# Evaluation of a Computerized Intervention for Learning to Re-Evaluate Suicidal Thoughts

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**Background.**

As rates of suicide have increased over the last several decades, research has identified that roughly two-thirds of individuals who attempt suicide do so within one year from the time that they begin to think about suicide. This suggests a greater need for interventions designed to specifically help individuals learn to cope with thoughts of suicide to interrupt the process by which thoughts may lead to suicidal behaviors (i.e., attempts). It is common that individuals with suicidal ideation may not understand where thoughts of suicide come from and are therefore distressed at the prospect they might never escape these thoughts. As a result, these individuals may attempt to distract from or avoid these thoughts in ways that contribute to suicidal ideation becoming more frequent and intense over the long-term. This 'experiential avoidance' of suicidal ideation is therefore an excellent target for treatment and has in fact been shown to help reduce the distress associated with suicidal thoughts in several treatment studies.

The intervention to be tested in this study seeks to reduce the distress related to suicidal thoughts by explaining that these thoughts are a normative response to extreme stress, and provides strategies that help individuals observe that suicidal thoughts are temporary (i.e., will not last "forever") and something they can tolerate without needing to rigidly control them. To maximize the potential of this intervention to help the largest number of individuals, it is entirely computerized and takes only 30 minutes to complete. This will help reduce many of the traditional barriers to treatment that individuals with suicidal ideation face (e.g., costs, time restrictions, and stigma of help-seeking).

**Objectives.**

Individuals (N=106) with current suicidal ideation will be randomly assigned to participate in either the experiential avoidance intervention for suicidal thoughts or a control intervention. Experiential avoidance (i.e., distress or avoidance) and severity of suicide risk will be measured one week, and one month after participants complete their assigned intervention. It is hypothesized that, compared to controls, individuals who receive the experiential avoidance intervention will report: 1) less experiential avoidance at one week follow-up, and 2) less severe suicide risk at one-month follow-up.

**Design.**

This is a double-blinded randomized treatment trial with two-arms (active and control conditions).

**Power Analysis**.

An a prior power analysis was conducted. Expected effect size was estimated given the reported effect of a similar single-session computerized intervention in a prior study. Compared to a health intervention control, Schmidt, Norr, Allan, Raines, and Capron (2017) reported a small-sized effect ($f$ = .18) of a brief computerized intervention for Anxiety Sensitivity on pre-intervention to one-month change in BSS suicidal ideation scores among participants (N = 72) with current suicidal ideation. Like REST, the active intervention described in that study was delivered by computer, sought to de-catastrophize cognitive symptoms of mental dyscontrol and anxiety, and led participants through exercises to demonstrate a sense of control over mental and physical symptoms of anxiety. Projecting a similar small-sized ($f$ = .18) main effect of REST on BSS suicidal ideation at one-month follow-up, estimating power to be 80%, and using an alpha value of .05, a two-group a priori repeated measures (i.e., pre-intervention and one-month follow-up) power analysis conducted in G*Power (version 3.1.9.2) suggested a sample size of 88. To further account for a 20% attrition rate at one-month follow-up, 106 participants were anticipated to be recruited for this study.

**Methods.**

At the baseline appointment participants provided written informed consent to participate in the study. Next, they completed a battery of self-report measures including the AAQ-SI, WBSI-SI, and BSS. Next, participants completed their assigned intervention condition from a desktop computer in a private room. Participants were assigned to intervention condition according to a random numbers table that was created prior to participant recruitment. Following the intervention all participants completed the AAQ-SI. Participants then spent two minutes writing about their recent suicidal thoughts, followed by a five-minute thought monitoring period, after which they completed the WBSI-SI to measure avoidance of suicidal ideation during the thought monitoring period. Lastly, a graduate-level clinician collaborated with participants to generate a safety plan for mitigating risk of future suicide attempt. Participants were then debriefed on the day's appointment, scheduled for their one-week follow-up check-in, and compensated ($20 or two research credits) for participation.

At the one-week follow-up appointment participants were sent an email containing a web-link to complete a battery of self-report follow-up questionnaires including the AAQ-SI, WBSI-SI, and BSS via Qualtrics. Completion of this survey triggered an email alert to study personnel, after which a suicide risk check-in was conducted over the telephone with a graduate-level clinician. Clinicians also helped participants update their individual safety plans as needed. Participants were then reminded of the date for their one-month follow-up check, and confirmed compensation for that appointment ($5 Amazon gift card or 0.5 research credits. These same procedures were followed for the one-month follow-up appointment, with the addition of debriefing following the one-month appointment. All participants in the control condition were offered the opportunity to complete the REST intervention following their last follow-up appointment. All procedures were approved by the Florida State University Institutional Review Board.

**Statistical Analysis Plan.**

**Power Analysis.** An a prior power analysis was conducted. Expected effect size was estimated given the reported effect of a similar single-session computerized intervention in a prior study. Compared to a health intervention control, Schmidt, Norr, Allan, Raines, and Capron (2017) reported a small-sized effect ($f$ = .18) of a brief computerized intervention for Anxiety Sensitivity on pre-intervention to one-month change in BSS suicidal ideation scores among participants ($N$ = 72) with current suicidal ideation. Like REST, the active intervention described in that study was delivered by computer, sought to de-catastrophize cognitive symptoms of mental dyscontrol and anxiety, and led participants through exercises to demonstrate a sense of control over mental and physical symptoms of anxiety. Projecting a similar small-sized ($f$ = .18) main effect of REST on BSS suicidal ideation at one-month follow-up, estimating power to be 80%, and using an alpha value of .05, a two-group a priori repeated measures (i.e., pre-intervention and one-month follow-up) power analysis conducted in G*Power (version 3.1.9.2) suggested a sample size of 88. To further account for a 20% attrition rate at one-month follow-up, 106 participants were anticipated to be recruited for this study.

**Equivalence of Random assignment.** Equivalence of random assignment to condition was evaluated with independent sample t-tests for continuous variables and chi-square tests of independence for categorical variables. There were no significant differences observed between intervention conditions for any demographic variables (e.g., age, sex, race; all $p$'s > .622) or psychological variables at baseline (e.g., AAQ-SI, WBSI-SI, BSS; all $p$'s > .210)

**Missing Data**. All variables were evaluated for missing data at each study time point. No missing values were identified at the baseline, post-intervention, or thought monitoring time-points. At one-week follow-up there were four values (4.2% of cases) missing. At one-month

follow-up there were 20 values missing (20.8% of cases). Little's test for data MCAR was non-significant ($\chi^2[38] = 48.42$, $p = .120$), suggesting that values were indeed MCAR. The a priori plan for handling longitudinal missing data, assuming data MCAR and equivalence of random assignment, was to replace missing values with the last-observation-carried-forward method.

**Differences among completer samples**. Baseline differences were evaluated among individuals who complete the one-month follow-up (i.e., completers) and those who were lost-to-follow-up (i.e., non-completers). Equivalence of random assignment to condition was evaluated with independent sample t-tests for continuous variables and chi-square tests of independence for categorical variables. There were no differences among those who provided complete data versus those who were lost to follow-up on any demographic variables (all $p > .511$) or baseline psychological variables (all $p$'s $> .249$). Similarly, there were no significant differences between conditions with respect to completer status, $\chi^2(1) = 1.64$, $p = .200$.

**Assumptions of Normality**. All self-report outcome variables were assessed for skewness, kurtosis, and outliers. Outliers were hand-corrected utilizing the interquartile range (IQR), to fall at the value 1.5xIQR +/- Q3/Q1. No AAQ-SI data were corrected. Five low-lying outliers were corrected to Q1-1.5xIQR for the WBSI-SI. One high value was corrected to Q3+1.5xIQR for the BSS. After correction, all values evidenced acceptable skew and kurtosis values of < |2|.

**Change scores.** Standardized residualized change scores were calculated for all outcome variables by regressing scores of each measure at the follow-up time point (i.e., one-week for AAQ-SI and WBSI-SI, and one-month for BSS) onto scores of their respective baseline measure.

**Primary Analyses**. All analyses were conducted in SPSS Version 26. To examine the first primary outcome, the direct effect of condition on change in distress of suicidal ideation at one-week, a linear regression model was conducted with condition as the independent variable and standardized residualized change in AAQ-SI the dependent variable. To examine the second primary outcome, the direct effect of condition on change in suicidal ideation severity one-month, a linear regression model was conducted with condition as the independent variable and standardized residualized change in BSS the dependent variable.

**Secondary Analyses.** To examine the first secondary outcome, the direct effect of condition on change in avoidance of suicidal ideation at one-week, a linear regression model was conducted with condition as the independent variable and standardized residualized change in WBSI-SI the dependent variable.