suicide attempters, and multiple suicide attempters. *J Psychiatr Res.* 2020;131:1–8. <https://doi.org/10.1016/j.jpsychires.2020.08.018>.
28. Siau CS, Klonsky ED, Kõlves K, Huen JMY, Chan CMH, Fariduddin MN, Ibrahim N, Tan YK, Jia C, Zhang J, Lew B, Psychache. Hopelessness, and Suicidal Ideation and Behaviors: A Cross-Sectional Study from China. *Int J Environ Res Public Health.* 2024;21(7):885. 10.3390/ijerph21070885.
29. Shneidman ES. The psychological pain assessment scale. *Suicide Life Threat Behav.* 1999;29(4):287–94.
30. Ordóñez-Carrasco JL, Cuadrado-Guirado I, Rojas-Tejada A. Escala de dolor psicológico: adaptación de la Psychache Scale al español en jóvenes adultos. *Rev Psiquiatr Salud Ment.* 2022;15(3):196–204. <https://doi.org/10.1016/j.rpsm.2019.04.003>.
31. Braquehais MD, Oquendo MA, Baca-García E, Sher L. Is impulsivity a link between childhood abuse and suicide? *Compr Psychiatry.* 2010;51(2):121–9. <https://doi.org/10.1016/j.comppsy.2009.05.003>.
32. Beristianos MH, Maguen S, Neylan TC, Byers AL. Trauma Exposure and Risk of Suicidal Ideation Among Older Adults. *Am J Geriatr Psychiatry.* 2016;24(8):639–43. <https://doi.org/10.1016/j.jagp.2016.02.055>.
33. Hadland SE, Wood E, Dong H, Marshall BDL, Kerr T, Montaner JS, et al. Suicide Attempts and Childhood Maltreatment Among Street Youth: A Prospective Cohort Study. *Pediatrics.* 2015;136(3):440–9. <https://doi.org/10.1542/peds.2015-1108>.
34. Spokas M, Wenzel A, Stirman SW, Brown GK, Beck AT. Suicide risk factors and mediators between childhood sexual abuse and suicide ideation among male and female suicide attempters. *J Trauma Stress.* 2009;22(5):467–70. <https://doi.org/10.1002/jts.20438>.
35. Alter S, Wilson C, Sun S, Harris RE, Wang Z, Vitale A, et al. The association of childhood trauma with sleep disturbances and risk of suicide in US veterans. *J Psychiatr Res.* 2021;136:54–62. <https://doi.org/10.1016/j.jpsychires.2021.01.030>.

36. González-Castro TB, Juárez-Rojop IE, Tovilla-Zárate CA, Ovando-Ricárdez JA, Hernández-Díaz Y, López-Narváez ML, et al. Gene-environment interaction between HPA-axis genes and trauma exposure in the suicide behavior: A systematic review. *J Psychiatr Res.* 2023;164:162–70. <https://doi.org/10.1016/j.jpsychires.2023.06.011>.
37. Bowlby J, Attachment. Attachment and Loss Volume One. New York: Basic Books Classics; 1983.
38. Boroujerdi FG, Kimiaee SA, Yazdi SAA, Safa M. Attachment style and history of childhood abuse in suicide attempters. *Psychiatry Res.* 2019;271:1–7. <https://doi.org/10.1016/j.psychres.2018.11.006>.
39. Griffin DW, Bartholomew K. Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *J Pers Soc Psychol.* 1994;67(3):430–45. <https://doi.org/10.1037/0022-3514.67.3.430>.
40. Levi-Belz Y, Gvion Y, Horesh N, Apter A. Attachment patterns in medically serious suicide attempts: the mediating role of self-disclosure and loneliness. *Suicide Life Threat Behav.* 2013;43(5):511–22. <https://doi.org/10.1111/sltb.12035>.
41. Klimes-Dougan B, Klingbeil DA, Meller SJ. The impact of universal suicide-prevention programs on the help-seeking attitudes and behaviors of youths. *Crisis.* 2013;34(2):82–97. <https://doi.org/10.1027/0227-5910/a000178>.
42. Matias O, Bakou AE, Barnicot K, McCabe R. The effectiveness of psychosocial interventions for self-harm in males compared to females: a systematic review and meta-analysis. *Lancet Reg Health Eur.* 2026;63:101606. <https://doi.org/10.1016/j.lanepe.2026.101606>.
43. Diefenbach GJ, Stubbing J, Rice TB, Lord KA, Rudd MD, Tolin DF. Uncovering the role of substance use in suicide attempts using a mixed-methods approach. *Suicide Life Threat Behav.* 2024;54(1):70–82. <https://doi.org/10.1111/sltb.13019>.
44. Padmanathan P, Hall K, Moran P, Jones HE, Gunnell D, Carlisle V, et al. Prevention of suicide and reduction of self-harm among people with substance use disorder: A systematic review and meta-analysis of randomised controlled trials. *Compr Psychiatry.* 2020;96. <https://doi.org/10.1016/j.comppsy.2019.152135>.
45. Poorolajal J, Haghtalab T, Farhadi M, Darvishi N. Substance use disorder and risk of suicidal ideation, suicide attempt and suicide death: a meta-analysis. *J Public Health.* 2016;38:e282–91. <https://doi.org/10.1093/pubmed/fdv148>
46. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983;67(6):361–70.
47. Herrero MJ, Blanch J, Peri JM, De Pablo J, Pintor L, Bulbena A. A validation study of the Hospital Anxiety and Depression Scale (HADS) in a Spanish population. *Gen Hosp Psychiatry.* 2003;25(4):277–83. [https://doi.org/10.1016/s0163-8343\(03\)00043-4](https://doi.org/10.1016/s0163-8343(03)00043-4).
48. Beck AT, Weissman A, Lester D, Trexler L. The measurement of pessimism: the hopelessness scale. *J Consult Clin Psychol.* 1974;42(6):861–5. <https://doi.org/10.1037/h0037562>.
49. Beck AT, Steer RA, Ranieri WF. Scale for Suicide Ideation: psychometric properties of a self-report version. *J Clin Psychol.* 1988;44(4):499–505.
50. Bobes J, García-Portilla MP, Bascarán MT, Bousoño M, Sáiz PA, Bousoño JM. Adaptación española de la Scale for Suicide Ideation (SSI). *Actas Esp Psiquiatr.* 2001;29(5):293–8.
51. Patton JH, Stanford MS, Barratt ES. Factor structure of the Barratt Impulsiveness Scale. *J Clin Psychol.* 1995;51(6):768–74.
52. Oquendo MA, Baca-García E, Graver R, Morales M, Montalvan V, Mann JJ. Spanish adaptation of the Barratt Impulsiveness Scale (BIS-11). *Eur J Psychiatry.* 2001;15(3):147–55.
53. Burckhardt CS, Anderson KL, Archenholtz B, Hägg O. The Flanagan Quality of Life Scale: evidence of construct validity. *Health Qual Life Outcomes.* 2003;1:59.
54. Norcross JC, Goldfried MR. Handbook of Psychotherapy Integration. 2nd ed. New York: Oxford University Press; 2005.
55. Homan S, Marciniak MA, Michel S, Bertram AM, Rühlmann C, Pethő A, et al. Effectiveness of brief interventions and contacts after suicide attempt: a systematic review and meta-analysis. *EClinicalMedicine.* 2026;93:103824. <https://doi.org/10.1016/j.eclinm.2026.103824>.

56. Gysin-Maillart A, Schwab S, Soravia L, Megert M, Michel K. A novel brief therapy for patients who attempt suicide: a 24-months Follow-Up Randomized Controlled Study of the Attempted Suicide Short Intervention Program (ASSIP). *PLoS Med*. 2016;13(3):e1001968. <https://doi.org/10.1371/journal.pmed.1001968>.
57. Bateman A, Fonagy P. *Mentalization-Based Treatment for Personality Disorders: A Practical Guide* [Internet]. Oxford University Press; 2016. <https://doi.org/10.1093/med:psych/9780199680375.001.0001>.
58. Linehan MM, Korslund KE, Harned MS, Gallop RJ, Lungu A, Neacsiu AD, et al. Dialectical behavior therapy for high suicide risk in individuals with borderline personality disorder: a randomized clinical trial and component analysis. *JAMA Psychiatry*. 2015;72(5):475–82. <https://doi.org/10.1001/jamapsychiatry.2014.3039>.
59. Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O'Neal L, et al. The REDCap consortium: Building an international community of software platform partners. *J Biomed Inf*. 2019;95:103208. <https://doi.org/10.1016/j.jbi.2019.103208>.
60. R Core Team. *R: A Language and Environment for Statistical Computing* [Internet]. Vienna (Austria): R Foundation for Statistical Computing. 2026. Available from: <https://www.R-project.org/>
61. Pinheiro J, Bates D, R Core Team. nlme: Linear and Nonlinear Mixed Effects Models. R package version 3.2026;1-170. Available from: <https://CRAN.R-project.org/package=nlme>
62. Richard-Devantoy S, Berlim MT, Garel N, Inja A, Turecki G. The impact of antidepressant treatment on the network structure of neurocognition and core emotional depressive symptoms among depressed individuals with a history of suicide attempt: An 8-week clinical study. *J Affect Disord*. 2024;361:425–33. <https://doi.org/10.1016/j.jad.2024.05.111>.
63. Bahlmann L, Lübbert MBJS, Sobanski T, Kastner UW, Walter M, Smesny S, et al. Relapse Prevention Intervention after Suicidal Event (RISE): Feasibility study of a psychotherapeutic short-term program for inpatients after a recent suicide attempt. *Front Psychiatry*. 2022;13:937527. <https://doi.org/10.3389/fpsy.2022.937527>.
64. Ribeiro JD, Huang X, Fox KR, Franklin JC. Depression and hopelessness as risk factors for suicide ideation, attempts and death: meta-analysis of longitudinal studies. *Br J Psychiatry*. 2018;212(5):279–86. <https://doi.org/10.1192/bjp.2018.27>.
65. Colborn VA, LaCroix JM, Neely LL, Tucker J, Perera K, Daruwala SE, et al. Motor impulsivity differentiates between psychiatric inpatients with multiple versus single lifetime suicide attempts. *Psychiatry Res*. 2017;253:18–21. <https://doi.org/10.1016/j.psychres.2017.03.026>.
66. Hofstra E, van Nieuwenhuizen C, Bakker M, Özgül D, Elfeddali I, de Jong SJ, et al. Effectiveness of suicide prevention interventions: A systematic review and meta-analysis. *Gen Hosp Psychiatry*. 2020;63:127–40. <https://doi.org/10.1016/j.genhosppsych.2019.04.011>.
67. O'Connor SS, Comtois KA, Wang J, Russo J, Peterson R, Lapping-Carr L, et al. The development and implementation of a brief intervention for medically admitted suicide attempt survivors. *Gen Hosp Psychiatry*. 2015;37:427–33. <https://doi.org/10.1016/j.genhosppsych.2015.05.001>.
68. Diefenbach GJ, Lord KA, Stubbing J, Rudd MD, Levy HC, Worden B, et al. Brief Cognitive Behavioral Therapy for Suicidal Inpatients: A Randomized Clinical Trial. *JAMA Psychiatry*. 2024;81(12):1177–86. <https://doi.org/10.1001/jamapsychiatry.2024.2349>.
69. Labaka A, Goñi-Balentziaga O, Lebeña A, Pérez-Tejada J. Biological Sex Differences in Depression: A Systematic Review. *Biol Res Nurs*. 2018;20(4):383–92. <https://doi.org/10.1177/1099800418776082>.
70. Békés V, Beaulieu-Prévost D, Guay S, Belleville G, Marchand A. Women with PTSD benefit more from psychotherapy than men. *Psychol Trauma*. 2016;8(6):720–7. <https://doi.org/10.1037/tra0000122>.
71. Blehar MC. Women's mental health research: the emergence of a biomedical field. *Annu Rev Clin Psychol*. 2006;2:135–60. <https://doi.org/10.1146/annurev.clinpsy.2.022305.095344>.
72. Wade D, Varker T, Kartal D, Hetrick S, O'Donnell M, Forbes D. Gender difference in outcomes following trauma-focused interventions for posttraumatic stress disorder: Systematic review and meta-analysis. *Psychol Trauma*. 2016;8(3):356–64. <https://doi.org/10.1037/tra0000110>.
73. Värnik A, Kõlves K, van der Feltz-Cornelis CM, Marusic A, Oskarsson H, Palmer A, et al. Suicide methods in Europe: a gender-specific analysis of countries participating in the European Alliance Against Depression. *J Epidemiol Community*

Health. 2008;62(6):545–51. <https://doi.org/10.1136/jech.2007.065391>.

74. Möller-Leimkühler AM. The gender gap in suicide and premature death or: why are men so vulnerable? *Eur Arch Psychiatry Clin Neurosci*. 2003;253:1–8.
75. Witt KG, Hetrick SE, Rajaram G, Hazell P, Taylor Salisbury TL, Townsend E, et al. Psychosocial interventions for self-harm in adults. *Cochrane Database Syst Rev*. 2021;4(4):CD013668. <https://doi.org/10.1002/14651858.CD013668.pub2>.
76. Witt KG, Hetrick SE, Rajaram G, Hazell P, Taylor Salisbury TL, Townsend E, et al. Interventions for self-harm in children and adolescents. *Cochrane Database Syst Rev*. 2021;3(3):CD013667. <https://doi.org/10.1002/14651858.CD013667.pub2>.
77. Rattel JA, Mauss IB, Liedlgruber M, Wilhelm FH. Sex differences in emotional concordance. *Biol Psychol*. 2020;151:107845. <https://doi.org/10.1016/j.biopsycho.2020.107845>.
78. Bianchin M, Angrilli A. Gender differences in emotional responses: a psychophysiological study. *Physiol Behav*. 2012;105(4):925–32. <https://doi.org/10.1016/j.physbeh.2011.10.031>.
79. Diefenbach GJ, Collett S, Black S, Rudd MD, Gueorguieva R, Tolin DF. The effect of inpatient brief cognitive-behavioral therapy for suicide prevention on post-discharge emergency department utilization: Secondary analysis of a randomized clinical trial. *Gen Hosp Psychiatry*. 2025;93:73–9. <https://doi.org/10.1016/j.genhosppsy.2025.01.007>.

Figures

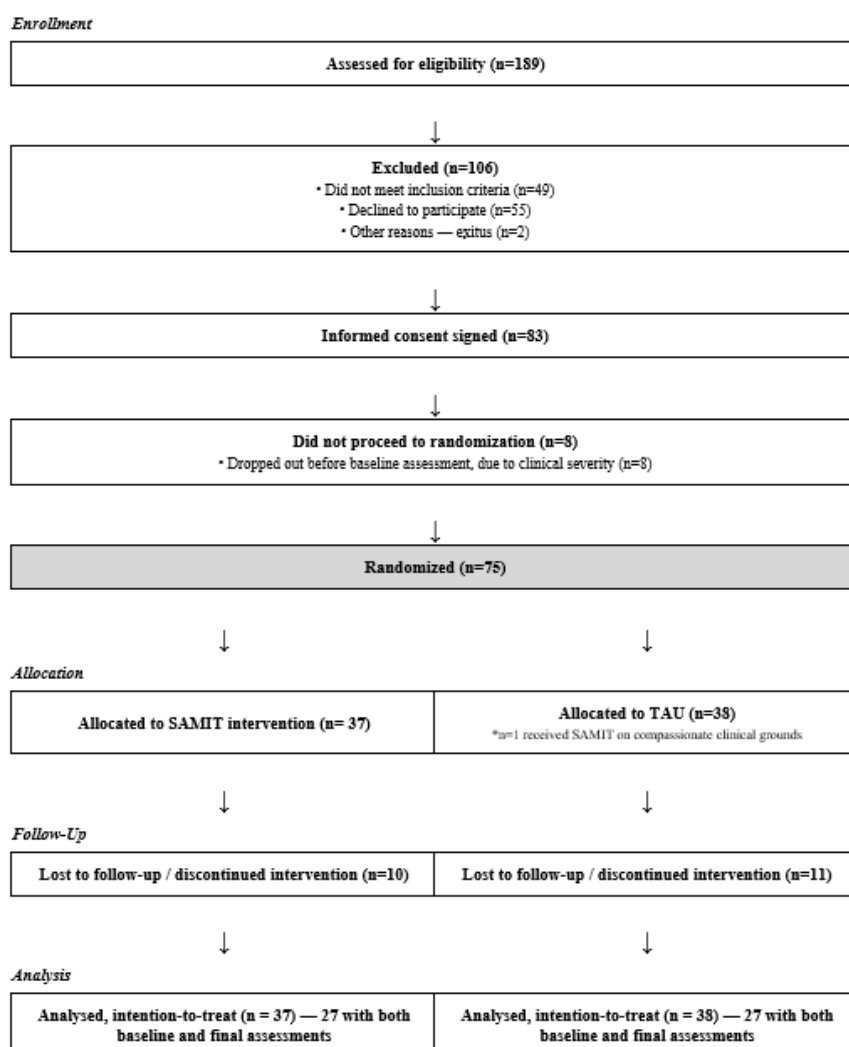


Figure 1

CONSORT Flow Diagram

*One participant allocated to TAU received the SAMIT intervention on compassionate clinical grounds; see Supplement S2 for as-treated sensitivity analyses.

Supplementary Files

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