Effectiveness of an Internet-Based Self-help Therapy Program for Suicidal Ideation With Follow-up at 6 Months:
Results of a Randomized Controlled Trial

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ABSTRACT

Objective: The majority of individuals with suicidal ideation do not receive help, and every year close to 800,000 people die by suicide. This study aimed to investigate the effectiveness of a guided internet-based self-help program compared to a waiting list control group in reducing suicidal ideation.

Methods: In a randomized controlled trial, 402 individuals with suicidal ideation were assigned to a guided internet-based self-help program or a waiting list control group from September 13, 2016, to September 2, 2018. The primary outcome was suicidal ideation measured with the Beck Scale for Suicide Ideation at postintervention (6 weeks after baseline).

Results: Participants assigned to the internet-based self-help program experienced at postintervention a significant reduction on the primary outcome of suicidal ideation (mean difference: 2.91; 95% CI, 1.28 to 4.54; $P = .0005$, Cohen's $d = 0.25$) compared to the waiting list control group and on the secondary outcomes of hopelessness (mean difference: 1.98; 95% CI, 0.97 to 3.99) and worrying (mean difference: 5.19; 95% CI, 2.36 to 8.10). Six months later (follow-up), the difference between the groups remained significant for suicidal ideation, hopelessness, and worrying. A total of 28 (16.8%) of the participants in the intervention group reported negative effects from the internet-based self-help program.

Conclusions: Internet-based self-help therapy was associated with a reduction in suicidal ideation at postintervention and 6-month follow-up. Some participants found it challenging to work with the therapeutic exercises, and we recommend that internet-based self-help therapy be implemented in mental health clinics or crisis lines, where support or online counseling is available.

Trial Registration: ClinicalTrials.gov identifier: NCT02872610

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Approximately 9.2% of the world's population suffers from suicidal ideation during their lifetime.[1] Suicidal ideation can be very distressing and involve feelings of hopelessness, defeat, and entrapment.[2,3] While the majority of individuals with suicidal ideation never attempt suicide, it is estimated that 29% of individuals who experience suicidal ideation will make an attempt.[1] The majority of individuals with suicidal ideation do not, however, receive help.[4] Common treatment barriers are preferences for self-management, beliefs that the problem is not severe enough, lack of financial means, and lack of available mental health care services.[4,5]

Internet-based self-help therapy has the potential of being scalable and cost-effective[6] and appealing for individuals who want to handle their suicidal ideation on their own.[7,8] Recent meta-analyses have found self-guided digital interventions to be effective in reducing suicidal ideation,[9,10] and a self-guided internet-based self-help therapy program addressing suicidal ideation has shown small and promising effects in 3 randomized trials.[11–13] Guided internet-based interventions, where feedback is provided over video, telephone, or messages, have been linked to larger effects than unguided in depression studies,[14,15] suggesting that a guided version of the internet-based self-help program for people at risk of suicide might enhance the program's effect.

The aim of the study was to examine whether a guided, 6-week-long internet-based self-help program provided to adults with suicidal ideation was superior to a waiting list control condition in reducing suicidal ideation. In addition, we wished to assess the effect on secondary outcomes of psychological well-being as well as long-term effects 6 months after the intervention had ended. The trial is a modified replication of a Dutch randomized study.[11]

Clinical Points

- Internet-based self-help therapy has shown promising results in reducing suicidal ideation, but no studies have investigated if guidance and help from a therapist can improve the effect.
- This study found that guided internet-based therapy can reach individuals with suicidal ideation who might otherwise not have sought help and can effectively reduce suicidal ideation.

METHOD

Study Design

The Self-help Online Against Suicidal Ideation (SOS) trial was designed as a 2-arm randomized superiority trial with a 1:1 allocation ratio and a waiting list control group. The study was approved by the Research Ethics Committee, Capital Region of Denmark (H-15002490). The study was registered at ClinicalTrials.gov: NCT02872610. Details regarding the trial have been published elsewhere.[16] A small pilot study with 13 participants, conducted from June–August 2016, demonstrated the program's feasibility.

Participants

Participants with suicidal ideation were primarily recruited through counselors at the Danish Lifeline, the Lifeline website, Google AdWords, and psychiatric outpatient and inpatient units. Those who wished to participate had to log on to the SOS trial's website with a personal code card ("NemID"), which is used in Denmark for digital communication with authorities.

Eligibility and Inclusion

Eligible persons had to be ≥ 18 years of age, have an internet connection and a personal code card, and be fluent in Danish. People were excluded if they did not have suicidal ideation (defined as < 3 on the Beck Scale for Suicide Ideation [BSS]) or did not provide their telephone number and that of a contact person. All participants received information about the study on the SOS trial's website and over the telephone. Written informed consent was obtained from all participants.

Randomization and Masking

Randomization was facilitated using a computer-generated algorithm, which was set up by another researcher and unknown to the trial manager, Dr Mühlmann. The randomization was stratified by sex and level of suicidal ideation (using a cutoff score of ≥ 16 on the BSS). The block size used in the randomization was 8 and unknown to the trial manager.

Due to the waiting list design, neither participants nor the trial manager were blinded during the intervention period. However, the trial manager was blinded during the data analyses, which was facilitated by having a data manager re-code the randomization groups. The trial manager wrote the conclusion in the discussion section while being blinded for the allocation of the two groups.

Intervention

The Dutch self-help program "Living under control" was translated into Danish and used for the trial.[7] The self-help program, accessed via a website, was primarily based on cognitive behavioral therapy. It consisted of 6 modules, an "Acute Help" page where psychiatric hospitals and suicide prevention clinics were listed, a "My profile" page, and a messaging system. Each module contained a theoretical introduction, several exercises, and a Frequently Asked Questions section. Every week, a new module was released to the participant. Approximately 10 days into the program, the participants received a message from the research team, encouraging them to write if they had any questions related to the exercises. Responding to the message was optional. The modules remained available to participants also after the 6-week study period.

Waiting List Control Condition

Participants randomized to the waiting list condition only had access to the "Acute Help" and "My profile" pages on the website. After 32 weeks, these participants were invited to use the self-help program.

Data Collection

Data were collected from participants in both groups via questionnaires on the trial website at baseline and after 2, 4, 6, and 32 weeks. For successful completion of questionnaires at postintervention (6 weeks) and follow-up (32 weeks; 6 months after postintervention), participants were rewarded with 2 cinema tickets.

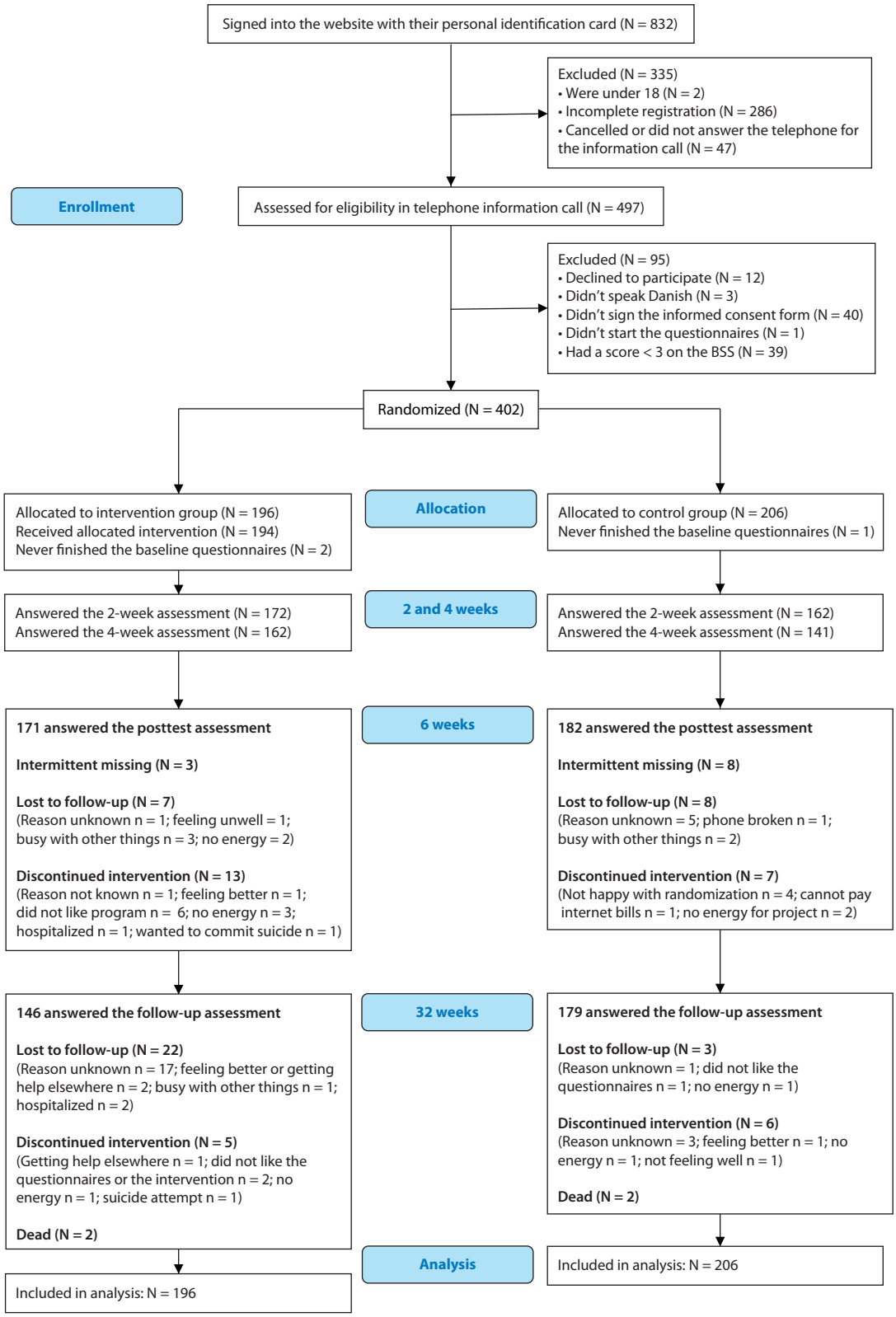
Outcomes

The primary outcome was level of suicidal ideation, measured using the BSS at postintervention.[17,18]

Different secondary outcomes were examined to secure a wider assessment of the effect of the intervention. These included depressive symptoms (6-item Hamilton Depression Rating Scale [HDRS-6]),[19] level of hopelessness (Beck Hopelessness Scale),[20] level of worrying (Penn State Worry Questionnaire-Past week),[21] and level of quality of life (WHO-5 Well-Being Index).[22] The Suicidal Ideation Attributes Scale[23] was used as a secondary measure of suicidal ideation. Although a pre-post difference of 6.48 points was considered clinically significant in the original trial,[6] we opted for a pre-post difference of 6 points on the BSS as more meaningful because BSS does not operate with decimal points.

The Trimbos/iMTA questionnaire for Costs associated with Psychiatric Illness[24] was used to collect demographic information. The Major Depression Inventory was used to assess whether participants presented symptoms that qualified for a diagnosis of depression according to the *ICD-10* or the *DSM-IV*.[25]

Figure 1. CONSORT Diagram



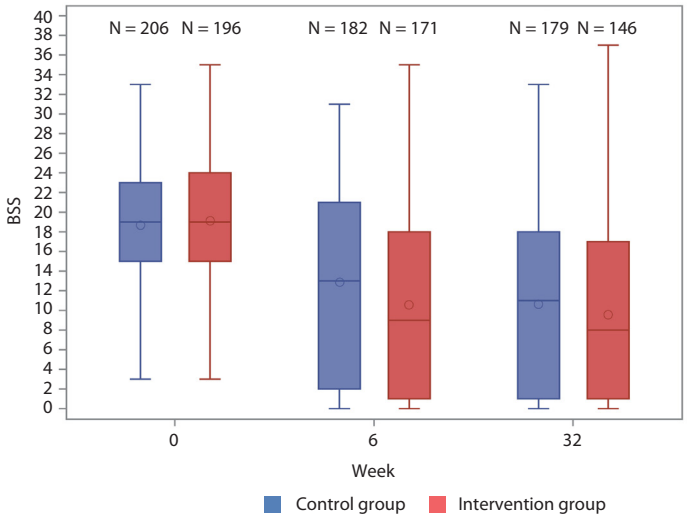
Abbreviation: BSS = Beck Scale for Suicide Ideation.

Table 1. Baseline Characteristics[a]

Variable	Control group (N = 206)	Intervention group (N = 196)
Female sex	146 (71)	139 (71)
Age, mean (SD), y	34.3 (13)	32.8 (13)
Civil status		
Married or living with a partner	50 (24)	49 (25)
Not married and does not live with a partner	127 (62)	121 (62)
Divorced	24 (12)	22 (11)
Widow(er)	5 (2)	3 (2)
Unknown	0 (0)	1 (1)
Highest education level		
Upper secondary school or lower	94 (46)	94 (48)
Vocational education	48 (23)	51 (26)
University	47 (23)	32 (16)
Other	17 (8)	18 (9)
Working or studying	112 (54)	110 (56)
In treatment	109 (53)	110 (56)
Hospitalized or in acute psychiatric care	7 (3)	10 (5)
Community mental health services or social psychiatry	11 (5)	16 (8)
Outpatient treatment	28 (14)	16 (8)
Psychiatric treatment	21 (10)	27 (14)
Psychologist or other therapist	37 (18)	37 (19)
General practitioner	2 (1)	2 (1)
Not specified	3 (2)	1 (1)
Not in treatment	96 (47)	85 (43)
Unknown	5 (2)	6 (3)
Lifetime history of suicide attempts		
Never	98 (48)	93 (48)
Once	40 (19)	46 (24)
More than once	68 (33)	57 (29)
ICD-10 diagnosis, Major Depression Inventory		
No depression	57 (28)	44 (23)
Mild depression	4 (2)	4 (2)
Moderate depression	54 (26)	47 (24)
Severe depression	91 (44)	100 (51)
DSM-IV diagnosis, Major Depression Inventory		
Major depression	162 (79)	158 (81)

[a]Data (except for age) expressed as n (%).

Figure 2. Boxplot of Suicidal Ideation at Baseline, Postintervention and Follow-up[a]



[a]The central circle corresponds to the sample mean, and the center horizontal line corresponds to the sample median. The top and bottom of the box correspond to the interquartile range (50% of BSS scores), and the whiskers show the maximum and minimum scores.
Abbreviation: BSS = Beck Scale for Suicide Ideation.

For participants in the intervention group, their time in and use of the program was collected through the website. Their evaluation of the program was obtained with the Internet Evaluation and Utility Questionnaire.[26] Negative effects were also explored. If the participants answered in the affirmative to having experienced negative effects from the intervention program, they were asked to describe these in an open-ended question.[27]

Safety Procedures and Adverse Events

During the enrollment interviews by telephone, participants who were not in treatment were encouraged to seek help while participating in the trial and were informed about relevant treatment options. Participants were contacted by telephone if they scored above 26 on the BSS on one of the 5 data collection points, and participants in the intervention group were contacted if they did not begin a new module within 10 days of its release. If a participant could not be reached within 3 days or if the research team was concerned about their safety, the designated contact person was called. Participants could contact the research team by text or telephone if they had questions.

Suicide attempts were assessed through self-reported information at postintervention and follow-up and with hospital records from the National Patient Register at week 6 and 16 (*ICD-10*: X60–X84 or suicide attempt as reason for contact). Information on deaths was obtained from the Civil Registration System and the Cause of Death Register.

Statistical Analysis

Baseline variables were compared to check the balance of the two randomized groups. All statistical analyses were performed according to the intention-to-treat principle. Differences at postintervention and follow-up between the intervention and control group, with respect to the level of suicidal ideation and depression symptoms, were analyzed using linear mixed models with repeated measurement points (baseline and 2, 4, 6, and 32 weeks) and an unstructured covariance. The remaining secondary outcomes were assessed using analyses of covariance based on Monotone missing multiple imputation models with measurement points at baseline, 6 weeks, and 32 weeks. Cohen's *d* analyses were performed to determine the difference in effect between the groups. The difference between the groups on significant clinical improvement (reduction of 6 BSS points between baseline and postintervention) was calculated with a logistic regression analysis.

All statistical models used the baseline value of the given questionnaire and the stratification variable as covariates. The multiple imputations predictions were based on the baseline scores of the BSS, HDRS-6, and the scale in question and classified for stratification and randomization group. Sensitivity analyses based on placebo imputations and penalty scores tested the robustness of the findings for the primary outcome.

Table 2. Outcome Measure Scores at Baseline, Postintervention, and Follow-up and Differences Between the Groups

Variable	Control group (n = 206), Mean (SD)	Intervention group (n = 196), Mean (SD)	Estimate mean difference (95% CI)[b]	Cohen's *d*[c]	*P* value[b]
BSS[a]					
Baseline	18.67 (5.99)	19.14 (6.58)			
Postintervention	12.88 (9.36)	10.59 (9.70)	2.91 (1.28 to 4.54)	0.25	**.0005**
Follow-up	10.64 (9.46)	9.57 (9.30)	1.97 (0.20 to 3.74)	0.09	**.0295**
HDRS-6[a]					
Baseline	12.69 (4.28)	13.59 (4.06)			
Postintervention	9.95 (5.92)	9.21 (6.00)	1.30 (−0.02 to 2.28)	0.12	.0536
Follow-up	8.42 (5.86)	8.36 (5.73)	0.06 (−1.21 to 1.34)	0.00	.3985
SIDAS[d]					
Baseline	29.62 (9.00)	30.31 (8.68)			
Postintervention	22.86 (12.38)	20.95 (12.28)	2.38 (0.12 to 4.65)	0.15	**.0391**
Follow-up	16.71 (11.94)	14.74 (12.40)	2.11 (−0.30 to 4.52)	0.15	.0855
BHS[d]					
Baseline	15.08 (4.22)	15.14 (3.87)			
Postintervention	13.56 (5.61)	11.50 (6.00)	1.98 (0.97 to 3.00)	0.31	**<.0001**
Follow-up	11.32 (6.27)	9.60 (6.49)	1.34 (0.14 to 3.73)	0.20	**.0277**
PSWQ-PW[d]					
Baseline	66.46 (14.00)	66.29 (12.86)			
Postintervention	63.00 (15.54)	57.99 (14.60)	5.19 (2.36 to 8.10)	0.33	**.0003**
Follow-up	59.30 (16.18)	55.54 (17.41)	3.37 (0.16 to 6.59)	0.19	**.0398**
WHO-5[d]					
Baseline	21.72 (14.18)	20.45 (14.69)			
Postintervention	33.15 (23.58)	34.91 (22.20)	−2.85 (−7.06 to 1.35)	0.09	.1834
Follow-up	39.44 (24.43)	43.72 (24.84)	−4.73 (−9.65 to 0.19)	0.16	.0596

[a]Linear mixed model analyses.
[b]Estimate is based on mixed linear models or multiple imputation ANCOVA.
[c]Estimate is based on multiple imputations.
[d]ANCOVA analyses.
Abbreviations: ANCOVA = analysis of covariance, BHS = Beck Hopelessness Scale, BSS = Beck Scale for Suicide Ideation, HDRS = 6-item Hamilton Depression Rating Scale, PSWQ-PW = Penn State Worry Questionnaire-past week, SIDAS = Suicidal Ideation Attributes Scale, WHO-5 = 5-item World Health Organization Well-Being Index.

For sensitivity analyses of the secondary outcomes, missing values were coded with either very low (10% quartile) or high (90% quartile) scores. Fifty imputations were conducted for the secondary imputation analysis, and 10,000 imputations were performed for the sensitivity analyses of the primary outcome.

We estimated that to detect a Cohen's *d* effect size of 0.30 with a type 1 error probability of 0.05 and 80% power, a total of 350 participants were required. When accounting for a 20% dropout rate, the total required sample size was 438 participants.

Analyses were primarily conducted using SAS Studio.

RESULTS

Between September 13, 2016, to September 2, 2018, a total of 832 individuals initiated the enrollment procedure (Figure 1). Of these, 335 (40.3%) did not fulfill the inclusion criteria, submitted an incomplete registration, or did not respond. In all, 497 individuals received information about the study by telephone, and 438 provided written consent and were randomized. Unfortunately, due to a procedural error on the website, 36 participants with a score under 3 on the BSS were included. This mistake was first discovered half a year after the inclusion had ended, and the 36 participants were then removed from the dataset. Of the 402 remaining participants, 206 had been randomized to the control group and 196 to the intervention group. All 402 participants were included in the analyses that were by original assigned groups.

The participants had primarily been recruited from the Danish Lifeline (49.8%) or had found the study on the internet (29.4%).

The mean age of participants was 33.6 years; 70.9% were female and 55.2% were working or studying. One third (31.1%) reported a history of more than 1 suicide attempt, and 54.5% were in psychiatric or therapeutic treatment. At baseline, 44 participants (10.9%) experienced severe suicidal ideation (> 26 BSS). There was no difference between the groups with respect to demographic or clinical measures (Table 1).

The retention rates on the self-report questionnaires were 87.8% at postintervention and 80.8% at follow-up. No significant differences were noted between participants who answered the postintervention questionnaires and those who did not.

Primary Outcome

The intervention group had at postintervention a significantly lower level of suicidal ideation compared to the control group (mean difference = 2.91; 95% CI, 1.28 to 4.54; *P* = .0005) (Figure 2).

A Cohen's *d* analysis showed a small effect size of 0.25 in favor of the intervention group. More participants in the intervention group (63.0%) than in the control group (45.6%) experienced a clinically significant reduction in their suicidal ideation, defined as a 6-point reduction on the BSS ($P = .002$). At follow-up, the difference between the groups on suicidal ideation remained significant (mean difference = 1.97; 95% CI, 0.20 to 3.74; $P = .0295$).

Secondary Outcomes

There were at postintervention significant between-group differences in favor of the intervention group for levels of hopelessness (mean difference: 1.98; 95% CI, 0.97 to 3.00; $P = .0003$); worrying (mean difference: 5.19; 95% CI, 2.36 to 8.10; $P = .0003$); and suicidal ideation measured using the Suicidal Ideation Attributes Scale (mean difference 2.38; 95% CI, 0.12 to 4.65; $P = .0391$). These differences remained at follow-up for hopelessness and worrying (Table 2).

Complete case analyses of the secondary outcomes did not render different results than the multiple imputation analyses, except for the analysis of quality at life that was significant at follow-up (Supplementary Table 1).

Sensitivity Analysis

Over the first 6 weeks, 37 participants dropped out. The trial manager systematically collected reasons for dropout and categorized these for the sensitivity analyses for the primary outcome. Out of the 37 participants, 14 participants were busy with other things (exams, traveling, moving, etc) and categorized with a "neutral" dropout reason; 14 participants lacked energy, were hospitalized, or felt unwell and were categorized with a "negative" dropout reason; 9 participants were categorized with an "unknown" dropout reason. The sensitivity analysis for the primary outcome (Supplementary Figure 1) and secondary outcomes showed the results at postintervention to be robust for suicidal ideation (measured with the BSS), hopelessness, and worrying.

Program Usage

Data from the website showed that 65.3% of participants in the intervention group worked with 4 or more of the modules and 34.2% completed exercises in all 6 modules. They self-reported having spent an average of 19.4 minutes per day working with the exercises in- and outside the program. The research team had a written correspondence in the program with 81.6% of the participants, and 5.7 messages were on average sent between each participant and the research team during the 6 weeks.

Evaluation and Negative Effects

As many as 77.8% of the participants evaluated the information in the program to be mostly or very useful. Around half (48.5%) stated that it was very likely that they would use it again if their difficulties continued or returned. Negative effects were reported by 28 participants (16.8%). The trial manager categorized these as follows (1 was not classifiable): 19 had experienced negative emotions or felt worse after having worked with some of the exercises; 5 had experienced an increase in suicidal ideation; and 3 had felt stressed or guilty for not having worked more with the program. A total of 25 participants who reported negative effects communicated to the research team that they experienced difficulties with the program or that they felt unwell.

Approximately half of the participants who reported negative effects (15 participants) experienced a clinically significant improvement on the BSS at postintervention.

Safety Procedures

A total of 30 participants in the control group (14.6%) and 38 participants in the intervention group (19.4%) received a phone call during the 6-week study period because of a high BSS score (> 26). Furthermore, 47 participants in the intervention group received a phone call due to inactivity. In both groups, several participants contacted or were contacted by the research team (23 in the control group vs 21 in the intervention group) due to questions about the study or elevated suicidal ideation. Contact persons of 17 participants in the control group (8.3%) and 23 participants in the intervention group (11.7%) received a telephone call because the research team was concerned about the participants' safety. In total, 23.3% of the participants in the control group and 42.9% of the participants in the intervention group were called or had their contact person called during the 6-week intervention period.

Harms

Combining the self-reported and hospital-recorded data, 27 participants (6.7%), 12 in the control group vs 15 in the intervention group had attempted suicide within the first 6 weeks. A total of 44 participants (10.9%) had attempted suicide during the entire study period, 22 in each group.

For the participants with the most severe suicidal ideation at baseline (BSS > 26), 3 out of 19 in the control group (15.8%) and 7 out of 25 in the intervention group (28.0%) had attempted suicide within the first 6 weeks.

Four deaths were recorded between postintervention and follow-up, 2 in each group. For 3 of these, information on the cause of death was available: 2 had died by suicide (1 in the intervention group and 1 in the control group), while the other died by another cause (control group).

DISCUSSION

The results of our study showed that the intervention group was superior to the control group in reducing suicidal ideation, hopelessness, and worrying over 6 weeks. Six months after the intervention had ended, the effect remained significant for suicidal ideation, hopelessness, and worrying. The combination of the self-help exercises, the written guidance, and the safety calls due to inactivity is the likely reason why the intervention group experienced a higher reduction in suicidal ideation than the control group.

Clinically significant improvements in suicidal ideation were found for 63% and 46% of the participants in the intervention vs control group. This is higher than in the original Dutch study in which 35% in the intervention group and 21% in the control group experienced clinically significant improvements. One explanation for the large improvements in both participant groups is likely the extended safety procedures, which meant that 23% vs 43% of the participants in the control group and intervention group, respectively, were called or had their contact person called during the 6-week intervention period. The participants could also receive written guidance, and 82% engaged in a correspondence with the research team. If all participants had received weekly feedback on the exercises, the effect of the self-help program would likely have been bigger.

The study is the first to report on negative effects of the internet-based self-help program, and the results indicate that exercises that are normal in regular face-to-face therapy might be too challenging for some individuals with suicidal ideation to work with on their own. Many of the participants who reported negative effects communicated to the research team that they were struggling with the program. It therefore seems likely that including a support component to the intervention may secure a high retention rate and prevent elevated distress.

Limitations

The inclusion goal of 438 participants was not accomplished, but due to the 88% retention rate the target sample size at postintervention was met and the sample size was sufficient. Hospital records were only available until the end of week 16, and the actual number of suicide attempts might therefore be higher. Data on causes of death were available only until the end of 2017.

CONCLUSION

The study strengthens the body of evidence showing that internet-based self-help therapy may be a valuable resource for people with suicidal ideation. We believe that internet-based self-help programs can be important suicide preventive tools, especially if implemented in guided versions where support and help with the therapeutic exercises are available.

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Author contributions: Drs Mühlmann, Nordentoft, Erlangsen, Kerkhof, and Madsen designed the trial, and Dr Nordentoft obtained the funding. Dr Mühlmann adjusted the Danish intervention and managed the trial. Dr Mühlmann conducted the statistical analyses with supervision from Drs Hjorthøj and Forman. The sensitivity analysis for the primary outcome was conducted by Dr Forman. Dr Mühlmann wrote the draft of the manuscript with supervision from Dr Erlangsen. All authors reviewed the manuscripts and provided revisions.

Potential conflicts of interest: **Dr Kerkhof** is the author of the Dutch internet-based self-help program described in this manuscript and receives royalties from an adapted paper version of the self-help program published under the title "Piekeren Over Zelfdoding." The other authors have no conflicts to disclose.

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Additional information: The data used in the study are owned by the Danish Research Institute for Suicide Prevention and the Danish Health Data Authority; access is available only for scientists approved by the Danish Data Protection Agency.

Supplementary material: Available at PSYCHIATRIST.COM

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Editor's Note: We encourage authors to submit papers for consideration as a part of our Focus on Suicide section. Please contact Philippe Courtet, MD, PhD, at pcourtet@psychiatrist.com.

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Supplementary Material

Article Title: Effectiveness of an Internet-Based Self-help Therapy Program for Suicidal Ideation With Follow-up at 6 Months: Results of a Randomized Controlled Trial

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List of Supplementary Material for the article

1. Table 1 — Complete Case Ancova Analyses of the Secondary Outcomes
2. Figure 1 — Sensitivity Analysis for the Primary Outcome Showing the BSS Treatment Effect at Post-Intervention, Using Multiple Placebo Imputations and Penalty Scores

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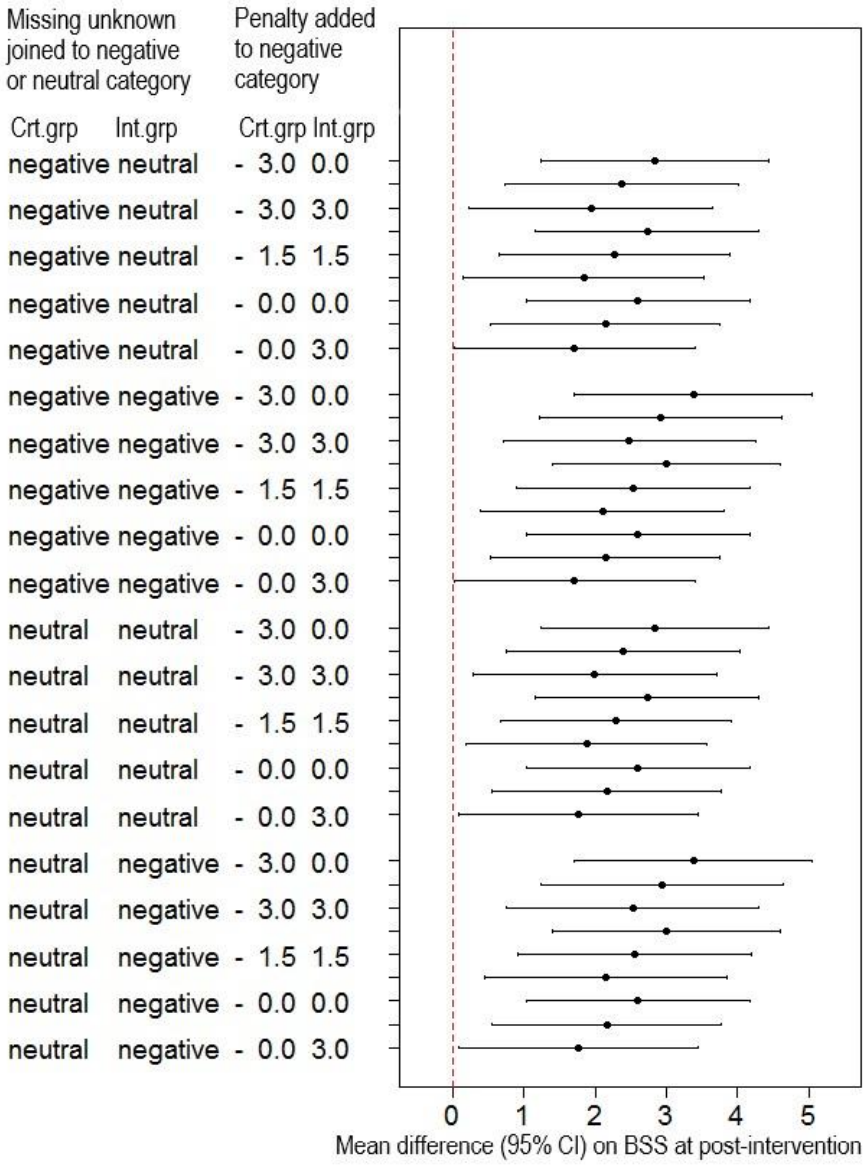
Supplementary Table 1. Complete case Ancova analyses of the secondary outcomes

Variable	Control group (n=206), Mean (SD)	Intervention group (n=196), Mean (SD)	Mean difference (95% CI)	*p*-value
SIDAS				
Post-intervention	22.86 (12.38)	20.95 (12.28)	2.26 (0.01;4.51)	**0.0489**
Follow-up	16.71 (11.94)	14.74 (12.40)	2.25 (-0.23:4.72)	0.0751
BHS				
Post-intervention	13.56 (5.61)	11.50 (6.00)	1.92 (0.93;2.92)	**0.0002**
Follow-up	11.32 (6.27)	9.60 (6.49)	1.60 (0.35:2.85)	**0.0124**
PSWQ-PW				
Post-intervention	63.00 (15.54)	57.99 (14.60)	5.08 (2.29;7.87)	**0.0004**
Follow-up	59.30 (16.18)	55.54 (17.41)	3.76 (0.36;7.17)	**0.0305**
WHO-5				
Post-intervention	33.15 (23.58)	34.91 (22.20)	-2.82 (-7.13;1.48)	0.1976
Follow-up	39.44 (24.43)	43.72 (24.84)	-5.50 (-10.62;-0.39)	**0.0352**

SIDAS= Suicidal Ideation Attributes Scale. BHS= Beck Hopelessness Scale. PSWQ-PW= Penn State Worry Questionnaire-Past Week. WHO-5= 5-item World Health Organization *Well-Being Index*.

Supplementary Figure 1. Sensitivity analysis for the primary outcome showing the BSS treatment effect at post-intervention, using multiple placebo imputations and penalty scores



Crt.grp= Control group. Int.grp= Intervention group. Participants with missing data in the intervention group were after dropout treated as if they belonged to the control group and modelled after the control group's parameters. Missing data were then accounted for by categorizing dropout-reasons for participants in both groups as neutral, negative or unknown. Four main imputation sensitivity analyses were performed, where participants with an unknown dropout reason where either joined to the neutral or negative dropout category for both intervention groups respectively and a penalty per week since dropout of 3 BSS points (worst case), 1.5 BSS points (realistic case) or 0 BSS points (best case), were added to the participants' BSS score in the negative dropout-category.