Predicting Suicidal Ideation in Psychiatrically Hospitalized Veterans Using the Death/Suicide Implicit Association Test: a Prospective Cohort study

Eric G. Smith[1*]

Alexandra Howard[1]

Mark Schultz[1]

Mingfei Li[1,2]

Paola Salvatore[1,3]

Brian O'Shea[4,5]

1 Department of Veterans Affairs, VA Bedford Healthcare System, Bedford, MA

2 Department of Mathematical Sciences, Bentley University, Waltham, MA

3 International Consortium for Bipolar and Psychotic Disorders Research, McLean Hospital, Belmont, MA

4 Department of Psychology, Harvard University, Cambridge, MA

5 School of Psychology, University of Nottingham, Nottingham, United Kingdom

Correspondence:

Eric G. Smith, Center for Healthcare Organization and Implementation Research (CHOIR), VA Bedford Healthcare System, 200 Springs Road (152), Bedford, MA 01730, USA

Eric.Smith5@va.gov

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Death Implicit Association Test in Inpatients

Introduction: We investigated whether the Death/Suicide Implicit Association Test (D/S-IAT) predicted suicidal ideation (SI) in psychiatric inpatients.

Methods: 180 Veterans admitted for either SI or suicidal behavior (SB) (the primary sample) (N=90) or alcohol detoxification (N=90) completed the D/S-IAT and scales measuring SI. Correlation and regression coefficients were measured between the D/S-IAT (as a full-scale or dichotomized score [D>0]) and self-reported current or imminent SI (over the next 1-3 days).

Results: In the primary sample, the full-scale D/S-IAT was significantly correlated with the intensity of current SI ($r=0.22$, $p=.04$) and especially with wishes to be dead ($r=0.35$, $p<.001$). The intensity of imminent SI was significantly predicted by the full-scale ($p=.02$) and dichotomized D/S-IAT score ($p=.05$) in a multiple regression model. However, no significant associations were observed when both the D/S-IAT score and current (present/absent) or imminent SI (occurred/did not occur) were dichotomous measures. In participants receiving alcohol detoxification, the D/S-IAT significantly predicted only wishes to be dead ($r=0.33$, $p<.001$).

Conclusion: The full-scale D/S-IAT score predicted the current intensity of wishes to be dead in both inpatient samples, and current and imminent SI in participants admitted for SI/SB. The dichotomized D/S-IAT score did not predict the simple occurrence of SI.

Keywords

Veterans

Implicit association test

Suicide

INTRODUCTION

Studies performed by our group (Smith et al., 2013) and others (Carter et al., 2017; Isometsa et al., 1995; Kleiman et al., 2017; Nock et al., 2009; Wilson et al., 2000) have suggested that individuals who are most at risk of suicidal behavior may not accurately disclose their suicidal ideation. For example, we observed that a large percentage (73-85%) of Veterans with a history of depression dying from suicide were recorded as denying suicidal ideation at their final healthcare encounter, even if the final visit occurred within seven days of their suicide death (Smith et al., 2013).

The need to improve suicide risk assessment is particularly acute in U.S. Veterans. Suicide rates rose 33% faster among Veterans than non-Veterans from 2001-2020, and age- and sex-adjusted suicide rates in 2020 were 57% higher among Veterans than non-Veterans (Office of Mental Health and Suicide Prevention, 2022). Veterans are also twice as likely to die by suicide than active service members (Kaplan et al., 2007).

The Implicit Association Test (IAT) (Greenwald et al., 1998; Greenwald et al., 2003) was designed to measure automatic associations reflective of attitudes/biases. A version of this test, the Death/Suicide Implicit Association Test (D/S-IAT), has been developed to assess an individual's inclination towards suicidal behavior (Nock et al., 2010; Tello et al., 2020). The D/S-IAT measures reaction times as individuals sort words related to concepts of "Death" and "Life" in directions that also, implicitly but not explicitly, pertain to self-identification (the concepts of "Me" versus "Not Me") (De Houwer, 2019). The test thus attempts to detect an individual's implicit tendencies to self-identify with death or suicide, similar to how other IATs detect implicit attitudes towards race or other characteristics (Greenwald et al., 1998).

Initially, D/S-IAT research focused on investigating associations between the D/S-IAT and suicidal behavior (Nock et al., 2010; Randall et al., 2013). Nevertheless, four studies have reported significant associations between the D/S-IAT and current suicidal ideation (Ellis et al., 2016; Glenn et al., 2017; Moreno M, 2020; Rath et al., 2018; Wang et al., 2022; Wortzel et al., 2017). Only one study in adult inpatients has examined if the D/S-IAT is associated with future suicidal ideation, and showed that the D/S-IAT at admission predicted suicidal ideation approximately six weeks later (at discharge) (Ellis et al., 2016). Among adolescent inpatients, the D/S-IAT predicted suicidal ideation at discharge among inpatients who stayed 14 days or longer, but not for inpatients who stayed fewer days (Glenn et al., 2017). Other studies with adolescents have reported significant associations between the D/S-IAT and future suicidal ideation over 6-12 months, although these associations weakened when adjusting for other factors (Glenn et al., 2019; Shin et al., 2023). To our knowledge, no studies have specifically examined the relationship between the D/S-IAT and imminent suicidal ideation (i.e., over the next several days), a period of distinct relevance for inpatient and outpatient safety.

We sought to examine whether the D/S-IAT was associated with self-reported suicidal ideation among newly-admitted psychiatric inpatients. Accurate evaluations of suicidal ideation are an important part of inpatient procedural safeguards against suicidal behavior (e.g., influencing the frequency of “safety checks”, level of independent privileges, etc.).

Our primary hypothesis was that the D/S-IAT would be associated with current suicidal ideation in newly-admitted Veteran inpatients. We were interested in predicting current suicidal ideation since initial decisions about safeguards for inpatients can be so

important. However, we also wanted to determine if the D/S-IAT was adding value to risk assessments beyond what was provided by typical risk factors. (If the D/S-IAT was only duplicating information from other risk factors, then it might prove simpler to just obtain information about these other risk factors, even though the D/S-IAT is fairly non-burdensome to administer). Our study design therefore included regression analyses to ensure that the D/S-IAT was not simply serving as a proxy for more traditional risk factor(s) (such as recent suicidal intent and depressive symptoms at admission, past suicidal behavior, past drug abuse, financial or legal troubles, marital/relationship stress, current alcohol use and depressive symptoms, and Emotion Dysregulation Syndrome (Borderline Personality Disorder) symptoms). Our major secondary hypothesis was that the D/S-IAT would predict imminent suicidal ideation (i.e., occurring over the next several days), adding considerably to the D/S-IAT's clinical value since decisions about patient safeguards are often revisited frequently in the first several days of an inpatient stay. Finally, we also evaluated the performance of the D/S-IAT in patients admitted for alcohol detoxification.

METHODS

Patient Sample

Study enrollment occurred at the acute inpatient psychiatry unit of the VA Bedford Healthcare System from February 21, 2017 to March 10, 2020. Recruitment was stopped early due to COVID-19 pandemic-related precautions. Our primary analysis sample consisted of individuals who were admitted for recent suicidal ideation (in the past week) or suicidal behavior (within the past 2 weeks). Because many Veteran inpatients are

admitted for alcohol detoxification, we also recruited a sample of individuals admitted for alcohol detoxification (some of whom had suicidal ideation on admission and some of whom did not). We chose *a priori* to exclude individuals admitted for alcohol detoxification from the primary analysis sample because it was not clear how well the D/S-IAT, a reaction time measure, would work in patients receiving substantial daytime doses of sedating medications.

Individuals qualifying for either sample were excluded if they: 1) were currently involuntarily committed (to avoid any unintended sense of coercion), 2) endorsed any of three acute psychosis screening questions, 3) either had Parkinson's disease, were unable to ambulate independently, or were receiving detoxification treatment for opiates, given the potential impact of these conditions on a second study aim (not reported on here) evaluating participants' movements and suicidal ideation (Indic et al., 2012).

All participants were pre-screened through their VA medical record and verbal report from hospital staff. Informed consent was obtained from all participants. The day of study enrollment was usually the day after their admission, but occasionally could be as long as 4 days or more post-admission.

The study was approved by the VA Bedford Healthcare System Institutional Review Board and registered, as a cohort study, in ClinicalTrials.gov (NCT03080168).

Implicit Association Test Administration

All participants were administered the D/S-IAT (Millisecond software, version 4, updated to version 5 during the study) once, on the day of their study enrollment. The test

was explained by research staff and then self-administered by the participant via laptop computer.

The D/S-IAT consists of 7 blocks of either 20- or 40-word trials. Early trials have participants practicing sorting words to the left or right related to the headers “Me” (“I”, “Mine”, “My”, “Myself”, “Self”) or “Not Me” (“They”, “Them”, “Their”, “Other”, “Theirs”) or “Life” (“Alive”, “Thrive”, “Breathing”, “Live”, “Survive”) or “Death” (“Die”, “Dead”, “Deceased”, “Lifeless”, “Suicide”) (Greenwald et al., 2003). Subsequent trials then have participants sort words with the headers of “Me” and “Not Me” paired on the same side of the screen with headers just below them for “Life” or “Death.” On one of two critical blocks, the headers “Me” and “Death” share a key press and “Not Me” and “Life” share another key press. On the other critical block, “Me” and “Not Me” switch locations from the previous critical block. The expectation is that participants will take longer to sort even a neutral word like “Myself” to the “Me” category if the header’s second word is a word they find incongruous with their current self-identification (e.g., “Life” if they are explicitly or implicitly contemplating suicide, or “Death” if they are not) (De Houwer, 2019). A score is generated (“D-score”) representing the difference between the response times of sorting words related to the pairings of “Me=Life” versus “Me=Death” (O'Shea et al., 2020).

Participants completing the D/S-IAT were excluded from our analyses if they met standard IAT exclusion criteria: either an error rate of > 30% for any trial block or > 10% of responses taking < 300 milliseconds (Greenwald et al., 2003).

Assessments

The study assessments are described below (and listed in Table 1, along with information about the validity or reliability for the measures used, when available):

1. **Current suicidal ideation:** At enrollment and daily during hospitalization, participants completed self-rated, 0-10 point visual analog scales (VAS) of the intensity of wishes to die or be dead ("I felt the wish to die or to be dead") (Indic et al., 2012) and thoughts of killing oneself ("I have had thoughts today of actually killing myself (Intensity of Thoughts)") thus far that day. ("That day" meant any occurrence in the daytime [typically 6+ hours] since participants had awoken). (We subsequently refer to the 0-10 VAS assessing thoughts of killing oneself as assessing "current" suicidal ideation, even though in some cases the rating may actually reflect suicidal ideation earlier that day).

The VAS scale of wishes to die or be dead was included because it was the exact question previously used in the research that our study's movement component was seeking to replicate. The VAS was based on an item from the Eppendorf Mood Scale (Supprian, 1975) that has been part of a VAS symptom questionnaire used extensively for research and clinical purposes in an outpatient mood disorders clinic. The VAS scale about actual thoughts of killing oneself was worded by the investigators to boost the 0-10 point scale's presumed inpatient relevance, a setting where thoughts of killing oneself might conceivably trigger more intensive clinical actions (e.g., more restrictive safety measures) than would simply wishes to be dead. (This item was also chosen as the primary outcome for that reason). Neither of these VAS items has been formally assessed for validity, however, 0-10 scales are often used clinically (e.g., for mood) and are recommended for assessing suicidal ideation by some experts (Shea, 1998). Such 0-10

scales are also intuitive and familiar to patients, and are used in other areas of medicine (e.g., for evaluating pain).

2. Suicidal ideation over the past 24 hours: Self-rated 0-4 point scales (from the 8-item Sheehan Suicidality Tracking Scale, 2009 version [S-STS], used with permission) (Coric et al., 2009) were administered at enrollment and daily during hospitalization. These scales measured "how seriously did you:" "think about suicide," "plan for a suicide," and "take active steps to prepare for a suicide attempt in which you expected or intended to die?" over the past 24 hours.

3. Suicidal ideation over longer time periods: An auxiliary study aim was to gain insight into whether the D/S-IAT appeared to be indexing just a participant's current suicidal ideation or their suicidal ideation over longer time periods (e.g., the past 1-2 weeks). Therefore the following scales were also administered at enrollment:

3A) Suicidal ideation during the past week (or 2 weeks if the participant was admitted for suicidal behavior): The Columbia Suicide Severity Rating Scale [CSSRS] was used. The CSSRS also includes questions about prior suicide attempts.

3B) Suicidal ideation frequency in the past 2 weeks: Item 9 of the 9-item Patient Health Questionnaire (PHQ-9) was used (Kroenke et al., 2001),

4. Other assessments: Participants' demographic characteristics were obtained through their VA medical records (age, gender, race, ethnicity) or questionnaires (education).

Depression (PHQ-9 (Kroenke et al., 2001) and current alcohol use (3-item AUDIT-C Screening Questionnaire (Meneses-Gaya et al., 2010)) were all assessed on the day of enrollment.

In addition, "yes/no" questions were asked at enrollment about the patient's history of drug abuse and current marital/relationship stress, financial or legal troubles (CSSRS Military Version) (e.g., "are you having any marital or relationship stress or problems?"). We also asked participants at enrollment about their total number of suicide attempts in the past year.

We also obtained additional background information the day after study enrollment about participants' lifetime suicidal behavior and ideation history (CSSRS lifetime measures) and administered the McLean Hospital rating scale for Emotion Dysregulation Syndrome (Borderline Personality Disorder) (used with permission) (Zanarini et al., 2003). Bipolar Disorder diagnostic information (Mini-International Neuropsychiatric Interview [MINI 7.0.2 August 2016] Module C) (Sheehan et al., 1998) was gathered on the day of and the day after enrollment. Twenty-seven participants (twelve participants in the primary analysis sample) were discharged before we could administer these measures on the day after enrollment, resulting in samples that were approximately 13-15% smaller for our multiple regression analyses.

Statistical Analysis

Spearman correlation coefficients were computed between the continuous D/S-IAT D-score and our primary outcome, the self-reported intensity (0-10 VAS) of current suicidal ideation (i.e., thoughts of killing oneself occurring on the day of enrollment). Correlations were also computed between the D/S-IAT and several other measures of suicidal ideation to assess the degree to which the D/S-IAT was indexing day-to-day ideation at enrollment, versus ideation over longer time frames, up to the past 2 weeks.

We then used generalized linear models with multiple independent variables (for simplicity, referred to as "multiple regression" subsequently) to examine the association of the D/S-IAT and other suicide risk factors with our primary outcome (the intensity of current suicidal ideation). The measure of our secondary outcome, the intensity of imminent suicidal ideation, averaged participants' responses on our primary outcome measure over the next 1-3 days (3 days in most cases, 1-2 days if the participant was discharged sooner). Goodness-of-fit testing indicated that a negative binomial regression provided an adequate fit for the intensity of suicidal ideation scores for our primary analysis sample. However, zero-inflated negative binomial regression provided a better fit for the participants admitted for alcohol detoxification (and for a *post hoc* exploratory analysis of imminent suicidal ideation in primary analysis patients initially denying suicidal ideation).

For imminent suicidal ideation, binomial models require integer values and some participants' 1-3 day averages were non-integer values (e.g., 1.33). Therefore the averaged values were rescaled (multiplied by 6) to create a set of integer values that exactly preserved the proportional relationship of the original average values. Predictors

entered into the multiple linear regression included the D/S-IAT score either as a continuous, full-scale variable (D-scores for the entire sample ranged from -1.34 to 1.09), or a dichotomous variable (D-scores > 0), along with other predictors of suicide risk.

The dichotomized form of the D-score was used in some of the multiple linear regression analyses to evaluate whether our primary analysis sample provided evidence to support using the D-score in its most basic form, as a simple “yes/no” (dichotomous) indicator of a higher intensity of SI. (For some clinical decision-making, simple “yes/no” thresholds for clinical action are seen as easier to interpret and implement).

We also evaluated by logistic regression whether the dichotomized D-score could either predict the presence or absence of any current, or the occurrence of any imminent, suicidal ideation (either of which might influence decisions about the level of inpatient safeguards that a patient might require).

RESULTS

Sample Description

Two hundred and twenty individuals consented to study participation. Eighteen individuals were excluded prior to study enrollment, 17 participants for not meeting inclusion/exclusion criteria (8 excluded for psychotic symptoms, 5 for also undergoing detoxification for opiates, and 4 who denied any recent suicidal ideation and did not need alcohol detoxification), and one participant withdrew consent. Out of the 202 enrolled participants, 22 were subsequently excluded: 13 participants had > 30% error rates for ≥1 D/S-IAT block, 3 participants had >10% responses of <300 milliseconds, 1 participant

completed the D/S-IAT after the day of enrollment, 2 participants never completed the D/S-IAT, and 3 participants disclosed they had given what likely were inaccurate answers concerning their suicidal ideation. The final participant sample had 90 participants in our *a priori* primary analysis sample (participants admitted for suicidal ideation not undergoing alcohol detoxification) and 90 participants in the sample admitted for alcohol detoxification (who may or may not have been experiencing suicidal ideation).

Table 2 summarizes the baseline characteristics of the two participant samples. In the primary analysis sample, 100% of participants had recent suicidal ideation or behavior, including 44% of participants with recent suicidal behavior (including completed, self- or other-interrupted, and preparatory behavior) in the past 2 weeks. Approximately 34% of the primary analysis sample had Bipolar Disorder, and 47% screened positive on the McLean Borderline Personality Disorder screening test.

Association between the D/S-IAT and Current Suicidal Ideation

In our primary analysis sample at study entry, the D/S-IAT had a significant, modestly-sized association with participant self-report of the intensity of thoughts that day of killing themselves (our primary outcome) ($r = 0.22$, $p=.04$), and a stronger association with wishes to die or to be dead ($r = 0.35$, $p < .001$) (Table 3A).

In the sample receiving alcohol detoxification, a significant association was observed between the D/S-IAT and wishes to be dead ($r = 0.33$, $p = .001$). (Table 3A), but not with self-reported thoughts of killing oneself ($r = 0.19$, $p = .08$).

Association between the D/S-IAT and Recent Suicidal ideation

Some significant associations between the D/S-IAT and suicidal ideation continued to be observed when the time frame of reported suicidal ideation was expanded to the past 1-2 weeks prior to admission (Table 3B). In general, the strongest associations were observed between the D/S-IAT and more pronounced measures of suicidal ideation (thoughts of suicidal method [r = 0.30, p=.005] or suicidal intention with a detailed plan [r = 0.23, p=.03]) over the past 1-2 weeks.

Regression Modeling of the D/S-IAT versus Current Suicidal Ideation

A multiple regression model that included the D/S-IAT (as a full-scale, continuous measure) with other risk factors for suicidal ideation or behavior indicated that the D/S-IAT was associated, in the primary analysis sample, with the intensity of current suicidal ideation largely independently of ten other risk factors (Table 4). (The D/S-IAT's coefficient and significance remained significant and largely unchanged when other covariates were included in the regression model (adjusted coefficient = 1.22 [0.23 – 2.21], p = .02). Furthermore, the D/S-IAT was equally or more strongly associated with current suicidal ideation than any of the other risk factors included in the model (Table 4). (Strictly speaking, the D/S-IAT had the strongest association with current suicidal ideation, although the difference between it and the Depression Score was slight).

No significant association was observed between the D/S-IAT and current suicidal ideation in the participants admitted for alcohol detoxification (Table 4, Additional Findings).

Regression Modeling of the D/S-IAT versus Imminent Suicidal Ideation

Table 5 shows how strongly the D/S-IAT and other risk factors were associated with imminent suicidal ideation (defined here as up to the next 3 days of inpatient care). When the D/S-IAT was used as a continuous measure, the D/S-IAT score was significant when other risk factors were included in the model (adjusted coefficient = 1.05 [0.20 – 1.92], p=.02), and was the second-most significant predictor of imminent suicidal ideation, behind only relationship stress (p=.004). The D/S-IAT was not a significant predictor of imminent suicidal ideation in participants undergoing alcohol detoxification (but neither were any other covariates) (Table 5, Additional Findings).

In *post hoc* exploratory analysis (Table 5, Additional Findings), the D/S-IAT also significantly predicted the intensity of imminent suicidal ideation in primary analysis participants who denied suicidal ideation on the day of D/S-IAT assessment in a regression adjusting for five other covariates (p = .005).

Associations between the Dichotomous Form of the D/S-IAT score and the Intensity of Current or Imminent Suicidal Ideation

The strength of association between the D/S-IAT and suicidal ideation outcomes weakened when the score was used as a dichotomous indicator (D>0 versus D<0), rather than the full-scale (continuous) score. As a dichotomous indicator, the D/S-IAT was no longer a significant predictor of the intensity of current suicidal ideation (Table 6A) in the primary analysis sample. However, in a regression model adjusting for other risk factors, the association between the D/S-IAT used as a dichotomous measure and the intensity of

imminent suicidal ideation just attained statistical significance (adjusted coefficient = 1.05 [0.01-2.10], p=.05) (Table 6B).

Associations between the Dichotomous Form of the D/S-IAT and a Dichotomous Measure of the Presence or Absence of Suicidal Ideation

When both the D/S-IAT score (D>0 versus D<0) and the suicidal thinking measures (0 versus > 0) were dichotomized (to investigate the simple application of the D/S-IAT as a "yes/no" indicator of the presence of any suicidal ideation), neither the D/S-IAT nor any other risk factor was significantly predictive (Table 7A). Similarly, when the dichotomous form of the D/S-IAT was used to predict a dichotomous measure of imminent suicidal ideation, neither the D/S-IAT or any other risk factor was significantly predictive (Table 7B). This lack of association was also observed for dichotomous forms of the other daily measures of imminent suicidal ideation (the S-STS and CSSRS) (Table 7, Additional Findings).

DISCUSSION

This study found that the Death/Suicide Implicit Association Test (D/S-IAT), a reaction time measure intended to detect implicit biases towards death or suicide, was significantly associated with current, recent, and imminent suicidal ideation in a U.S. Veteran inpatient sample (patients admitted for suicidal ideation or behavior without a need for alcohol detoxification). Strictly speaking, in this sample we observed that the full-

scale D/S-IAT was more strongly correlated with current suicidal ideation than any other risk factor assessed in a multiple regression model. Similarly, the D/S-IAT also predicted suicidal ideation over the next 1-3 days more strongly than any other risk factor assessed except an indicator of marital/relationship stress at admission. (In a sense, the D/S-IAT was the strongest “positive” predictor of imminent suicidal ideation since relationship stress at admission was actually associated with a decreased intensity of imminent suicidal ideation). The finding that it is possible to significantly predict what psychiatric inpatients reported concerning the intensity of both their current and upcoming suicidal ideation through an assessment that never asks directly about suicidal ideation may prove quite valuable.

Our study is the first to our knowledge to demonstrate an association between the D/S-IAT and imminent suicidal ideation over the next three days. Assessing imminent suicidal ideation is a clear clinical priority for acute inpatient care, since very high-risk patients need to be kept safe. Only two prior studies involving inpatients, to our knowledge, have investigated the association of the D/S-IAT and future suicidal ideation (Ellis et al., 2016; Glenn et al., 2017). Both of these studies examined longer time periods (approximately 2-6 weeks) than the 1-3 days assessed in this study. Of note, the relationship between the D/S-IAT and imminent suicidal ideation persisted among participants denying suicidal ideation initially, suggesting that the association with imminent suicidal ideation was not simply a reflection of the D/S-IAT’s potential to predict current suicidal ideation. This finding, while exploratory, is similar to a recent study of future suicidal behavior (Brent et al., 2023), and suggests that the D/S-IAT may help

address some of the well-recognized challenges of assessing risk in patients denying suicidal ideation (Bernecker et al., 2019).

To our knowledge, our study is also the first to demonstrate that the D/S-IAT was significantly associated with current wishes to be dead in a sample of patients admitted for alcohol detoxification, which involves treatment with medications (benzodiazepines) that typically slow reaction times.

In sum, our significant findings in a clinical sample of Veterans hospitalized for suicidal ideation or behavior are largely consistent with substantial prior literature (summarized in two meta-analyses (Moreno et al., 2022; Sohn et al., 2021)) indicating that the D/S-IAT is associated with suicidal ideation or behavior risk in clinical and non-clinical samples.

Our study also provided valuable information about risk factors for suicidal ideation in Veteran inpatients. We observed that participants' Depression and McLean Borderline Personality Disorder Screening Scale score and their history of nonalcohol substance abuse were significant predictors of current suicidal ideation, marital/relationship stress was a predictor of imminent suicidal ideation, and legal troubles were a significant predictor of both current and imminent suicidal ideation. These risk factors may be appropriate targets for additional clinical and/or research attention. In particular, confirmation of our finding of an inverse relationship (i.e., participants reporting marital/relationship stress actually endorsed less intense suicidal ideation over the next 1-3 days) is needed. Future studies ideally would also investigate possible mechanisms for this association, such as whether patients generally perceived their marital/relationship stress as diminishing while hospitalized, and whether a subset of these inpatients remain

at higher risk (e.g., those not perceiving a reduction in marital/relationship stress). Researchers or clinicians should also consider whether to follow up an endorsement of marital/relationship stress (or other psychosocial stressors) with more detailed evaluations of that specific risk factor on admission and during the hospitalization.

It is more difficult to judge what weight to assign to our largely nonsignificant findings involving the D/S-IAT in participants admitted for alcohol detoxification or the use of the D/S-IAT as a dichotomous measure. With only 90 participants each, our study samples were limited in their statistical power. In addition, the sedating properties of the medications given to treat alcohol withdrawal, or the symptoms of alcohol withdrawal itself (such as a coarse tremor), might conceivably affect the reaction time-based D/S-IAT D-score. Nevertheless, these factors did not prevent a strong association between the D/S-IAT and current wishes to be dead from being observed among participants admitted for alcohol detoxification.

Of note, despite the significant associations between the D/S-IAT and current, recent, and imminent suicidal ideation in our primary analysis sample, the associations we observed with current suicidal ideation were generally small-to-moderate in effect size. Unless observed effect sizes substantially increase in future studies, it is unclear to us whether the D/S-IAT will provide sufficient discrimination between individuals with and without suicidal ideation to be used routinely as a stand-alone assessment. We agree with other investigators who believe that the D/S-IAT will ultimately prove the most useful when used in a set of assessments (Barnes et al., 2017; Moreno et al., 2022; Randall et al., 2013; Sohn et al., 2021). However, our multiple regression findings suggest that the D/S-

IAT may be one of the most important elements to include in any such multi-component risk assessment.

The value of incorporating many data elements into predictive models has been supported in recent research with Veterans. A 64-variable risk score was found to identify Veterans who were at 60- to 80-fold increased risk of suicide death (McCarthy et al., 2015), and multivariate risk score models have outperformed individual risk factors for the prediction of overdose deaths (Oliva et al., 2017). Both of these prediction models used information solely from Veterans' electronic medical records. Ultimately, even stronger prediction might occur from combining electronic health data with data from patient interviews and the D/S-IAT or other testing.

Multi-component risk scores can also be accompanied by interpretive guidance and/or instructions for providers (Oliva et al., 2017). Guidance of this type might help clinicians understand how to use continuous D/S-IAT scores or continuous risk scores to help support clinical decision-making, since in our study continuous D/S-IAT scores were more predictive than simpler-to-interpret dichotomous D/S-IAT scores.

One reason the D/S-IAT may not have predicted imminent suicidal ideation well in participants admitted for alcohol detoxification may relate to the substantial changes these participants experienced in degree of alcohol withdrawal symptoms and in their doses of highly-sedating, but also potentially anxiety-relieving, benzodiazepines. (Benzodiazepines are often started, tapered and stopped over 3 days during treatment of alcohol withdrawal). These rapid and pronounced changes might have contributed to changes in suicidal ideation that were difficult to predict with a one-time measure. If so, it is possible

that the D/S-IAT might be less strong of a predictor of imminent suicidal ideation in other situations in which patients undergo highly variable circumstances after testing.

One possible strategy to address this concern (or to consider employing routinely) is repeated administration of the D/S-IAT. (D/S-IAT results would, however, need to remain valid with repeated administration. For online IATs, some reduction in scores has typically been noted after one repeat administration but then scores become more stable (Greenwald et al., 2003; Moreno et al., 2022)). Of note, repeat testing might not be overly burdensome: the D/S-IAT took patients only about 7 minutes to complete, a briefer D/S-IAT now exists (Millner et al., 2018), and one study using repeated inpatient D/S-IAT administration has already occurred (Ellis et al., 2016). If repeat administrations are not feasible, then consideration may need to be given to the optimum time to administer inpatients a single D/S-IAT assessment, such as on admission or near discharge (to facilitate discharge planning).

Limitations of our study included its single-site design, early termination, and moderate sample size. All of these would be expected to limit statistical power, as would condensing either the D/S-IAT or the suicidal ideation outcome to a dichotomous measure. Power would also be expected to be weaker for our analyses of the patients admitted for alcohol detoxification, since these participants were not required to have had recent suicidal ideation. (Indeed, as Table 2 shows, only 54% of these participants had recent suicidal ideation, compared to 100% of our primary analysis sample). Therefore, our largely nonsignificant findings concerning the patients receiving alcohol detoxification and concerning the D/S-IAT as a dichotomous predictor are perhaps best viewed as

preliminary. Our study also lacked the size to adequately investigate the value of using cutpoints other than 0 for dichotomized D/S-IAT D-scores.

Another study limitation is its reliance on participants' self report of their suicidal ideation to gauge the accuracy of the D/S-IAT, given that one potential role for the D/S-IAT is to help detect suicidal ideation in individuals who may not be self-disclosing such ideation. We attempted to minimize some drawbacks involving self-report by emphasizing to participants that we did not participate in decisions about whether to discharge or retain patients. Nevertheless, some participants may have misreported suicidal ideation due to stigma, or if they felt it was in their interest.

An additional limitation is that our primary measure of suicidal ideation, the 0-10 visual analogue scale of the intensity of suicidal ideation, has not been formally evaluated for validity. Nevertheless, in our correlation analysis of current suicidal ideation and in our logistic regression models, the results obtained with the 0-10 measure were similar to those obtained for the validated Sheehan Suicidality Tracking Scale and the Columbia Suicide Severity Rating Scale measures.

Because the D/S-IAT was administered after several questions concerning suicidal ideation and behavior, it is also not known whether some participants' D/S-IAT responses and/or their self-identification with death or suicide may have been influenced by these prior questions. This question merits further research since, as noted above, the D/S-IAT is likely to have particular value as part of a set of assessments.

Our findings may not generalize to all psychiatric inpatients. Our Veteran sample likely has a higher prevalence of male gender and certain comorbidities than some other

populations, and did not include patients requiring opiate detoxification, active psychosis, or other reasons for inpatient admission. Our sample also may have been less acute than some other inpatient samples, with only 22% of the primary analysis sample (and 7% of the participants admitted for alcohol detoxification) having completed a recent suicide attempt. Our patient samples also had voluntarily agreed to inpatient care, thus displaying help-seeking that may differentiate them from some populations at risk for suicidal ideation or behavior.

Counterbalancing these limitations is the fact that the D/S-IAT is very easy to administer, not time-intensive, and currently available at no or very low cost. Furthermore, in regression analyses we found the D/S-IAT to be both 1) independently related to suicidal ideation relative to a number of other risk factors, and 2) either the strongest, or one of the strongest, predictors of suicidal ideation.

In conclusion, our study of recently admitted Veteran inpatients found that, when used as a full-scale measure, the D/S-IAT was one of the two strongest predictors of which individuals were currently experiencing suicidal ideation and the strongest positive predictor of which participants were likely to report suicidal ideation over the next 1-3 days. However, we were unable to demonstrate in our moderately-sized sample that using the D/S-IAT as a dichotomous “yes/no” indicator would helpfully predict the simple presence or absence of suicidal ideation. Nor were we able to observe an association between the D/S-IAT and current or imminent suicidal ideation among individuals admitted for alcohol detoxification, although we did observe a strong association in these individuals between the D/S-IAT and current wishes to be dead. Future research is needed to investigate the role and optimal application of the D/S-IAT for assessing both suicidal ideation and suicidal

behavior risk, especially in larger samples and as part of multi-component risk assessments that might include medical record, interview, and testing data.

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Availability of data and materials:

This data is not available publicly since participants did not consent for use of the data outside of this study.

Ethics approval and consent to participate:

This study was approved by the VA Bedford Healthcare System Institutional Review Board. All methods were carried out in accordance with relevant guidelines and regulations. All the participants filled informed consent forms which were approved by the VA Bedford Healthcare System Institutional Review Board.

Consent for Publication of Previously Published Material:

Not applicable.

Conflict of Interest:

All the authors declare that they have no conflicts of interest with this research.

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Table 1. Study Measures			
Measure	**When Given**	**Information supplied**	**Source** **Available validity and reliability information**
Current Suicidal Ideation **(Ideation occurring today, either currently or in today's earlier waking hours)**			
0-10 point visual analog scales of suicidal ideation or the intensity of wishes to die or be dead	At Enrollment* and Daily	Intensity (0-10) of Current (i.e., thus far today) Suicidal Ideation or Wishes to Be Dead	Source: Indic et al., 2012, and (for active thoughts of suicide) the investigators of this study Support for the Visual Analog Scale format comes from its reported value for evaluating global vigor and global affect (Monk, 1989).
Current or Very Recent Suicidal Ideation **(Ideation in the past 24 hours, which could include currently)**			
Sheehan Suicidality Tracking Scale [S-STS], 2009 version 8 (used with permission)	At Enrollment and Daily	Intensity (0-4) of Suicidal Ideation or Wishes to Be Dead in the past 24 hours	Source: Coric et al., 2009 The S-STS has been shown in an Italian patient population to have acceptable internal consistency (Guttman's lambda2 of 0.86) and test-retest reliability (intra-class correlation coefficient of 0.88 (Preti et al., 2013), and in another patient population to have greater sensitivity (100%) for detecting suicidal ideation than the Hamilton Depression Scale suicidal ideation item (63%) (Coric et al., 2009).
Recent Suicidal Ideation (past 1-2 weeks)			
The Columbia Suicide Severity Rating Scale [CSSRS] (Severity Subscale)	At Enrollment and Daily	Degree of suicidal ideation (From Wishes to be Dead to Suicidal Ideation with Detailed Plan and Intent) in the past week, and then daily	Source: Posner et al, 2011. There was a strong relationship between the CSSRS severity subscale and the Montgomery-Asberg Depression Rating Scale suicidal ideation item ($r=0.63$, $p<0.001$; as well as with the Beck Depression Inventory suicide item (0-4 points) ($r=0.80$, $p<0.001$) (Posner et al., 2011).

Patient Health Questionnaire (PHQ-9), item 9	At Enrollment	Frequency of thoughts of being better off dead or of harming oneself in the past 2 weeks	Source: Kroenke et al., 2001 Cronbach's alpha 0.89, intraclass correlation coefficient 0.94, area under the curve 0.92 (Indu et al., 2018). The PHQ-9 item 9 (wishes to be dead/thoughts of self-harm) had a a sensitivity of 82.5 %, specificity of 83.1 %, PPV of 58.4 %, and NPV of 94.3 % versus CSSRS response (item 2: thoughts of suicide) (Chung et al., 2023).
Past Suicidal Behavior			
Columbia Severity Rating Scale [CSSRS] (Lifetime)	On Study Day Two	Total Lifetime Suicide Attempts	Source: Posner et al, 2011 The CSSRS had 100% specificity and 100% sensitivity in correctly identifying lifetime actual attempts and 99% specificity and 94% sensitivity in correctly identifying lifetime interrupted attempts that were recorded on the Columbia Suicide History Form (Posner et al., 2011).
Single question concerning a participant's number of suicide attempts in the past year	At Enrollment	Total Suicide Attempts in the past year	Source: Investigator-worded item Item was developed due to evidence that recent suicide attempts are a potent risk factor for suicidal behavior (Owens et al., 2002).

Other Measures			
Patient Health Questionnaire (PHQ-9), (all 9 items)	At Enrollment	Depression Symptoms in the past 2 weeks	Source: Kroenke et al., 2001 Cronbach's alpha 0.89, intraclass correlation coefficient 0.94, area under the curve 0.92 (Indu et al., 2018). Reliability analysis showed that the Cronbach's alpha of the PHQ-9 was better than the Hamilton Depression Rating Scale (17-item) [HAMD-17] (0.893 versus 0.829). Validity analysis showed that the PHQ-9 was a single factor structure, and the total score of the scale was strongly correlated with the HAMD-17 (r = 0.724, P < 0.001). The Item Response Theory analysis showed that the discrimination parameters of the PHQ-9 were higher than that of the HAMD-17 in all dimensions. The PHQ-9 also had the higher measurement accuracy than the HAMD-17 for distinguishing depression severity (Ma et al., 2021).
Columbia Suicide Severity Rating Scale, Military Version	At Enrollment	Current Marital/Relationship Stress Current Financial Troubles Current Legal Troubles History of Non-Alcohol Drug Abuse	Source: Available at https://cssrs.columbia.edu/documents/lifetimerecent-military/c-ssrsmilitaryversion/ Many of these factors have been shown to be important to fatal or nonfatal suicidal behavior risk among active military in some studies (e.g., Skopp et al, 2016), but there are no validity or reliability data to our knowledge about how well the CSSRS Military version measures these factors.

3-item AUDIT-C Screening Questionnaire	At Enrollment	Alcohol Use in past 2 weeks	Source: Bush et al., 1998 The AUDIT-C was initially validated in VA patients. For detection of heavy drinking and/or alcohol abuse or dependence, AUDIT-C had a very strong Area-Under-the-Curve (AUC) compared to a World Health Organization Consumption Interview (AUC=0.881), and its performance was virtually identical to the 10 question full AUDIT (AUC 0.880). The AUDIT did show slightly but significantly better detection of Alcohol Abuse or Dependence (0.811 versus 786), while the AUDIT-C did show slightly but significantly better detection of heavy drinking (0.891 versus 0.881) (Bush et al., 1998).
McLean Hospital Borderline Personality Disorder (Emotional Dysregulation Syndrome) Screening Scale (used with permission)	On Study Day Two	Number of Emotion Regulation Syndrome (Borderline Personality Disorder) symptoms endorsed	Source: Zanarini et al., 2003 The initial study describing this scale reported a Cronbach's alpha for the scale of 0.74 (Zanarini et al., 2003).
*At Enrollment is also referred to as the Day of D/S-IAT Assessment, since all participants included in this study completed the D/S-IAT on their day of enrollment.			

Table 2. Characteristics of the Samples				
Patient Characteristic	**Patients Admitted for Suicidal Ideation/Behavior only (with no need for Alcohol Detoxification) (N=90)**		**Patients Admitted for Alcohol Detoxification (with or without Suicidal Ideation/Behavior) (N=90)**	
	Mean	***Standard Deviation***	***Mean***	***Standard Deviation***
Age	46.1	14.7	52.8	10.9
PHQ-9	19.4	5.99	14.42	7.2
PHQ9 item 9	2.01	0.88	0.73	1.01
Lifetime Suicide Attempts	1.22	1.6	0.68	1.2
Patient Characteristic	**N**	**% ***	**N**	**% ***
Sex (Male)	76	84.5	87	96.7
Race				
AA or Black	6	6.7	5	5.6
Asian	2	2.2	0	0
White	81	90	84	93.3
Unknown/ Declined to Answer	1	1.1	1	1.1
Education				
High school but not college	61[b]	68.5	71[b]	78.8
At least some College	28[b]	31.5	18[b]	20.2
Any history of Suicide in 1st degree Relative (1 or More Relatives)	5[d]	6.3	2[e]	2.6

Any history of Suicide, 2nd degree Relative	7[d]	8.9	6[e]	7.7
Any history of Suicidal Behavior, 1st degree Relative	13[d]	16.5	7[g]	9.1
Any history of Suicidal Behavior, 2nd degree Relative	5[e]	6.4	4[e]	5.1
Any history of Self-harm, 1st degree Relative	4[d]	5.1	2[e]	2.6
Any history of Self-harm, 2nd degree Relative	3[d]	3.8	0[g]	0.0
Any Bipolar Disorder	30[i]	34.5	25[i]	28.8
MINI Bipolar I Disorder	9[i]	10.34	14[i]	16.1
MINI Bipolar II Disorder	10[i]	11.5	3[i]	3.4
Other Bipolar Disorder	11[i]	12.6	9[i]	10.3
Lifetime Suicide Attempt (Y/N)	48[k]	57.8	36[l]	41.9
Lifetime History of Self Injurious Behavior	16[k]	19.3	16[n]	19.5
Positive screen for Borderline Personality Scale	41[i]	47.1	30[i]	34.5

Recent Suicidal Ideation (past week) or Behavior** (past 2 weeks)	90	100	49	54.4
Any Suicidal Behavior** in past 2 weeks	40	44.4	10	11.1
Suicide Attempt in the past 2 weeks	20	22.2	6	6.7

* Percentages accurately reflect the percentage of participants with data for a given characteristic. However, to obtain the percentages the counts given (n) are sometimes divided by a denominator different from the 90 participants in each full patient sample, since there was occasional missing Patient Characteristic data for some baseline/historical data points. This missing data was due largely because certain historical information was collected on days after the date of study entry, to reduce participant burden on the initial study day. A few patients were discharged before some of the later day assessments could be given. Exact counts of participants providing data (when less than 90) were as follows: [a] n = 178; [b] n = 89; [c] n = 157; [d] n = 79; [e] n = 78; [f] n = 156; [g] n = 77; [h] n = 174; [i] n = 87; [j] n = 169; [k] n = 83; [l] n = 86; [m] n = 165; [n] n = 82.

** Includes attempts, interrupted attempts, and preparatory behavior.

Table 3. Association between Death/Suicide IAT (D/S-IAT) and Current or Recent Suicidal Ideation

Table 3A. Association between D/S-IAT and Intensity of Current Suicidal Ideation (SI)

	Patients Admitted for Suicidal Ideation only (Primary Analysis Sample)[a] (n=90)		**Patients Admitted for Alcohol Detoxification** (n=90)	
Type of Suicidal Ideation	**Spearman Correlation Coefficient**	**P value**	**Spearman Correlation Coefficient**	**P value**
Primary Outcome: Thoughts of Killing Oneself*	0.22	.04	0.18	.08
Wishes to be Dead***	0.35	<.001	0.33	.001

Table 3B. Association between D/S-IAT and Most Intense Suicidal Ideation over the Past Week

Columbia Suicide Severity Rating Scale [CSSRS], (1-5)) Severity Subscale (1-5)	**Spearman Correlation Coefficient**	**P value**	**Spearman Correlation Coefficient**	**P value**
1) Wishes to be dead/be permanently asleep	0.05	.67	0.15	.15
2) Nonspecific thoughts of suicide	0.18	.08	0.02	.83
3) SI plus thoughts of method **	0.30	.005	0.005	.96
4) SI plus intent	0.15	.16	0.12	.26
5) SI plus intent plus detailed plan*	0.23	.03	0.07	.52

* p < .05: ** p <.01; *** p < .001

ADDITIONAL FINDINGS:

Associations between D/S-IAT and: 1) suicidal ideation or wishes to be dead over the past 24 hours were either significant or close to significant (p = .002 to p = .06) for both patient groups, 2) frequency of wishes to be dead or of self-harm ideation over the past two weeks were statistically significant for both patient groups (p = .01 to p = .04).

Table 4. Negative Binomial Regression of D/S-IAT Score versus the Intensity of Current Suicidal Ideation

Primary Analysis Sample		
Risk Factor	**Coefficient, [95% CI]**	**P Value**
D/S-IAT versus Intensity of Current Suicidal Ideation, Unadjusted (n=90)		
D/S-IAT (continuous score)*	0.99 [0.04 – 1.94]	.04
D/S-IAT versus Intensity of Current Suicidal Ideation, Adjusted for other Covariates (n=78)		
D/S-IAT (continuous score)*	1.22 [0.23 - 2.21]	.02
Other Significant Predictors from the Multiple Regression Model (n=78)		
Depression Score, past 2 weeks*	0.10 (0.02 – 0.18)	.02
Full Set of Covariates included in the Multiple Regression model		
The full set of covariates included in the multiple regression model were, in order of increasing p value, (with covariates associated with current suicidal ideation with a p-value < 0.2 listed in italics): *Depression Score (see above), , History of Nonalcohol Substance Abuse, Legal Troubles,* Suicide Attempts in the Past Year, McLean Borderline Personality Screening Scale, Marital/Relationship Stress, Financial Stress, the Presence of Suicidal Intent in the past week, Current Alcohol Use (AUDIT-C), Lifetime Suicide Attempts.		

* $p < .05$

ADDITIONAL FINDINGS:

For the participants admitted for alcohol detoxification, the continuous D/S-IAT score was not significantly associated with current suicidal ideation: p = .18 (unadjusted) to p = .86 (adjusted). (Four of the 10 covariates were significantly associated with current suicidal ideation: Legal Troubles, Depression Score, Marital/Relationship Stress, and Financial Troubles).

Table 5. Negative Binomial Regression of D/S-IAT and other Risk Factors versus the Intensity of Imminent Suicidal Ideation (next 1-3 Days)

Primary Analysis Sample		
Risk Factor	**Coefficient (95% CI)**	**P Value**
D/S-IAT versus Intensity of Imminent Suicidal Ideation, Unadjusted (n=87)		
D/S-IAT (continuous score)*	0.75 (-0.27 – 1.77)	.15
D/S-IAT versus Intensity of Imminent Suicidal Ideation, Adjusted for other Covariates (n=78)		
D/S-IAT (continuous score)*	1.06 (0.20 – 1.92)	.02
Other Significant Predictors from the Multiple Regression Model (n=78)		
Marital/Relationship Stress**	-1.25 (-2.10 – -0.39)	.004
Legal Troubles*	1.13 (0.01 – 2.24)	.05

Full Set of Covariates included in the Multiple Regression model

The full set of covariates included in the multiple regression model were, in order of increasing p value (with risk factors associated with current suicidal ideation with a p-value < 0.2 listed in italics): *Marital/Relationship Stress (see above), Legal Troubles (see above), Suicide Attempts in the Past Year, History of Nonalcohol Substance Abuse,* Depression Score, Current Alcohol Use, Financial Troubles, McLean Borderline Personality Screening Scale, Presence of Suicidal Intent in the past week, Lifetime Suicide Attempts.

* $p < .05$; ** $p < .01$.

ADDITIONAL FINDINGS:

In the patient sample admitted for alcohol detoxification, the continuous D/S-IAT score was not a significant predictor of imminent suicidal ideation (p = .07 [unadjusted] to p = .61 [adjusted]). (None of the covariates were statistically significant, either).

In a subsample of primary analysis patients who denied suicidal ideation on the day of D/S-IAT Assessment using a zero-inflated negative binomial model, the full-scale, continuous D/S-IAT was significantly associated with imminent suicidal ideation (adjusted coefficient=0.71 [0.21 – 1.20], p = .005). (For this model of only 52 patients to properly converge, only five other covariates could be included: Depression Score (p< .0001), History of Nonalcohol Substance Abuse (p < .0001), McLean Borderline Personality Screening Scale, Presence of Suicidal Intent in the past week, and Current Alcohol Use).

Table 6. Negative Binomial Regression of Dichotomized D/S-IAT score versus Suicidal Ideation Outcomes

Table 6A. Dichotomous D/S-IAT score versus Intensity of Current Suicidal Ideation

Primary Analysis Sample

Risk Factor	Coefficient (95% CI)	P value
D/S-IAT versus Intensity of Current Suicidal Ideation, Unadjusted (n=90)		
D/S-IAT (dichotomous, D > 0)	0.67 [-0.30 – 1.65]	.17
D/S-IAT versus Intensity of Current Suicidal Ideation, Adjusted (n=78)		
D/S-IAT (dichotomous, D > 0)	0.32 (-0.73 – 1.37)	.55
Other Significant Predictors from the Regression Model (n=78)		
Depression Score	0.09 (0.03 – 0.16)	.005

Table 6B. Dichotomous D/S-IAT score versus Intensity of Imminent Suicidal Ideation (next 1-3 days)

Primary Analysis Sample

Risk Factor	Coefficient (95% CI)	P value
D/S-IAT versus Intensity of Imminent Suicidal Ideation, Unadjusted (n=87)		
D/S-IAT (dichotomous, D > 0)	0.62 (-0.54 – 1.78)	.29
D/S-IAT versus Intensity of Imminent Suicidal Ideation, adjusted (n=78)		
D/S-IAT (dichotomous, D > 0)	1.05 [0.01 – 2.10]	.05
Other Significant Predictors from the Multiple Regression Model (n=78)		
Marital/Relationship Stress	-1.12 (-2.00 - -0.26)	.01

Full Set of Covariates included in the Multiple Regression model

Both regression models contained the same covariates (listed in no specific order): Depression Score, Marital/Relationship Stress, Legal Troubles, McLean Borderline Personality Screening Scale, Suicide Attempts in the Past Year, History of Nonalcohol Drug Abuse, Presence of Suicidal Intent in the Past Week, Current Alcohol Use, Lifetime Suicide Attempts, and Financial Troubles.

Table 7. Logistic Regression of Dichotomous D/S-IAT score versus Dichotomous Suicidal Ideation Outcomes

Table 7A. Dichotomous D/S-IAT score versus Dichotomous Current Suicidal Ideation (presence versus absence of current suicidal ideation of any intensity)

Primary Analysis Sample		
Risk Factor	**Coefficient (95% CI)**	**P Value**
D/S-IAT versus Presence of Current Suicidal Ideation, Unadjusted (n=90)		
D/S-IAT (dichotomous, D > 0)	0.69 (0.62 – 4.61)	.30
D/S-IAT versus Presence of Current Suicidal Ideation, Adjusted for other Covariates (n=78)		
D/S-IAT (dichotomous, D > 0)	1.74 [0.54 – 5.66]	.35
Other Significant Predictors from the Multiple Regression Model (n=78)		
NONE		

Table 7B. Dichotomous D/S-IAT score versus Dichotomous Imminent Suicidal Ideation (occurrence of any suicidal ideation over the next 1-3 days)

Primary Analysis Sample		
Risk Factor	**Coefficient (95% CI)**	**P Value**
D/S-IAT versus Presence of Imminent Suicidal Ideation, Unadjusted (n=87)		
D/S-IAT (dichotomous, D > 0)	1.29 [(.46 – 3.57)	.63
D/S-IAT versus Presence of Imminent Suicidal Ideation, Adjusted for other Covariates (n=78)		
D/S-IAT (dichotomous, D > 0)	1.87 (0.56 – 6.30)	.31
Other Significant Predictors from the Multiple Logistic Regression Model (n=78)		
NONE		

Full Set of Covariates included in the Multiple Regression model

Both regression models contained the same covariates (listed in no specific order): Depression Score, Marital/Relationship Stress, Legal Troubles, McLean Borderline Personality Screening Scale, Suicide Attempts in the Past Year, History of Nonalcohol Drug Abuse, Presence of Suicidal Intent in the Past Week, Current Alcohol Use, Lifetime Suicide Attempts, and Financial Troubles.

ADDITIONAL FINDINGS (in the Primary Analysis Sample):

When the Sheehan Suicidality Tracking Scale suicidal ideation item (item 4) was used as the dichotomous outcome of imminent suicidal ideation (any degree of thinking about suicide over the

next 24-72 hours after enrollment), neither the unadjusted D/S-IAT (dichotomous) odds ratio (p = .37) or the adjusted D/S-IAT (dichotomous) odds ratio coefficient (p = .31) was statistically significant.

When the Columbia Suicide Severity Rating Scale item for any suicidal ideation (item 2) was used as the dichotomous outcome (any thoughts of suicide over the next 24-72 hours after enrollment), neither the unadjusted D/S-IAT (dichotomous) odds ratio (p = .18) nor the adjusted (dichotomous) D/S-IAT odds ratio (p = .14) was statistically significant.