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A Randomized Controlled Trial of the Collaborative Assessment and Management of Suicidality (CAMS) Versus Treatment as Usual (TAU) for Suicidal College Students

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ABSTRACT

This randomized controlled trial compared the Collaborative Assessment and Management of Suicidality (CAMS) and Treatment as Usual (TAU) for suicidal college students within a feasibility trial. Sixty-two suicidal college students were randomized to CAMS ($n = 33$) or TAU ($n = 29$). We hypothesized that those receiving CAMS would show more improvement in suicide-related measures, and effects would be moderated by borderline personality disorder (BPD), prior suicide attempts, and age. Both treatment groups showed improvements in all outcome variables; CAMS had a significantly higher impact on depression and suicidal ideation when measured weekly during care and was more likely than TAU to decrease hopelessness among students with fewer BPD features, no suicide attempt history, and older age. Conversely, TAU did better for students with BPD features and history of multiple suicide attempts.

KEYWORDS

Collaborative Assessment and Management of Suicidality; college students; counseling center; suicidal ideation; suicidal risk

INTRODUCTION

Suicide is the second leading cause of death on campus (Suicide Prevention Resource Center, 2004); 35.8% of students seeking college counseling center (CCC) services have considered suicide and 10.3% have attempted it (Center for Collegiate Mental Health, 2019). Student suicides reverberate through the whole college campus community (Lamis & Lester, 2011). For suicidal students, CCCs are the front-line treatment option for mental health problems (Grayson & Meilman, 2006; Kay & Schwartz, 2010), despite increasingly limited resources (Gallagher, 2013). CCCs are routinely over-run; half have treatment waitlists for care that last the entire term (Gallagher, 2013). Upward trends in threat-to-self issues, such as non-suicidal self-injury (NSSI) and suicidality, are notable among students (Xiao et al., 2017) and such students on average use 20–30% more CCC services (Center for Collegiate Mental Health, 2019). Despite these concerns, there is little guidance as to how CCCs can best work with threat-to-self students (Center for Collegiate Mental Health, 2019; Lamis & Lester, 2011). CCCs thus have pressing needs

for effective, streamlined, suicide-specific interventions to help save the lives of students who need care the most (Center for Collegiate Mental Health, 2019).

The Collaborative Assessment and Management of Suicidality (CAMS)

One CCC intervention potentially well-suited to meet this challenge is the CAMS framework, developed by David Jobes (Jobes, 2006, 2016). CAMS is a suicide-focused therapeutic approach guided by a multi-purpose assessment, treatment planning, tracking, and clinical outcome tool called the Suicide Status Form (SSF), which was originally developed in a CCC (Jobes, 1995; Jobes, Jacoby, Cimbolic, & Hustead, 1997). The SSF “Core Assessment” items (i.e., ratings of psychological pain, stress, agitation, self-hate, hopelessness, and overall risk of suicide) are repeatedly assessed across CAMS-guided care. The SSF Core Assessment has excellent validity and reliability in CCC samples (Jobes et al., 1997) and its psychometrics are robust with high-risk suicidal inpatients (Conrad et al., 2009) and suicidal teenagers (Brausch et al., 2020). The first session version of the SSF includes various qualitative assessments to further guide care (Brancu, Jobes, Wagner, Greene, & Fratto, 2016; Jobes et al., 2004; Jobes & Mann, 1999) and a meta-analysis showed that the SSF functions as a *therapeutic assessment* (Poston & Hanson, 2010).

Beyond assessment, CAMS has evolved into a suicide-focused intervention, treating client-defined “suicidal drivers”—problems that make them suicidal (Jobes, 2016). For example, suicidal students struggle with relationship, academic/vocational, and self-esteem problems that can be readily treated in CCCs (Hamadi, Colborn, Bell, Chalker, & Jobes, 2019; Jobes & Jennings, 2011). Randomized controlled trials (RCTs) with suicidal samples have shown that CAMS significantly reduces suicidal ideation in 6–8 sessions (Comtois et al., 2011; Jobes et al., 2017; Ryberg, Zahl, Diep, Landro, & Fosse, 2019) and overall symptom distress at 12-month follow-up (Comtois et al., 2011; Ryberg, Zahl, et al., 2019), while significantly increasing hope, patient satisfaction, and retention to care relative to Treatment as Usual (TAU). In non-randomized comparison-controlled trials, CAMS was significantly associated with decreases in suicidal ideation (Ellis, Rufino, & Allen, 2017; Ellis, Rufino, Allen, Fowler, & Jobes, 2015; Jobes, Wong, Conrad, Drozd, & Neal-Walden, 2005), emergency department and primary care visits (Jobes et al., 2005), depression, hopelessness, and functional disability (Ellis et al., 2017) relative to TAU. Statistically significant increases in subjective well-being and psychological flexibility, in addition to changes in suicidal cognitions, have also been associated with CAMS in comparison to TAU care (Ellis et al., 2017). While there were encouraging trending data that CAMS may help reduce self-harm and suicide attempts on par with Dialectical Behavior Therapy (DBT; Andreasson et al., 2016), definitive RCT data on the impact of CAMS on suicidal *behaviors* are lacking (and being further studied in three ongoing CAMS RCTs). Moderator secondary analyses from two CAMS RCTs with highly suicidal soldiers (Huh et al., 2018) and community-based suicidal inpatients and outpatients (Ryberg, Diep, Landrø, & Fosse, 2019) showed that CAMS was significantly more effective with *lower* complexity patients. Within this line of moderator analyses research, “complexity” is generally operationalized as patients with borderline personality disorder (BPD) features, and/or histories of multiple suicide

attempts, and/or marked emotional dysregulation at baseline, and/or significant substance use. Given limited CCC time and resources (Center for Collegiate Mental Health, 2019), it would be useful to know if there is any indication of similar patterns of moderation among suicidal college students. Might those presenting with less complexity (e.g., no prior attempts or no BPD features) similarly benefit more from CAMS when compared to TAU? It is noteworthy that even though the SSF and CAMS were originally developed within a CCC setting, an RCT of CAMS in a CCC has heretofore not been performed.

The Present Study

The present study is an RCT wherein suicidal college students seeking services at a CCC were randomly assigned to either CAMS or TAU for 4–8 weeks as part of a larger feasibility study conducted using a “Sequential Multiple Assignment Randomized Trial” (SMART; Lei, Nahum-Shani, Lynch, Oslin, & Murphy, 2012) design. The method of the larger study was previously described in this journal and the CONSORT diagram is presented in Figure 1 (Pistorello et al., 2018). We hypothesized that CAMS would show more improvement on suicide-related variables than TAU and would be more effective with suicidal college students presenting with less complexity at baseline.

METHOD

Sample and Participant Selection

This study (Developing Adaptive Interventions for Suicidal College Students Seeking Treatment—SMART; Clinical Trial Registry #NCT02442869) was approved by two university Institutional Review Boards (IRBs) and had a Data and Safety Monitoring Board. Sixty-two suicidal college students at a mid-sized public university participated. Inclusion criteria included students: (1) seeking CCC services; (2) 18–25 years of age; (3) new to CCC treatment (or not in treatment for 3 months prior); and (4) endorsing a 2 or above on the question, “I have thoughts of ending my life,” on the Counseling Center Assessment of Psychological Symptoms (CCAPS-34; Locke et al., 2012). Like all CCAPS questions, the answer choices range from 0 (not at all like me) to 4 (extremely like me). Students meeting these criteria were invited to participate by an intake worker and close to 70% agreed to participate (Pistorello et al., 2018). The sample was mostly female (68%) and between 18 and 19 years old (52%). Racially, they self-identified as Caucasian (49.2%), Multi-racial (23%), Asian (16.4%), Hispanic/Latino (8.2%), and African American (3.3%).

Study Design

The present study focuses on the first stage of an adaptive SMART design study; suicidal clients were randomly assigned to 4–8 weeks of CAMS or TAU.¹ The present

¹The current outcome study is limited to Stage 1 only of a feasibility trial. In Stage 2 clients who insufficiently responded to Stage 1 care were randomized to 4–16 weeks of CAMS or Dialectical Behavior Therapy (DBT). But with

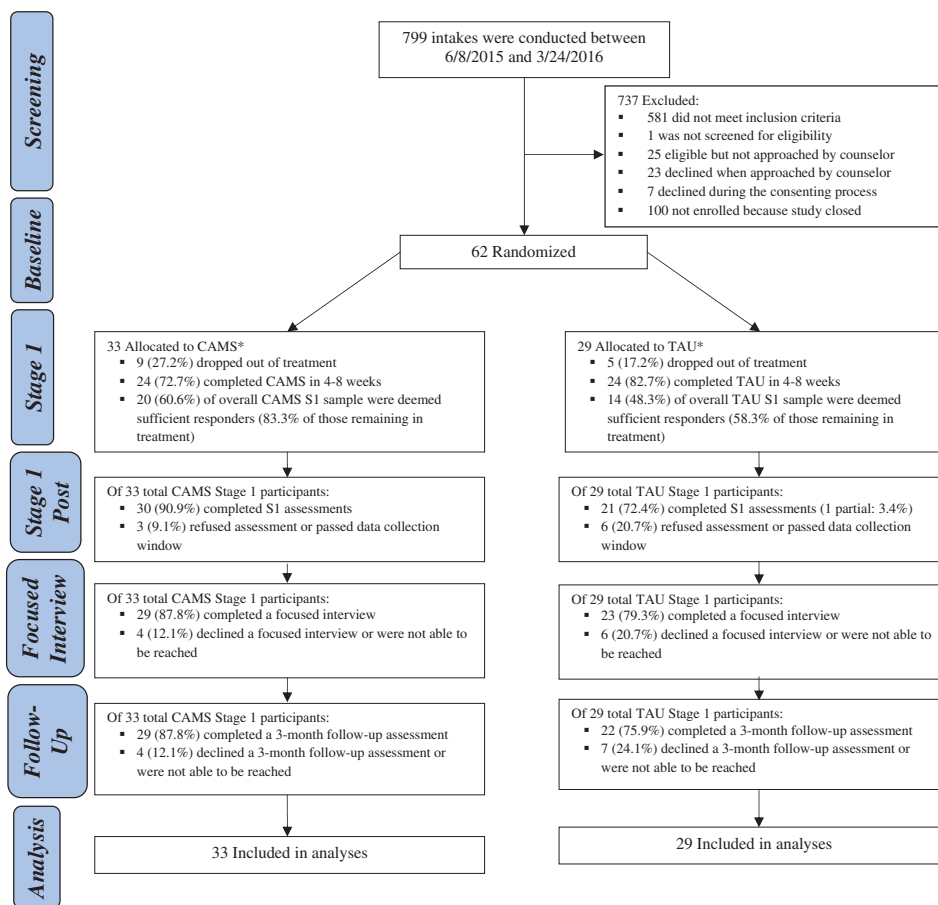


Figure 1. CONSORT diagram; flow of participants through SMART for suicidal college students (Stage 1 only). Diagram was adapted from Pistorello et al., 2017. *Note: CAMS: Collaborative Assessment and Management of Suicidality; TAU: Treatment as Usual

study relied on “real world” features that integrate science and practice through “practice-oriented research” (POR)—a “bottom-up” approach to gather and use scientific knowledge where clinicians are engaged within clinical research to improve practice and maximize subsequent dissemination (Castonguay, Barkham, Lutz, & McAleavey, 2013). A key POR idea is having *both* treatments provided by the *same* therapists, as is done in real-world CCC practice.

Participants recruited into the study met with the Independent Evaluator (IE), who was blind to the treatment conditions, for a two-hour baseline assessment after which they were randomized to 4–8 weeks of CAMS or TAU. After 8 weeks of care, clients returned for a post-treatment assessment. Clients were paid \$10 for the post-treatment assessment; an additional \$10 was paid for attending the assessment the first time that

it was scheduled. Beyond baseline/post-treatment assessments conducted by the blinded IE, participants completed a routine CCC questionnaire with measures of depression, overall distress, and suicidal ideation before each session and counselors completed two global clinical impressions items after each session.

Randomization

Of the 62 participants, 33 (53%) were randomized to CAMS and 29 (47%) were randomized to TAU. Both treatments were balanced in terms of psychotropic medication use, presence of a past suicide attempt, and gender utilizing an adaptive-biased coin design (Wei & Lachin, 1988). The intervention began shortly after the participants were randomized.

Selection and Training of Counselors

Given POR's emphasis on effectiveness and dissemination (Castonguay et al., 2013), the study therapists were seven current on-site staff members (four licensed psychologists, two postdoctoral fellows, and one social work intern) interested in learning new treatment approaches for suicidal clients. As noted by Pistorello et al. (2018), study therapists varied in theoretical orientation, professional discipline, and stage of training; none were familiar with CAMS prior to this study. CAMS training for therapists entailed reading the CAMS manual (Jobes, 2006), attending a two-day role-play training, and weekly phone consultations with the developer of CAMS, David Jobes.

Interventions

Treatment lasted 4–8 weeks, depending on clients' responses to care. This treatment length was chosen because it is consistent with CCCs' average number of 5.61 sessions (Center for Collegiate Mental Health, 2019) as well as CAMS data demonstrating that "acute resolvers" improve after about six sessions or fewer (Jobes et al., 1997). The variability allowed for tailoring to client needs.

CAMS

The original CAMS treatment manual was primarily used (Jobes, 2006), but more recent updates were also included (Jobes, 2016). Each CAMS session started with the collaborative completion of an SSF between the client and therapist, which varies in content depending on the stage of treatment (first session versus interim/tracking sessions versus final outcome/disposition session). In turn, all CAMS sessions across care ended with a reconsideration of the CAMS Stabilization Plan and the driver-focused treatment plan. The first four sessions conducted by each study counselor (and additional randomly selected sessions) were rated for adherence using the CAMS Rating Scale (Corona, Gutierrez, Wagner, & Jobes, 2019a, 2019b) by reviewing digitally recorded sessions.

TAU

The TAU condition was defined as the treatment a study counselor would ordinarily use in their routine clinical work, based on their theoretical orientation. The only attempt to control the type of intervention provided as part of TAU treatment was to ensure that therapists *not* use any CAMS or DBT strategies (the latter stipulation occurred because DBT was a Stage 2 intervention within the larger SMART feasibility study). Both conditions allowed for referrals to medication management or group therapy (e.g., interpersonal process groups). Approximately 10% of TAU recorded sessions were reviewed to ensure that TAU sessions were not clinically “contaminated” by the use of CAMS or DBT strategies.

Outcome Measures: Weekly/Multiple Assessments

Counseling Center Assessment of Psychological Symptoms (CCAPS-34)

The CCAPS-34 (Locke et al., 2012) was designed by CCC staff and researchers to assess key domains of college student mental health within “Titanium,” an electronic medical record that is used extensively at CCCs nationwide (Center for Collegiate Mental Health, 2019). Students respond to CCAPS questions based on a 5-point Likert scale, ranging from 0 (*not at all like me*) to 4 (*extremely like me*). There are subscales, but to limit our number of analyses, only depression and overall distress subscales and the suicidal ideation question (“I have thoughts of ending my life”) were used. The CCAPS-34 has shown adequate reliability, validity, and sensitivity to change and only takes 2–3 minutes to complete (Locke et al., 2012). The CCAPS was administered at intake, baseline, and at every subsequent visit (mostly weekly) across care, as per regular clinic policy.

The Clinical Global Impressions (CGI)

The CGI (Guy, 1976) was the primary instrument for assessing treatment response. At the end of each treatment session, counselors rated (a) clients’ *overall improvement* in suicidal risk since baseline on a 7-point Likert style CGI from (1) *Very much improved* to (7) *Very much worse* and (b) clients’ *current overall severity* of suicidality from (1) *Normal, not at all suicidal* to (7) *Extremely suicidal*. Clinicians rated improvement (CGI-I) and severity (CGI-S) based on clients’ suicidal ideation as well as their ability to cope with thoughts about suicide without engaging in life-threatening behaviors. The CGI-I/CGI-S rating scales were developed for this study with respect to suicidal risk specifically.

Outcome Measures: Pre/Post Only

Scale for Suicide Ideation-Current (SSI)

The SSI (Beck, Brown, & Steer, 1997; Beck, Kovacs, & Weissman, 1979) is a 19-question interview focused on the highest intensity of suicidal ideation in the most recent 2 weeks, including suicidal thoughts, behaviors, and plans. Items are rated as 0, 1, or 2 and the total score ranges from 0 to 38.

Suicide Attempt and Self-Injury Count (SASI-C)

The SASI-C (Linehan & Comtois, 1996) is a brief interview of past self-inflicted injuries, categorized into suicide attempts and non-suicidal self-injury (NSSI). The SASI-C creates counts of self-inflicted injuries by method, medical risk severity, and lethality. Given the low base rate of suicide attempts during treatment in this population (e.g., Pistorello, Frusetti, MacLane, Gallop, & Iverson, 2012), only the frequency of NSSI events were used as a primary outcome measure.

Beck Hopelessness Scale (BHS)

The BHS (Beck, Weissman, Lester, & Trexler, 1974) is a true/false measure with 20 questions assessing negative expectations for the future. The scale has been shown to predict subsequent death by suicide and has adequate psychometric properties (Beck, Brown, & Steer, 1989).

Moderation Measures: Baseline Assessments

In addition to age, gender, and initial level of distress (CCAPS subscale), the following two baseline measures were included as potential measures of moderator effects.

Personality Assessment Inventory-Borderline Features Scale (PAI-BOR)

The PAI-BOR (Morey, 1991) is a 24-item self-report measure of BPD features frequently used with college students (Trull, 1995, 2001). It uses a 4-point Likert scale and the final score has a range of 0-72 (38 is the cut point for significant BPD symptoms). It has good to excellent psychometric properties (Morey, 1991; Trull, 1995).

Prior Suicide Attempts

Based on lifetime data on the number of suicide attempts (SASI-C, Linehan & Comtois, 1996), participants were subdivided into no suicide attempts, 1 suicide attempt, and 2+ suicide attempts, as done in other studies (e.g., Chen, Brown, Harned, & Linehan, 2009; Linehan, McDavid, Brown, Sayrs, & Gallop, 2008).

Adherence to CAMS Treatment Measure

CAMS Rating Scale (CRS.3)

The CRS.3 has 14 items rated on a seven-point Likert scale ranging from 0 (*Poor*) to 6 (*Excellent*) with demonstrated validity and reliability (Corona et al., 2019a, 2019b). Digitally recorded CAMS therapy sessions were coded for adherence and clinicians were rated as highly adherent to CAMS with high inter-rater reliability on the CRS (Pistorello et al., 2018). The CRS can also be used to ensure experimental fidelity (i.e., that control providers are *not* using CAMS and are providing their usual treatment—e.g., Jobes et al., 2017). Digitally recorded TAU sessions coded for adherence to CAMS were found not to be contaminated with CAMS treatment strategies.

Statistical/Analytic Approach

Treatment Outcome

Our primary analyses implemented two modeling frameworks: longitudinal analyses and Analysis of Covariance (ANCOVA) models (depending on a number of assessment points). The CCAPS and CGI measures were assessed at weekly sessions and analyzed using longitudinal analyses fit through linear mixed-effects models (Verbeke & Molenberghs, 2009). Mean profile plots and subject-specific graphs depicted a greater rate of change earlier in the intervention and a smaller rate of subsequent change; they were modeled through a Hierarchical Linear Model (HLM; Raudenbush & Bryk, 2001) and Hierarchical Generalized Linear Models (HGLM), with the within-subject portion modeling change per unit log-time, similar to Gibbons et al. (1993) analytic approach. HLM/HGLM data from all participants (the intent-to-treat sample) were utilized with weekly measures; HGLM accommodates non-continuous outcomes such as binary, ordinal, count, or zero-inflated outcomes. All remaining measures were assessed in the context of IE appointments at baseline and post-treatment and were analyzed using ANCOVA models (logistic regression for binary or ordinal outcomes). Pre-randomization measures were used as covariates in all models; additionally, potential baseline covariates such as BPD features, level of distress, age, gender, and previous suicide attempts were tested and, if significant, included subsequently in all models.

Treatment Moderation

A moderator is a pretreatment characteristic that is not different across groups at pretreatment but its effect on the outcome is differential across conditions (Kraemer, Wilson, Fairburn, & Agras, 2002). Based on previous CAMS moderator research (e.g., Huh et al., 2018), we considered the following measures collected pre-randomization as potential moderators for intervention effects: BPD features, level of baseline distress, gender, age, and previous suicide attempts (0, 1, 2+, see above). For the HLM/HGLM models, potential moderators were included by considering the three-way interaction of the potential moderator by treatment by the log-time effect. For the ANCOVA models, potential moderators were included by considering the two-way interaction of the potential moderator by treatment with a change in outcome as the dependent variable with the baseline measure as a covariate. Continuous moderators were centered on analysis. For HLM/HGLM, significant interactions involving a continuous moderator were probed by estimating and contrasting slope estimates with the continuous predictor set at the mean, 1 SD above, and 1 SD below the mean. The same process was used for ANCOVA models but based on the expected change from pre to post per measure.

Clinical Significance

Effect sizes, corresponding to the standardized mean difference between CAMS and TAU, were derived for each measure using Cohen's *d* (1988) and adaptations (Borenstein, Hedges, Higgins, & Rothstein, 2009), relying on standard thresholds for Cohen's *d* of 0.2 (small), 0.5 (medium), and 0.8 (large) effects.

Power Analyses

Alpha was set at 0.05 to preserve power. HLM was our primary analytic model (following Ahn, Overall, & Tonidandel, 2001); we determined that with a sample size of 62 clients, the outcome analyses had at least 80% power to detect an effect size of 0.80.

Results

Preliminary Analyses

Baseline Differences

There were no significant differences between the conditions on any baseline clinical, diagnostic, or demographic variables (See Table 1).

Attendance and Attrition

As reported in the feasibility study (Pistorello et al., 2018), most participants (66%) completed all eight sessions ($M = 6.76$, $SD = 2.32$). Differences in treatment dropout between the CAMS (27.3%) and the TAU (17.2%) conditions were not statistically significant, and the overall level of treatment dropout (22.6%) was comparable to dropout in CCCs generally (27.1% according to Center for Collegiate Mental Health, 2019). Furthermore, most participants completed the post assessment at least partially, without condition differences.

Clinician Adherence to CAMS across Arms

The overall average therapist adherence rating for the CAMS condition exceeded the required score of 3 ($M = 4.32$; $SD = 1.54$), while that of the TAU condition ($M = 1.09$; $SD = 0.84$) was well below the cutoff score ($t(74) = 11.95$, $p < .001$), demonstrating overall robust experimental fidelity between the treatment arms.

Intervention Effects: Weekly/Multiple Assessment Measures

Intervention effects appear in Table 2, which includes the means, SDs, and frequencies for all dependent variables across time.

CCAPS Results

As depicted in Figure 2, HLM indicated a significant differential rate of change on the CCAPS-Depression from baseline through the post, $t(60) = 2.15$, $p = .035$, $d = 0.55$ (CI: 0.04–1.05), controlling for intake depression and distress level. CAMS decreased a total of 0.721 ($se = 0.171$) points from baseline through the post, whereas TAU decreased a total of 0.275 ($se = 0.116$) points. HLM indicated a non-significant differential rate of change on the CCAPS-Distress from baseline through the post, $t(60) = 0.65$, $p = .42$, $d = 0.17$ (CI: -0.33 to 0.67), controlling for intake distress level; both treatments improved over time with CAMS experiencing a significant reduction ($t(60) = 3.12$, $p = .002$) and TAU a marginally significant reduction ($t(60) = 1.78$, $p = 0.075$) from baseline through the post. As illustrated in Figure 3, HGLM indicated a significant

TABLE 1. Pretreatment demographic and clinical data by condition.

Variable	CAMS (<i>n</i> = 33)	TAU (<i>n</i> = 29)	Total (<i>n</i> = 62)	Statistic
Gender identity (Female) (%)	63.6 (<i>n</i> = 21)	72.4 (<i>n</i> = 21)	67.7 (<i>n</i> = 42)	$\chi^2(1) = 0.54, p = .46$
Age	19.48 (SD = 1.48)	20.52 (SD = 2.31)	19.97 (SD = 1.97)	$T(60) = 2.00, p = .051$
Race (%)				
White	48.5 (<i>n</i> = 16)	48.3 (<i>n</i> = 14)	48.4 (<i>n</i> = 30)	Fisher's exact: $p = .65$
Multi-racial	18.2 (<i>n</i> = 6)	31.0 (<i>n</i> = 9)	24.2 (<i>n</i> = 15)	
Hispanic	9.1 (<i>n</i> = 3)	6.9 (<i>n</i> = 2)	8.1 (<i>n</i> = 5)	
Black	6.1 (<i>n</i> = 2)	0 (<i>n</i> = 0)	3.2 (<i>n</i> = 2)	
Asian	18.2 (<i>n</i> = 6)	13.8 (<i>n</i> = 4)	16.1 (<i>n</i> = 10)	
Previous suicide attempts (%)				
0	72.7 (<i>n</i> = 24)	65.5 (<i>n</i> = 19)	69.4 (<i>n</i> = 43)	$\chi^2(1) = 0.78, p = .38$
1	21.2 (<i>n</i> = 11)	20.7 (<i>n</i> = 6)	21.0 (<i>n</i> = 13)	
2 or more	6.1 (<i>n</i> = 2)	13.8 (<i>n</i> = 4)	9.7 (<i>n</i> = 6)	
Sexual orientation (%)				
Heterosexual	48.5 (<i>n</i> = 16)	53.2 (<i>n</i> = 16)	51.6 (<i>n</i> = 32)	$\chi^2(2) = 0.28,$ $p = .87$
Bi-sexual/gay	36.4 (<i>n</i> = 12)	31.0 (<i>n</i> = 9)	33.9 (<i>n</i> = 21)	
Unknown/unsure	15.2 (<i>n</i> = 5)	13.8 (<i>n</i> = 4)	14.5 (<i>n</i> = 9)	

differential rate of change on the CCAPS-Suicidal Ideation Question from baseline through the post, $t(60) = 2.10, p = .040, d = 0.54$ (CI: 0.03–1.05), controlling for intake scores on this question and distress level. The rate of reduction on the log-odds scale was 3.64 ($se = 1.03$) for CAMS and 1.28 ($se = 0.47$) for TAU.

To interpret this effect, we implemented another HGLM examining any SI versus no SI over time, which yielded a significant intervention effect, $t(60) = 2.00, p = .046, d = 0.52$ (CI: 0.01–1.02), where model-based estimates showed the prevalence of no SI from 40.6% at baseline to 74.4% at the post for CAMS, whereas TAU prevalence of no SI increased from 36.5% at baseline to 54.3% at the post. Pattern mixture models (Hedeker & Gibbons, 1997) indicated that analyses on intervention effects for depression and suicidal ideation were not sensitive to missing data patterns (SI question: $F(1, 58) = 0.05, p = .83$; depression subscale: $F(1, 58) = 1.13, p = .29$).

CGI Results

An HGLM was used to analyze the clinician ratings of suicidal risk severity (CGI-S) and improvement (CGI-I) to accommodate the ordinal nature of the two items. HGLM yielded non-significant differential rates of change on both the CGI-S ($t(47) = 0.53, p = .60, d = 0.16$ (CI: −0.34 to 0.66)) and the CGI-I ($t(47) = 1.08, p = .28, d = 0.33$ (CI: −0.18 to 0.83)). For both scales, there were significant improvements for both CAMS and TAU ($t(47) = 7.26, p < .0001$ for CGI-S; $t(47) = 7.87, p < .0001$ for CGI-I). The on-average reduction for CGI-S was 0.527 ($se = 0.075$) and 0.700 ($se = 0.103$) for CAMS and TAU, respectively. For CGI-I, the on-average reduction was 0.696 ($se = 0.071$) and 0.615 ($se = 0.105$) for CAMS and TAU, respectively.

Intervention Effects: Baseline-Post Assessments Only

BHS Results

The ANCOVA model used to examine the BHS yielded a non-significant intervention effect, $t(48) = -0.27, p = 0.79$. On-average reduction from baseline to post on the BHS was 5.55 ($se = 0.892$) and 5.20 ($se = 0.985$) for CAMS and TAU, respectively. Hence,

TABLE 2. Means (and SDs) or percent frequencies for all dependent variables across treatment.

Measures	Condition	Intake	Baseline	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8	Post
Depression (CCAPS-34)	CAMS	3.00 (0.53)	2.23 (0.99)	1.34 (1.10)	1.20 (1.12)	1.12 (1.03)	1.12 (1.03)	1.12 (1.03)	1.12 (1.03)	1.14 (1.04)	1.13 (1.08)	1.42 (1.18)
	TAU	2.96 (0.78)	1.98 (1.06)	1.54 (1.11)	1.47 (1.07)	1.49 (1.07)	1.49 (1.07)	1.49 (1.07)	1.45 (1.06)	1.38 (0.99)	1.40 (1.05)	1.70 (0.90)
Distress Index (CCAPS-34)	CAMS	2.52 (0.52)	1.86 (0.70)	1.40 (0.96)	1.26 (0.89)	1.18 (0.83)	1.18 (0.83)	1.18 (0.83)	1.18 (0.83)	1.21 (0.83)	1.19 (0.82)	1.39 (0.96)
	TAU	2.59 (0.73)	1.77 (0.89)	1.47 (0.85)	1.41 (0.79)	1.44 (0.80)	1.44 (0.80)	1.44 (0.80)	1.41 (0.82)	1.35 (0.74)	1.33 (0.78)	1.67 (0.74)
Suicidal Id. Question (CCAPS-34)	CAMS	3.12 (0.78)	1.94 (1.27)	0.77 (1.20)	0.66 (1.20)	0.56 (1.05)	0.56 (1.05)	0.56 (1.05)	0.56 (1.05)	0.95 (1.23)	0.61 (1.12)	1.07 (1.25)
	TAU	2.79 (0.90)	1.83 (1.36)	1.11 (1.31)	1.04 (1.32)	1.04 (1.34)	1.04 (1.34)	1.04 (1.34)	0.96 (1.23)	0.61 (1.12)	1.00 (1.28)	1.30 (1.15)
Severity of Suicidal Risk (CGI-5)	CAMS			3.17 (0.79)	2.94 (0.93)	2.39 (0.70)	2.14 (1.11)	2.26 (1.18)	1.92 (0.93)	1.55 (0.74)	1.70 (0.66)	
	TAU			3.53 (1.19)	3.06 (1.24)	3.00 (1.14)	2.90 (1.45)	2.27 (1.08)	2.27 (1.12)	2.21 (0.92)	2.05 (1.18)	
Improvement in Suicidal Risk (CGI-I)	CAMS			3.78 (0.43)	3.44 (0.81)	2.83 (0.79)	2.52 (1.21)	2.39 (1.12)	1.96 (0.62)	1.73 (0.70)	1.85 (0.75)	
	TAU			3.60 (0.63)	3.50 (0.73)	3.11 (1.02)	2.57 (0.98)	2.45 (0.91)	2.41 (0.91)	2.32 (0.89)	2.16 (1.12)	
Suicidal Ideation (SSI)	CAMS		13.79 (5.13)									5.66 (6.44)
	TAU		13.72 (7.07)									7.35 (6.45)
Hopelessness (BHS)	CAMS		12.76 (4.85)									6.79 (5.53)
	TAU		13.00 (5.01)									7.61 (5.37)
Non-Suicidal Self-Injury (SASI-C)	CAMS		3.75 (9.54)									0.43 (0.96)
	TAU		10.86 (20.76)									0.24 (0.51)

Note. CAMS: Collaborative Assessment and Management of Suicidality (Jobes, 2006; Andreasson et al., 2016); TAU: Treatment as Usual; CCAPS-34: Counseling Center Assessment of Psychological Symptoms-34 (Center for Collegiate Mental Health, 2019); CGI: Clinical Global Impression Scale for Severity (CGI-S) and Improvement (CGI-I; Guy, 1976); SSI: Scale for Suicide Ideation (Beck et al., 1979); BHS: Beck Hopelessness Scale (Beck et al., 1974); SASI-C: Suicide Attempt Self-Injury Count Interview (Linehan, Comtois, Brown, Heard, & Wagner, 2006).

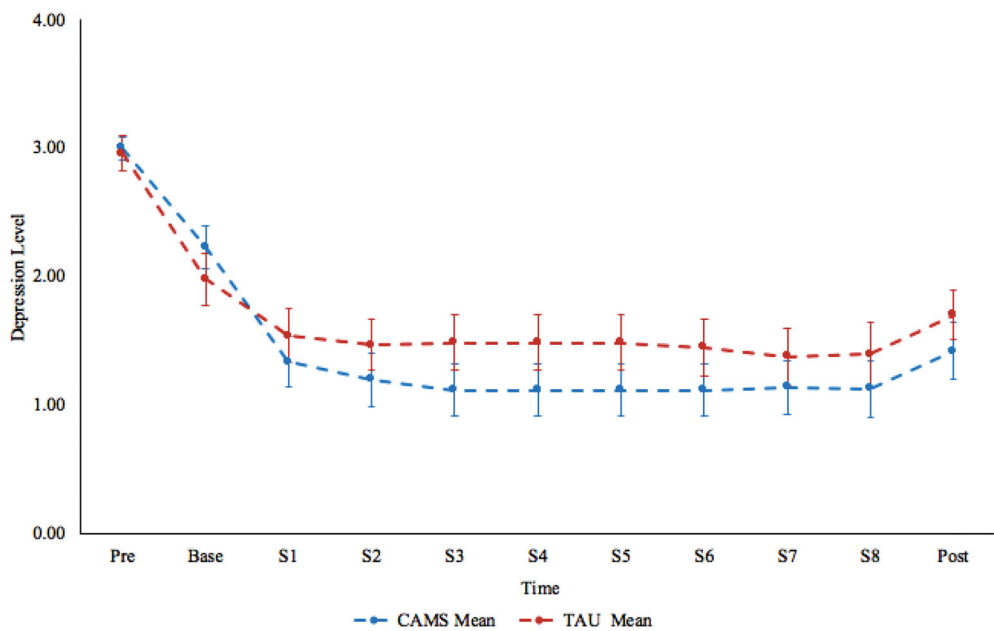


Figure 2. Depression levels (CCAPS-34 Subscale, ranging from 0–4) between conditions and across time—initial intake (pre), baseline assessment (base), session number (S1–S8), and post-assessment (post).

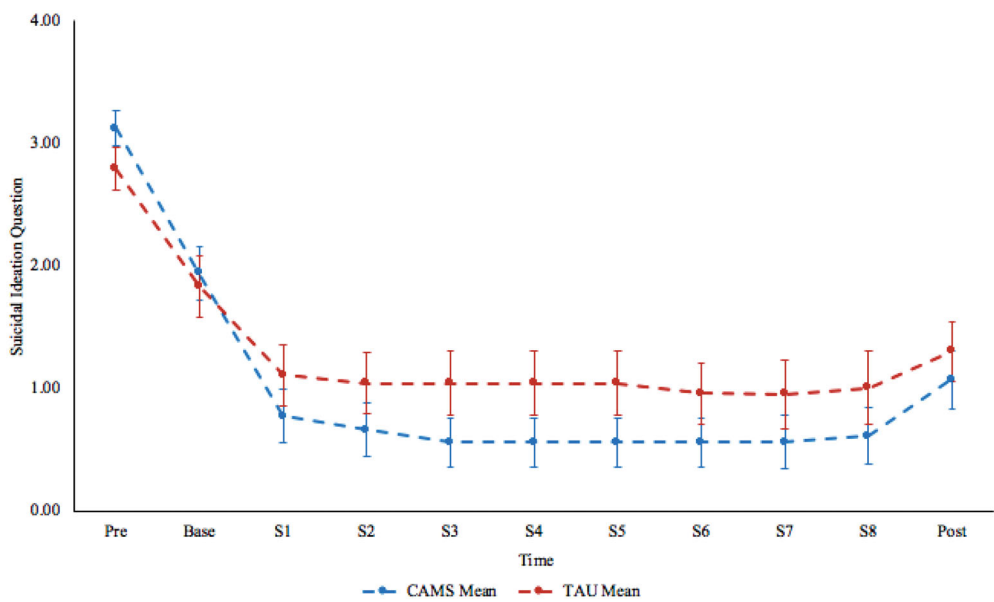


Figure 3. Suicidal Ideation Question (CCAPS-34, ranging from 0–4) between conditions and across time—initial intake (pre), baseline assessment (base), session number (S1–S8), and post-assessment (post).

while there is not a significant between-group intervention effect, both interventions experienced sizeable reductions in hopelessness from baseline to post.

SSI Results

Due to a large number of zeros in the SI-Current Subscale of the SSI at post (over a third of the participants reported no SI at the end of treatment), a zero-altered model (Atkins, Baldwin, Zheng, Gallop, & Neighbors, 2013) was utilized, which divided the outcome into (1) the probability of any SI and (2) the intensity of SI when non-zero, as done in other studies (e.g., Jobes et al., 2017). At post, 48.3% (14/29) of CAMS participants reported during an interview no SI compared to 30.4% (7/23) of TAU participants. This 17.9% difference between CAMS and TAU is not significant ($\chi^2(1) = 1.73$, $p = .19$, $NNT = 5.59$ (CI: -2.41 to 15.35)). For those with any SI, the median score was 11.0 (SD = 4.59) for CAMS and 11.0 (SD = 4.98) for TAU, a non-significant difference ($\chi^2(1) = 0.05$, $p = .83$).

SASI-C Results

Logistic Regression models were used to examine intentional injuries, including NSSI, from the SASI-C due to the binary nature of this outcome. At baseline, 3 clients within CAMS (9.1%) and 6 clients within TAU (20.7%) reported suicide attempts in the last two months ($\chi^2(1) = 1.67$, $p = .20$). Whereas at the post, none of the participants contributing data (51/62 or 82%) reported suicide attempts in the last two months. At baseline, 78.8% (26/33) of CAMS and 82.8% (24/29) of TAU reported engaging in NSSI within the past year, a non-significant baseline difference. At post, 24.1% (7/29) in CAMS and 39.1% (9/23) in TAU reported engaging in NSSI in the last two months; the logistic regression model at post-only yielded a non-significant intervention effect ($\chi^2(1) = 1.30$, $p = .25$).

Moderation Effects

Moderation effects on the measures acquired solely at baseline and post-treatment only yielded one statistically significant moderator—reductions in hopelessness were moderated by BPD features ($F(1, 45) = 4.44$, $p = .041$). The moderation effect, as illustrated in Figure 4, is driven by a disordinal interaction, which indicates that the treatment difference varies both in magnitude and direction as a function of the levels of the moderator; therefore, the on-average better treatment varies differentially over the levels of the moderator. In terms of the impact of BPD features on hopelessness (BHS) across treatment arms, there is a statistically significant contrast: those scoring at least 1 SD below the mean of 33 on BPD features experienced more improvements in hopelessness in the CAMS condition compared to TAU ($t(45) = 2.03$, $p = .048$), whereas the opposite is true for those scoring at least one SD or above the mean on BPD features (defined as 53+), with more improvement in hopelessness in the TAU condition compared to CAMS, although the contrast is not significantly different ($t(45) = -0.95$, $p = .35$). Figure 4 also shows a marginally significant moderation effect for previous suicide attempts ($F(2, 43) = 2.56$,

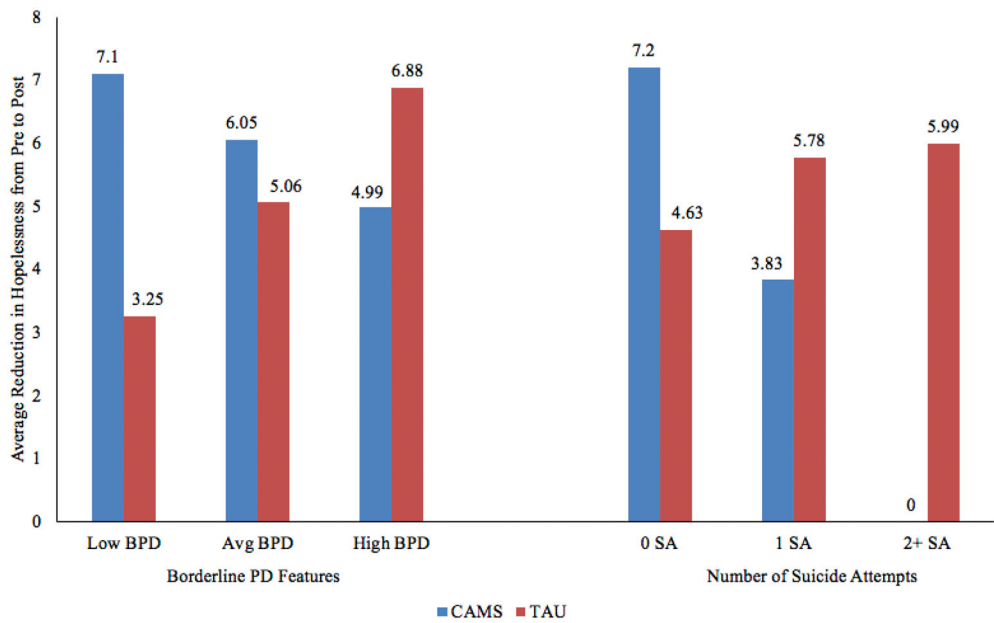


Figure 4. Hopelessness Levels (BHS; changes pre to post) by severity of Borderline Personality Disorder (BPD) features (PAI-BOR) and prior number of suicide attempts (SA).

$p = .089$), suggesting a similar disordinal effect with higher reductions in hopelessness among those with no prior suicide attempts in the CAMS condition relative to TAU (an additional 2.57 ($se = 1.69$) units reduction for CAMS), but the opposite being true for those with two or more prior attempts (an additional 6.00 ($se = 4.12$) unit reduction for TAU compared to CAMS).

With variables assessed weekly, four significant moderation effects were found: BPD features (PAI-BOR; $F(1, 45) = 5.21, p = .023$) and age ($F(1, 48) = 8.27, p = .005$) moderated clinician-rated severity (CGI-S); and previous suicide attempts ($F(1, 55) = 3.17, p = .043$) and age ($F(1, 57) = 4.71, p = .031$) moderated depression (CCAPS-Depression).

As illustrated in Figure 5, we again see a disordinal interaction effect of treatment on clinician-rated severity of suicidal risk as a function of the two moderators. For the treatment and BPD features (PAI-BOR) interaction, there is more reduction in clinician ratings of suicidal risk severity for CAMS compared to TAU for those with fewer BPD features, whereas there is a greater reduction for TAU compared to CAMS for those with more BPD features. Similarly, for the treatment and age interaction, there is more reduction in clinician ratings of suicidal risk severity for CAMS compared to TAU with older ages, whereas we see more improvement in severity ratings for TAU compared to CAMS with younger ages. Statistical contrasts indicated that for those with high levels of BPD features ($PAI-BOR \geq 53$, corresponding to 1 SD above the mean), there was a significantly larger rate of severity improvement for those within TAU compared to CAMS ($t(45) = 2.00, p = .047$). Additional contrasts indicated that for clients with average BPD features ($PAI-BOR = 43$), there was a comparable rate of improvement for CAMS compared to TAU ($t(45) = 0.38, p = .70$). Contrasts indicated a faster but not

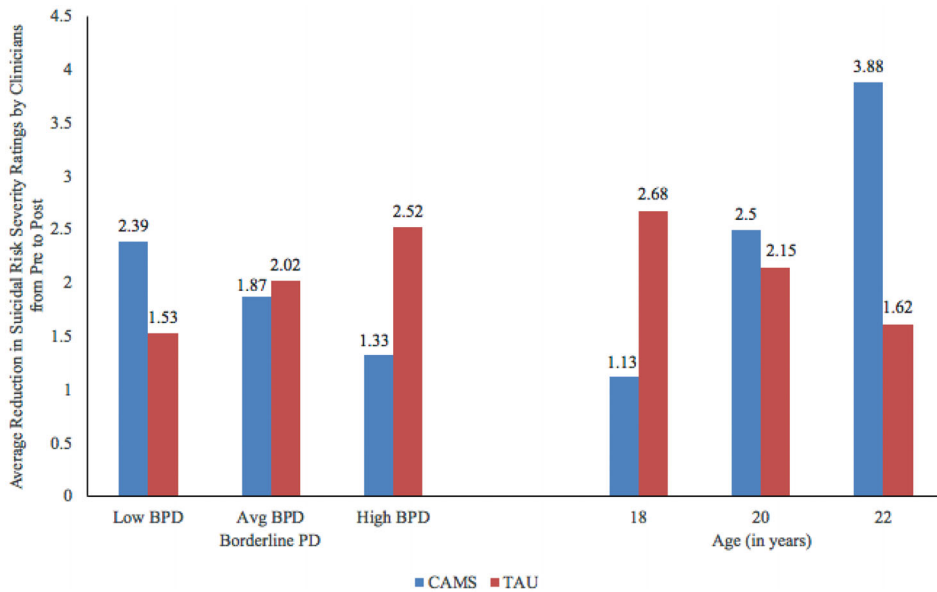


Figure 5. Clinician-rated severity of suicidal risk (CGI-S; changes from pre to post) by severity of Borderline Personality Disorder (BPD) features (PAI-BOR) and age (1 SD below the mean, mean, and 1 SD above the mean).

statistically significant difference in the rate of improvement for CAMS compared to TAU, on average, among clients with fewer BPD features ($\text{PAI-BOR} \leq 33$) ($t(45) = 1.35$, $p = .18$). For age, statistical contrasts indicated that for older clients (22, corresponding to 1 SD above average age), there was a larger rate of improvement for those within CAMS compared to TAU ($t(48) = 0.63$, $p = .53$). Contrasts showed that for clients at the average age (i.e., 20 years of age), there was a larger rate of improvement for TAU compared to CAMS, ($t(48) = 0.60$, $p = .55$). A similar statistically significant contrast indicated a faster rate of improvement for TAU versus CAMS on average, among younger clients (18 years of age) ($t(48) = 2.09$, $p = .04$).

Similarly, as shown in Figure 6, there were also disordinal interaction effects of treatment on client self-reported depression (CCAPS-Depression Subscale) as a function of two moderators—number of previous suicide attempts and age. Statistical contrasts indicated that for clients with no previous suicide attempts, there was a significant difference in the rate of improvement, with those within CAMS reducing severity at a more rapid rate compared to TAU ($t(56) = 2.55$, $p = .011$). Similar contrasts indicated relatively comparable rates for CAMS and TAU, on average, among clients with 1 previous attempt ($t(56) = 0.28$, $p = .78$). For those with 2 or more previous attempts, however, on average TAU shows statistical improvement in depression, but not CAMS, although the contrast is not statistically significantly different ($t(56) = 1.09$, $p = .27$). Statistical contrasts indicated that for older clients (22 years old, corresponding to 1 SD above average age) there was a significant difference in the rate of improvement with those within CAMS reducing severity at a more rapid rate compared to TAU ($t(58) = 2.42$, $p = .016$). Additional contrasts indicated that for clients at the average age (20 years of age), there was a significant difference in the rate of improvement with those within CAMS experiencing reductions in depression at a more rapid rate compared to TAU ($t(58) = 2.06$, $p = .040$). A similar contrast indicates comparable rates for

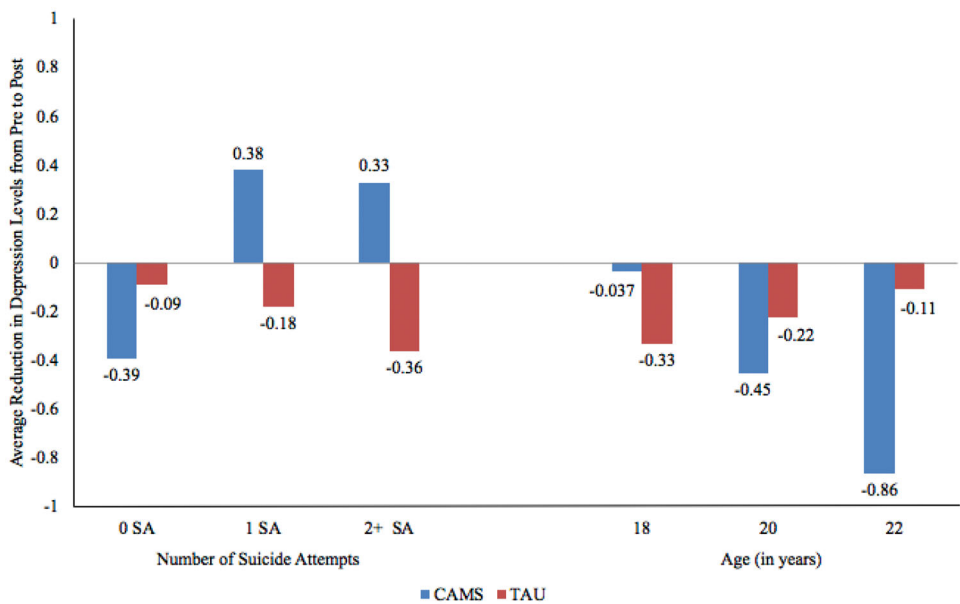


Figure 6. Depression levels (CCAPS-34 Subscale) by number of previous suicide attempts (SA) and age (1 SD below the mean, mean, and 1 SD above the mean).

CAMS and TAU, on average, among younger clients (18 years old, corresponding to 1 SD below the average age; $t(58) = 0.10, p = .92$).

Discussion

The results of this randomized controlled trial of 62 suicidal college students yielded some valuable preliminary data, worthy of subsequent investigations, in terms of primary experimental outcomes and secondary analyses of moderation results. Notably, this study relied heavily on practice-oriented research methodology (Castonguay et al., 2013), which enhances the generalizability of the findings and increases the prospect of dissemination. For example, the *same clinicians* provided treatment in *both* arms of the study, which is common in CCC general clinical practice. Counselors thus served as their own controls, and robust fidelity data indicate that there was no treatment contamination between conditions. Previous feasibility findings (Pistorello et al., 2018) and the lack of baseline differences between conditions rule out other confounding variables that may otherwise impact experimental findings.

Treatment Condition Differences in Outcomes

Generally speaking, across both treatment conditions, all clients improved on suicidal ideation, depression, overall distress, hopelessness, and NSSI over the course of care and in the follow-up assessment, thus showing that 4–8 sessions at a CCC are reasonable first-stage interventions with suicidal college students. However, there were no between-group main effects for variables measured only at baseline and post-treatment, which impacts our ability to make strong conclusions regarding the overall experimental

effectiveness of study treatments. While there were trending experimental results favoring CAMS, this feasibility RCT study may have been unduly impacted by a lack of statistical power—suggesting that a well-powered RCT with larger sample size is needed to more fully test any potential experimental main effects.

Nevertheless, HLM and HGLM analyses, relying on variables with multiple repeated data points (often weekly), yielded statistically significant findings in favor of CAMS for rapidly decreasing depression and suicidal ideation specifically over the course of care. Significantly reducing suicidal ideation more quickly and deeply, and sustaining that reduction over the course of care—in comparison to TAU—corroborates a finding that has been seen across previous clinical trials of CAMS (Comtois et al., 2011; Ellis et al., 2015, 2017; Jobes et al., 2017; Ryberg, Zahl, et al., 2019). Similarly, the new finding corresponds with previous evidence of significant reductions in depression associated with CAMS (Ellis, Green, Allen, Jobes, & Nadorff, 2012; Ellis et al., 2015). More importantly, our results add to the literature given the fact that, unlike prior studies of CAMS with college students (e.g., Jobes, Kahn-Greene, Greene, & Goeke-Morey, 2009; Jobes et al., 1997), the present study relied on randomization and the same therapists provided both arms of clinical care with clear experimental fidelity. These findings suggest that a suicide-specific approach such as CAMS is, on average, more likely to impact suicidal ideation and depression in suicidal college students, even over a relatively brief course of treatment.

Moderation Findings

Our hypothesis that CAMS might be particularly effective with students presenting with a less complex profile was supported. In particular, moderation analyses across variables such as client self-reported hopelessness, depression, and clinician-rated severity of the suicidal risk revealed a general pattern of CAMS doing better than TAU with less complex cases. The statistically significant moderator finding of decreased hopelessness for less complex CAMS clients needs to be considered with caution because while decreased hopelessness is a desirable clinical outcome, it may not cause any decreases in suicidal ideation or behavior.

It should be noted that the moderation effects of CAMS trials often turned out to be disordinal, meaning that opposite patterns were observed across groups. So, whereas CAMS performed better with less complex cases, clients with a more complex profile, actually did better in TAU care. Whereas both arms of the trial generally improved over the course of care, rates of improvement among students with fewer BPD features, no prior suicide attempts, and older age (22–25) had better outcomes within the CAMS arm of the trial; conversely, those with more BPD features and 2 or more prior suicide attempts had better outcomes within the TAU arm. Age also moderated outcome in another CAMS RCT (Huh et al., 2018), but generally needs to be interpreted cautiously in this study as the age range was very truncated (18–25) and age turned out to be negatively correlated with BPD features, meaning that younger students were more likely to report more BPD features.

Our moderation results broadly replicate findings from two other CAMS RCTs (Jobes et al., 2017; Ryberg, Zahl, et al., 2019). For example, within a CAMS RCT of 78 Norwegian outpatients and inpatients, Ryberg, Diep, et al. (2019) found in moderation analyses that

CAMS was less effective for more complex patients (i.e., those who used illicit drugs and with BPD features). In the Jobes et al. (2017) RCT of 148 suicidal US Army soldiers, moderation analyses showed that lower baseline distress in the CAMS arm of the trial was significantly associated with decreases in emergency department (ED) admissions for suicide-related episodes and *any* behavioral health-related ED admission at 12-month follow-up when compared to enhanced usual care (Huh et al., 2018). Thus, there are now three RCTs showing that less distressed “up-stream” suicidal clients may benefit the most from a short course of CAMS on both psychological and behavioral measures.

We might, therefore, infer that the suicide-specific focus of CAMS may be particularly beneficial for college students who are experiencing (1) a first suicidal crisis, or (2) acute (versus chronic) suicidal ideation, and/or (3) fewer BPD symptoms. Perhaps the ability to speak freely about suicidal ideation and plans, as well as identify and target client-defined suicidal drivers in CAMS helps normalize these feelings and enables clients to find alternatives to suicidal coping.

The disordinal interaction findings showing that TAU care was better than CAMS for students presenting with a more complex profile (more BPD features, history of two or more suicide attempts) are a little harder to explain, particularly because the components of TAU are unknown, with the exception of not using any CAMS or DBT techniques. While CAMS was effective for these students, TAU was more effective in decreasing hopelessness, for example, with complex cases. One potential explanation for this finding is that for students with a more complex profile, the overt change-oriented emphasis of CAMS may have been unsettling for chronically suicidal clients for whom suicide has perhaps become a comforting notion and a way to feel in control. Thus, TAU care may not have focused on the elimination of suicidal ideation as much as CAMS, which may also explain the between-group dropout differences (albeit not statistically significant). It should be noted that, although at first glance it may appear that CAMS had a higher dropout rate than TAU, this difference, due to the small sample size, was not statistically significant. In fact, the CAMS dropout rate of 27.3% is almost exactly the same as the national CCC dropout rate of 27.1% (Center for Collegiate Mental Health, 2019) and as noted earlier, CAMS has been previously shown to significantly increase clinical retention (Comtois et al., 2011).

Students with BPD features and history of multiple attempts are likely optimal candidates for an intensive treatment such as DBT (which we have previously proposed in developing adaptive strategies for treatment non-responders to first-stage approaches—Pistorello et al., 2018). While there is some evidence that CAMS may be able to “compete” with DBT using fewer sessions and resources (Andreasson et al., 2016), the overwhelming evidence base would underscore the therapeutic superiority of DBT with more chronic, dysregulated, multiple attempting individuals (e.g., DeCou, Comtois, & Landes, 2019; Kliem, Kröger, & Kosfelder, 2010; Linehan 1993).

An exciting potential narrative emerges from our results with implications for effective life-saving care based on the use of different adaptive strategies depending on responses to treatment (cf. Pistorello et al., 2018). Notably, 66% of suicidal clients in our sample were effectively treated by only 4–8 sessions of CAMS or TAU with no hospitalizations (Pistorello et al., 2018). However, the rest of the sample required further care, either more CAMS, or as noted above for the more chronic group, an intensive

course of DBT. Such findings need further replication within a well-powered design to fully study the potential of adaptive treatment strategies. Within our findings, we see the promise of identifying different suicidal subsets (or typologies) potentially in need of different types, dosages, and/or sequences of suicide-specific evidence-based care. In other words, relatively newly suicidal students with fewer BPD symptoms may be readily and quickly treated by CAMS, whereas more chronic and dysregulated cases may need more care or a more intensive intervention, such as DBT. This study provides preliminary support for pursuing a kind of “prescriptive” clinical approach to suicide-specific care. This notion was a speculative “pipe-dream” some 20 years ago (Jobes, 1995), but today is a potential clinical reality wherein suicidal people may be effectively treated with evidence-based practices that are least-restrictive and cost-effective (Jobes & Chalker, 2019).

There are of course methodological limitations to our study: the small sample size, the absence of data on suicidal behaviors, and other measurement flaws (i.e., single-item measure and the lack of follow-up assessment). Perhaps the biggest limitation in outcomes of the present study is that although weekly measures showed CAMS to have a more pronounced impact on suicidal ideation and depression, relative to TAU, that was not the case in terms of pre to post measures often utilized in other suicide-related studies. One hypothesis for this finding is that analyses of weekly measures carried greater statistical power. Another possibility is that the weekly measures are more likely to capture the dynamic process of suicide risk, as proposed by the fluid vulnerability theory (Rudd, 2006), where fluctuations in risk occur as a function of the ongoing ebb-and-flow of proximal risk and protective factors. Recent studies utilizing smartphone data collected every few hours showed that suicidal ideation indeed tends to change considerably within just a few hours (Kleiman et al., 2017).

The number of meaningful linear results and important moderator findings that underscore the potential promise of matching different treatments to different suicidal clients cannot be dismissed. While the reduction of suicidal behaviors is an aspirational goal, reduction in suicidal ideation is too often an under-appreciated treatment goal in and of itself (Jobes & Joiner, 2019), as suicidal ideation is a significant problem within our culture as it has been shown to serve as a path for suicide attempts (e.g., Lewinsohn, Rohde, & Seeley, 1994). On college campuses, suicidal ideation is three times more commonly seen than attempt behaviors (Center for Collegiate Mental Health, 2019), so it gives us an opportunity for targeted prevention efforts. The use of a single-item measure from the CCAPS-34 not typically utilized in suicidology research and the lack of follow-up assessment data may also limit the generalizability of our findings and our ability to evaluate long-term treatment effects. Yet, using a repeated assessment at every session based on a “real world” measure most commonly used in CCCs to gauge treatment effectiveness does create the potential for more sophisticated statistical linear analyses, which may partially offset such concerns.

Concluding Remarks

From a purely clinical perspective, we know that college campuses are protective environments for college students in terms of suicidal risk when compared to non-college

cohorts (Schwartz, 2006). Yet for these very students, suicide is still the second leading cause of death on campus. For many campuses, there are implicit or explicit policies that remove such students from the protective campus environment through psychiatric hospitalizations or medical withdrawals, which according to some of the research literature, ironically could *increase* the risk post-discharge (Coyle, Shaver, & Linehan, 2018; Pistorello, Coyle, Locey, & Walloch, 2017). The goal of saving lives of emerging adults, who are the foundation of our shared future, compels us to find ways to effectively, safely treat suicidal students and keep them *on campus* if possible, if they can be helped with a treatment dosage that fits the setting. This study has shown that an evidence-based, suicide-specific treatment like CAMS can be used within routine CCC practice with positive findings. Providing this kind of treatment and further identifying the most effective and efficient sequences of care could prove useful to students, their parents, and institutions of higher education that aspire to teach not only academic lessons but also life lessons, especially in the face of *treatable* suicidal states.

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AUTHOR NOTES

Jacqueline Pistorello, PhD, Director of Counseling Services, University of Nevada, Reno. Dr. Pistorello specializes in mindfulness and acceptance-based approaches for the prevention and treatment of mental health problems among college students. David A. Jobes, PhD, Professor of Psychology, Associate Director of Clinical Training, and Director of the Suicide Prevention Lab at The Catholic University of America in Washington, DC. Dr. Jobes is the developer of the CAMS. Robert Gallop, PhD, Professor of Mathematics, West Chester University, West Chester, PA. Dr. Gallop specializes in biostatistics, longitudinal data analysis, causal modeling, and informative missing data. Scott N. Compton, PhD, Associate Professor in Psychiatry and Behavioral Sciences, Duke University Medical Center. Dr. Compton specializes in anxiety disorders, Cognitive Behavioral Therapy, children and adolescents, and trichotillomania. Nadia Samad Locey, PhD, Research Faculty, Counseling Services, University of Nevada, Reno. Dr. Locey specializes in Cognitive Behavioral Therapy and Dialectical Behavior Therapy for adolescents and adults. Josephine S. Au, PhD, Research Associate, Suicide Prevention Lab at The Catholic University of America in Washington, DC.; Postdoctoral Fellow in Child and Adolescent Psychiatry, McLean Hospital/Clinical Fellow in Psychology in the Department of Psychiatry, Harvard Medical School. Dr. Au studies suicide assessment and interventions in adolescents and young adults. Samantha K. Noose, MA, Doctoral student in the Clinical Psychology Ph.D.

program at the University of Tennessee, Knoxville. Ms. Noose is interested in the development of psychopathology in childhood and adolescence, particularly difficulties with emotion regulation, and the impact of parental psychopathology and parenting stress on child development. Joseph C. Walloch, PsyD, Assistant Director/Director of Clinical Services, University of Nebraska, Lincoln. Dr. Walloch specializes in borderline personality disorder, suicidality, non-suicidal self-injurious behaviors, disordered eating, depression, anxiety, men's issues, and LGBTQ populations. Jacquelyn Johnson, PsyD, Dr. Johnson is currently in private practice in Los Angeles, CA, specializing in diversity and multiculturalism in adolescents and adults. Maria Young, LCSW Licensed Clinical Social Worker, Counseling Services, University of Nevada, Reno. Ms. Young specializes in depression, suicidality, non-suicidal self-injury, anxiety, imposter phenomenon, stress management, self-esteem, self-compassion, grief and loss, mindfulness, utilization of yoga in therapy, and interpersonal and family relationships. Yani Dickens, PhD, Associate Director, Director of Training, Counseling Services, University of Nevada, Reno. Dr. Dickens specializes in sport psychology consulting, eating disorders prevention and treatment, and diversity as well as applying Cognitive and Dialectical Behavior Therapies to stress, anxiety, depression, eating, and personality disorders. Patricia Chatham, PhD, Dr. Chatham was a licensed psychologist and supervisor at Counseling Services at the University of Nevada, Reno until her retirement. She has also served as the Director of Training of the Psychology Service at the VA Sierra Nevada Health Care System. Tami Jeffcoat, PhD, Licensed Psychologist, Blue Tara Psychological Services. Dr. Jeffcoat specializes in Acceptance and Commitment Therapy, Dialectical Behavior Therapy, Functional Analytic Psychotherapy, and Cognitive Behavioral Therapy.

Correspondence concerning this article should be addressed to Jacqueline Pistorello, PhD, Director of Counseling Services, MS 0080, University of Nevada, 1664 N Virginia St., Reno, NV 89557, USA. Email: pistorel@unr.edu.

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ORCID

Jacqueline Pistorello  <http://orcid.org/0000-0002-3926-5474>

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