RESEARCH ARTICLE

The psychometric properties of the Collaborative Assessment and Management of Suicidality rating scale

Christopher D. Corona[1,2] 🆔 | Peter M. Gutierrez[3,4] 🆔 |
Barry M. Wagner[5] | David A. Jobes[5]

[1]VISN 2 Center of Excellence for Suicide Prevention, Canandaigua VA Medical Center, Canandaigua, New York

[2]Department of Psychiatry, University of Rochester Medical Center, Rochester, New York

[3]Rocky Mountain Mental Illness Research, Education, and Clinical Center, Denver VA Medical Center, Denver, Colorado

[4]Department of Psychiatry, University of Colorado School of Medicine, Aurora, Colorado

[5]Department of Psychology, Catholic University of America, Washington, District of Colombia

Correspondence
Christopher D. Corona, PhD, VISN 2 Center of Excellence for Suicide Prevention, Canandaigua VA Medical Center, 400 Fort Hill Avenue, Canandaigua, NY 14424.
Email: christopher.corona2@va.gov

Funding information
Military Operational Medicine Research Program, Grant/Award Number: W81XWH-11-1-0164

Abstract

Objective: The CAMS Rating Scale (CRS) is an adherence measure for the Collaborative Assessment and Management of Suicidality (CAMS), a suicide-specific clinical intervention. This study examined the ability of the CRS to assess adherence to CAMS.

Methods: Video-recorded therapy sessions of clinicians delivering either CAMS or Enhanced Care-As-Usual (E-CAU) were rated with the CRS. These ratings ($N = 98$) were used to evaluate criterion validity, internal consistency, and factor structure.

Results: Criterion validity and factor analyses did not support the organization of the CRS into its current subscales. Furthermore, the identified factor model and item-level statistics revealed weak CRS items. Finally, internal consistency was higher among CAMS clinicians than among clinicians delivering E-CAU.

Conclusion: These results establish the CRS as a measure that can effectively assess the adherence to CAMS in its current form. Potential revisions to future iterations of the CRS are discussed.

KEYWORDS
adherence, CAMS, evidence-based practice, psychometrics, suicide

---

1 | INTRODUCTION

Suicide currently ranks as the 10th leading cause of death in the United States and is a major public health concern both domestically and abroad (Drapeau & McIntosh, 2017). There were over 44,000 suicides in the United States in 2016, and over 800,000 suicides internationally in 2012 (World Health Organization, 2014). One continuing challenge in the effort to reduce the rate of suicide worldwide is the relative lack of randomized controlled trials (RCTs) that evaluate treatments designed specifically to target suicidal behavior (Comtois & Linehan, 2006; Leenaars, Pompili, & Tatarelli, 2011; Ward-Ciesielski & Linehan, 2014). To date, only dialectical behavior therapy (DBT), two forms of suicide-specific cognitive therapy (CT; i.e., CT for Suicide Prevention and Brief Cognitive Behavioral Therapy), and the Collaborative Assessment and Management of Suicidality (CAMS) have replicated positive outcomes in RCTs (G. K. Brown et al., 2005; Jobes, 2016; Linehan, 1993, 2015; Rudd et al., 2015; Wenzel, Brown, & Beck, 2009).

CAMS is a therapeutic framework designed to be used by clinicians from a variety of training backgrounds on a short-term basis (CAMS; Jobes et al., 2015; Jobes, 2016). The framework is characterized by initial and continued risk assessment, treatment planning, and suicide-specific interventions. In addition to a sharp focus on clinical material relevant to suicide, a collaborative interaction style is a key component of CAMS that should frame all technical aspects of the intervention. Such an approach mitigates the adversarial therapeutic tone that can arise within discussions about suicide, and fosters a strong therapeutic alliance by enlisting the patient as the expert of their experience who can make valuable contributions to their own treatment (Jobes, 2016).

Care within the CAMS framework is guided by the "Suicide Status Form" (SSF; Conrad et al., 2009; Jobes, Jacoby, Cimbolic, & Hustead, 1997), and begins with a thorough assessment of the risk factors related to suicide. This assessment entails having patients rate their experience of psychological pain, stress, agitation, hopelessness, and self-hate using the SSF, as well as obtaining a relevant history from the patient (e.g., past suicidal ideation and behavior, substance use, sleep problems, relationship problems, etc.). The preliminary identification of patient-defined suicidal "drivers" (i.e., particular problems or issues that make suicide compelling) follows, along with the creation of both an outpatient safety plan as well as a general treatment plan focusing on problem-drivers (e.g., beliefs about oneself). Ongoing sessions include continued assessment of suicide risk using the SSF, the use of optional instruments, which are designed to help the dyad further understand the patient's unique relationship or attachment to suicide (e.g., the CAMS Therapeutic Worksheet), and clinical interventions aimed at patient-defined problem-drivers (e.g., CT targeting beliefs about oneself). Once suicide risk is satisfactorily mitigated as per ongoing assessment, the resolution phase of treatment is characterized by discussions of what has worked in treatment as well as a plan for addressing future suicidality (Schembari, Jobes, & Horgan, 2016).

Evidence supporting CAMS as a suicide-specific intervention is growing. Comtois et al. (2011) compared CAMS with treatment-as-usual care (TAU) in an outpatient setting and found that those receiving CAMS showed significantly greater increases in hope, as well as significantly greater reductions in suicidal ideation and overall symptom distress 12 months after treatment. Andreasson et al. (2016) also found that CAMS showed promise for treating self-harm and suicide attempts when compared with DBT. Most recently, Jobes et al. (2017) compared CAMS with Enhanced Care-As-Usual (E-CAU) among active-duty U.S. soldiers and found that suicidal ideation had been eliminated 3 months after treatment among those receiving CAMS. These studies replicated and extended findings from previous correlational studies also suggesting positive outcomes related to CAMS (Arkov, Rosenbaum, Christiansen, Jønsson, & Münchow, 2008; Ellis, Green, Allen, Jobes, & Nadorff, 2012; Ellis, Rufino, Allen, Fowler, & Jobes, 2015; Jobes, Kahn-Greene, Greene, & Goeke-Morey, 2009; Jobes, Wong, Conrad, Drozd, & Neal-Walden, 2005; Nielsen, Alberdi, & Rosenbaum, 2011).

An important consideration related to RCTs evaluating psychotherapeutic interventions is treatment fidelity or the extent to which treatments being studied are delivered as intended. Comprising the construct of treatment fidelity are both differentiation (i.e., demonstrating distinct treatment groups throughout a study) as well as adherence (i.e., demonstrating that defining elements of intervention are being practiced;

Perepletchikova, Treat, & Kazdin, 2007). Thus, using effective methods for assessing adherence is integral to the process of developing and disseminating suicide-specific, evidence-based interventions such as CAMS.

To date, CT is the only empirically supported treatment for suicidal behavior with a corresponding measure that has been psychometrically evaluated (Dobson, Shaw, & Vallis, 1985; Vallis, Shaw, & Dobson, 1986). Whereas, this measure has been used in trials evaluating CT within the context of suicidal behavior (G. K. Brown et al., 2005; Rudd et al., 2015); psychometric analyses have not been carried out with these data. Furthermore, no psychometric evaluations have been published pertaining to the DBT Global Rating Scale (Linehan, 2003). Whereas, an adherence measure for CAMS (i.e., the "CAMS Rating Scale"; CRS) has been mentioned in the literature, its psychometric properties have not been extensively evaluated thus far (Comtois et al., 2011; Jobes, 2012).

The CRS was initially developed for use within treatment studies evaluating the effectiveness of CAMS. Those with expert knowledge of the CAMS model adapted the CRS from the Cognitive Therapy Scale (Young & Beck, 1980). Further refinement of the measure was based on feedback provided by raters using the measure within earlier studies as well as consultation among CAMS experts (Comtois et al., 2011). No data have been published regarding the psychometric properties of earlier iterations of the CRS. Such properties speak the ability of the CRS to assess the delivery of CAMS in an effective manner, and have implications for the use of this measure within the contexts of research, treatment dissemination, and patient outcomes (Webb, DeRubeis, & Barber, 2010). Thus, the goal of the current study was to examine the psychometric properties of the CRS in an effort to determine its appropriateness as a measure assessing adherence to CAMS.

2 | MATERIALS AND METHODS

2.1 | Setting

The current study is a retrospective analysis using data from measures that were included in the "Operation Worth Living" (OWL) study, an RCT evaluating the effectiveness of CAMS versus E-CAU in a sample of army soldiers (Jobes et al., 2017). Data for the RCT were collected between September 2012 and March 2016 in both a pilot phase, as well as with an intent-to-treat sample. The site of both RCT phases was an army post in the southeastern United States, and the data were collected in health clinics on this post.

2.2 | Patients

Patients in the RCT included adult, active duty U.S. army soldiers who were identified as being suicidal. The intent-to-treat sample in the larger RCT from which data for the current study were drawn included 148 patients, whereas the sample for the current study included 72 of these patients. The sample in the current study ranged in age from 18 to 48 years ($M = 27.14$; $SD = 6.06$). Those identifying as male comprised 87% of the sample, and 13% identified as female. Enlisted army soldiers comprised 97% of the sample, and the officers comprised 3%. Additional patient demographic information is presented in Table 1.

Among patients in the current sample, scores on the Beck Scale for Suicide Ideation (BSS; Beck, Steer, & Ranieri, 1988) at baseline ranged from 13 to 33 ($M = 19.46$; $SD = 4.95$). Scores on the BSS can range from 0 to 38, and scores at or above 6 may indicate clinically significant levels of suicidal ideation. The number of lifetime suicide attempts in the current sample per self-report ranged from 0 to 222 ($M = 7.01$; $SD = 29.55$). These statistics should be interpreted with caution, however, given that 55.7% of the sample reported 0 lifetime suicide attempts and 90% of the sample reported between 0 and 4 lifetime suicide attempts. Thirty-eight patients (52.78%) were randomly assigned to the E-CAU treatment condition, whereas 34 (47.22%) were randomly assigned to the CAMS condition.

TABLE 1 Patient demographic information

	N	%
Ethnicity		
White/Caucasian	38	55.1
Black/African American	16	23.2
Latino/a	8	11.6
Other	7	10.1
Sexual orientation		
Heterosexual	58	85.3
Other	10	14.7
Marital status		
Single, never married	19	27.5
Married	35	50.7
Separated or divorced	14	20.3
Widowed	1	1.4
Education		
High school graduate or GED	24	34.3
Some college or technical training	31	44.3
Associate's degree	11	15.7
Bachelor's degree	4	5.7
Number of combat deployments		
0	29	41.4
1	20	28.6
2	10	14.3
3 or more	11	15.7

GED: general equivalency diploma.

2.3 | Clinicians

Clinicians in the current study included six licensed clinical social workers delivering either CAMS ($n = 3$) or E-CAU ($n = 3$). Providers in the CAMS condition were extensively trained in the therapeutic framework, which included reading the treatment manual, training in-person with the developer of the framework, and participation in regular case conferences with study personnel for clinical consultation. E-CAU clinicians did not receive training or clinical consultation related to CAMS, and were instructed to respond to suicide-related clinical issues in a manner that was consistent with their training. In addition, elements of a structured treatment study provided enhancements to the usual care provided in this condition. These elements included close monitoring and follow-up related to patients' session attendance, as well as the standardized administration of multiple assessments throughout the study.

2.4 | The rating process

The CRS was used to establish baseline adherence or nonadherence to the CAMS framework, and to ensure treatment fidelity throughout the study. Video-recorded sessions were viewed and coded by a rating team to ensure that study clinicians were properly delivering their respective treatments (i.e., CAMS or E-CAU). Members of the rating team included two licensed psychologists with expert knowledge of the CAMS framework, as well as a pool of five advanced doctoral students extensively trained in the CAMS model. Clinicians were made aware before entering the study that video recordings of their sessions would be periodically viewed and assessed by the study personnel. However, they did not know specifically which sessions would be selected for assessment to minimize the potential for performance bias.

Upon entering the study, each clinician was required to establish either baseline adherence to CAMS or baseline nonadherence to CAMS (i.e., E-CAU), and to be reassessed at regular intervals via spot-checking. To establish baseline adherence or nonadherence, the two psychologists watched and rated sessions until baseline criteria for respective treatment conditions were met. Clinicians were considered adherent at baseline after four consecutive sessions that met criteria for adherence. These criteria included the following: An average score of 3 (*satisfactory*) or higher in each CAMS subscale, as well as an average score of 3 (*satisfactory*) or higher on one item pertaining to overall adherence to the CAMS framework. Scores for each CRS subscale were obtained by averaging ratings across all raters and items in that subscale. Clinicians were considered nonadherent at baseline after four consecutive sessions that did not meet all CAMS adherence criteria. Thereafter, a team of three raters (one psychologist and two rotating doctoral students) watched and rated every 10th session from each clinician in each treatment group to ensure fidelity throughout the study. Findings from a previous trial indicate that patients receiving CAMS were seen for an average of 8.4 sessions (Comtois et al., 2011). Thus, the 10-session interval was chosen to minimize the likelihood of repeatedly rating the same patient-clinician dyad. The same criteria for adherence were applied to spot-check sessions for each treatment group.

In addition to rating both baseline and spot-check sessions required to ensure fidelity, individual raters from the doctoral student pool randomly watched and rated individual sessions from both treatment groups in the interest of collecting additional data for the current study. There are 69 spot-checked sessions and 29 individually rated sessions included. The results presented were obtained by analyzing one randomly selected set of ratings from the 69 spot-check sessions along with the 29 individual ratings, thus producing an overall *N* of 98. Session number in this sample of ratings ranged from 1 to 21. First session comprised 13.4% of the ratings, and another 69.1% came from sessions 2–7. The modal session number (21.4%) was 4. In all cases, raters were not blind to the treatment conditions.

2.5 | Measures

The CRS is a measure used to assess adherence to CAMS, and is completed by coders who watch and rate videotapes of therapy sessions. The measure consists of 14 items evaluating clinician performance, all rated on a seven-point Likert scale ranging from 0 ("*Poor*") to 6 ("*Excellent*"). The first 11 items on the CRS are intended to capture both stylistic and technical elements of the framework, and are organized into theoretically based subscales.

The collaboration subscale includes four items measuring the extent to which the therapist empathizes with the patient's suicidal wish and uses a collaborative style when assessing for risk, creating a treatment plan, and intervening with suicidal drivers. The Suicide Focus subscale includes one item measuring the extent to which the therapist focuses only on clinical material that is relevant to suicide. The Risk Assessment subscale includes one item measuring the extent to which the therapist completes the SSF-based suicide risk assessment in each session. The Treatment Planning subscale includes three items measuring the extent to which the therapist creates an outpatient safety plan, identifies suicidal drivers, and selects interventions that appropriately target those drivers. Finally, the Intervention subscale includes two items that measure the extent to which the therapist uses interventions defined in the treatment plan, and discusses relevant themes including hope, reasons for living, plans, goals, purpose, and meaning.

Item 12 is a general item measuring overall adherence to the CAMS framework, whereas Items 13 and 14 are not CAMS-specific and measure general elements of the therapeutic process (i.e., clinician comfort and patient receptivity). Because Items 13 and 14 pertain to therapeutic elements that are encouraged but not required for adherent delivery of CAMS, only items 1–12 are included in CAMS adherence assessments. A preliminary analysis of the current CRS using intraclass correlation coefficients (ICCs) with an earlier subset of data from the OWL study demonstrated that the measure could be used with high inter-rater reliability (Corona & Jobes, 2015). In that study, ICCs for CRS subscales ranged from 0.95 to 0.99.

The "Working Alliance Inventory-Short Revised; Client Version" (WAI-SR) is a self-report measure used to assess therapeutic alliance (Hatcher & Gillaspy, 2006). It was administered to patients in the OWL study once after completing their course of treatment, and includes 12 items rated on a five-point Likert scale that are clustered into three subscales: Agreement on the goals of therapy (four items), agreement on the tasks of therapy (four items), and the development of a bond (four items).

Previous factor analyses conducted using inpatient and outpatient samples in the United States and Germany demonstrated that a correlated three-factor model (i.e., Goals, Tasks, and Bond) fit that data optimally (Hatcher & Gillaspy, 2006; Munder, Wilmers, Leonhart, Linster, & Barth, 2010). Moreover, this factor structure demonstrated invariance when compared across these samples and to scores on the original WAI. Finally, scores on the WAI-SR in these samples were highly correlated with other alliance measures (i.e., Helping Alliance Questionnaire, California Psychotherapy Alliance Scale, and the Confident Collaboration Scale), suggesting high convergent validity. In the current sample, internal consistency values for the different WAI-SR subscales were $\alpha = 0.91$ (Goals), $\alpha = 0.85$ (Tasks), and $\alpha = 0.86$ (Bond). These values in combination with previous psychometric findings suggest that the WAI-SR is an appropriate measure of the therapeutic alliance in the current sample.

2.6 | Data analyses

The selection of statistical tests used in the current study was influenced by the fact that CRS scores in this sample were not normally distributed. Clinicians in the CAMS condition generally received higher scores on CRS items, which reflected adherent delivery of CAMS. Conversely, E-CAU clinicians generally received lower scores on CRS items, which reflected nonadherent delivery of CAMS (i.e., adherent delivery of E-CAU). Thus, CRS scores in this sample were bimodal in nature, and clustered at either the high or low end of the rating scale depending on the treatment condition.

Nonparametric Spearman's correlation coefficients were generated to evaluate the criterion (i.e., concurrent) validity of the CRS collaboration subscale by comparing this CRS subscale to each subscale of the WAI-SR using scores that were averaged across items in these subscales. This analysis was framed as a concurrent validity analysis as opposed to a discriminant validity analysis because it was anticipated that scores on CRS items measuring a collaborative interaction style would be directly correlated with items assessing working alliance. One requirement of using Spearman's coefficient is monotonic relationships among all variables analyzed (Kachapova & Kachapov, 2010). To assess whether such relationships existed in the current study, scatter graphs were generated that plotted all combinations of variables included in the analysis. Preliminary analyses showed that relationships between all possible combinations of variables were monotonic.

An exploratory factor analysis (EFA) was used to identify a latent variable model for the CRS, and to test whether theoretical CRS subscales were supported statistically. The EFA used principal axis factoring (PAF) as the extraction method, which is preferred when deviations from normality are found in the data (Fabrigar & Wegener, 2012). As part of the EFA, two tests were conducted to determine the appropriate number of factors to retain: Analysis of the scree plot (i.e., scree test) as well as parallel analysis (Fabrigar & Wegener, 2012). Parallel analyses were conducted with permutations of the raw data using both principal axis factors and principal components (O'Connor, 2000). Analyzing permutations of the raw data is recommended when data are not normally distributed. Furthermore, there is no consensus on whether analyzing principal axis factors or principal components is more appropriate for EFAs using PAF as the extraction method, so both approaches were taken.

Finally, internal consistency evaluations were conducted for the overall sample and within each treatment group. This was done to evaluate the results of the EFA, establish the validity of the CRS as a measure that assesses adherence to CAMS, and provide information about the quality of the items included in the measure. These evaluations included the calculation of Cronbach's α coefficients, which do not assume normality in the data and have demonstrated robustness amidst deviations from normality (Bay, 1973). All analyses in the current study were conducted using SPSS version 23 (IBM Corp., Armonk, NY).

3 | RESULTS

3.1 | Criterion validity

Spearman's (r_s) correlation coefficients comparing the CRS collaboration subscale with all subscales of the WAI-SR were as follows: Goals, $r_s(66) = 0.03$, $p = 0.788$; Tasks, $r_s(66) = -0.01$, $p = 0.944$; and Bond, $r_s(65) = -0.04$, $p = 0.740$.

3.2 | Exploratory factor analysis

Both the scree test and parallel analyses indicated that a one-factor model was most appropriate for these data. Thus, the EFA identified one factor that explained 82.18% of the variance in CRS scores and was highly internally consistent ($\alpha = 0.98$). Strong factor loadings (i.e., ≥0.862) and high extracted communalities (i.e., ≥0.743) were observed for all CAMS-specific items. Furthermore, low extracted communalities (i.e., <0.4) were observed for the two general process items, suggesting that these items are not related to the others (Costello, Down, Pollard, Pacas, & Taylor, 2005). Factor loadings and extracted communalities for all items are presented in Table 2.

3.3 | Internal consistency

Cronbach's α coefficient for CRS items within the CAMS group was 0.89. Within the E-CAU group, $\alpha = 0.74$. Item-level statistics (including interitem correlation ranges and item-total correlations) for each group are presented in Table 3. Within the CAMS group, lower interitem correlations were observed between the general process items and the CAMS-specific items. Interitem correlations in this group were also lower between two CAMS-specific items in particular (i.e., Items 6 and 11) and the other CAMS-specific items. Furthermore, the maximum values across inter-item correlation ranges indicate a lack of item redundancy in both groups.

TABLE 2 EFA factor matrix for the CRS ($N = 98$)

	Factor 1 ($\alpha = 0.98$)	Communalities (extracted)
Item 1 (collaboration)	0.949	0.900
Item 2 (collaboration)	0.954	0.910
Item 3 (collaboration)	0.952	0.907
Item 4 (collaboration)	0.951	0.905
Item 5 (suicide focus)	0.956	0.914
Item 6 (risk assessment)	0.950	0.903
Item 7 (treatment planning)	0.892	0.796
Item 8 (treatment planning)	0.952	0.905
Item 9 (treatment planning)	0.952	0.907
Item 10 (intervention)	0.924	0.853
Item 11 (intervention)	0.862	0.743
Item 12 (overall adherence)	0.978	0.957
Item 13 (client receptivity)	0.622	0.386
Item 14 (therapist comfort)	0.609	0.371

CRS: CAMS Rating Scale; EFA: exploratory factor analysis.
Note. Rotation converged in four iterations. Extraction method: Principal axis factoring. Case-to-item ratio: 7:1.

TABLE 3 Item-levels statistics for CRS items in each treatment group

	Inter-item correlation ranges	Corrected item-total correlation	Cronbach's α if item deleted
Item-level statistics for CRS items within the CAMS group (N = 47; α = 0.89)			
Item 2	0.114–0.798	0.696	0.878
Item 3	0.128–0.798	0.689	0.879
Item 4	0.188–0.631	0.620	0.882
Item 5	0.094–0.717	0.705	0.878
Item 6	−0.010–0.584	0.342	0.894
Item 7	0.128–0.648	0.680	0.879
Item 8	0.214–0.590	0.657	0.880
Item 9	0.046–0.781	0.629	0.882
Item 10	0.086–0.781	0.577	0.883
Item 11	0.020–0.365	0.318	0.897
Item 12	0.244–0.721	0.852	0.872
Item 13	−0.010–0.562	0.267	0.901
Item 14	0.167–0.625	0.670	0.881
Item-level statistics for CRS items within the E-CAU group (N = 47; α = 0.74)[a]			
Item 1	−0.220–0.487	0.451	0.719
Item 2	−0.028–0.653	0.749	0.690
Item 3	−0.019–0.733	0.557	0.709
Item 4	0.106–0.733	0.654	0.702
Item 5	−0.115–0.724	0.330	0.730
Item 7	−0.014–0.360	0.252	0.738
Item 8	−0.427–0.374	−0.023	0.754
Item 9	−0.032–0.615	0.547	0.708
Item 10	−0.153–0.348	0.181	0.743
Item 11	−0.002–0.615	0.546	0.702
Item 12	−0.226–0.724	0.326	0.734
Item 13	−0.272–0.723	0.404	0.727
Item 14	−0.427–0.723	0.238	0.773

CAMS: Collaborative Assessment and Management of Suicidality; CRS: CAMS Rating Scale; E-CAU: Enhanced Care-As-Usual.
[a]Item 6 had zero variance in this group and was removed from the scale.

4 | DISCUSSION

The goal of the current study was to examine the psychometric properties of the CRS to determine its ability to function as a CAMS adherence measure. The organization of the CRS into its current theoretical subscales was evaluated in two ways. First, CRS collaboration scores were compared with all subscales of the WAI-SR to examine the criterion (i.e., concurrent) validity of this CRS subscale. Resulting Spearman coefficients were very low, suggesting that the collaboration subscale of the CRS does not measure the same construct as the WAI-SR (i.e., working alliance).Whereas, the sample size for these analyses was small, it is not anticipated that such weak observed effects would have been substantially different even with a larger sample.

It should be noted that the selection of the WAI-SR as a comparison measure was based on convenience (i.e., it was written into the original OWL study protocol). Furthermore, the WAI-SR is a self-report measure completed by patients at the end of treatment, whereas independent observers used the CRS to rate patient–clinician dyads throughout the course of care. It has been argued that self-report measures are retrospectively assessing a relationship at a single time point capture constructs that are fundamentally different from those measured by random independent observations of several encounters within a relationship (Arney, 2004). However, it is expected that at least some correlation would exist between the WAI-SR and the CRS if they are in fact measuring similar constructs. Thus, these results suggest that the CRS could be capturing a collaborative interaction style that is specific to CAMS as opposed to reflective of the general construct of the therapeutic alliance.

Theoretical subscales of the CRS were also evaluated using an EFA to determine the factor structure of the measure. Results suggest that the CRS is a unidimensional measure comprised of one factor containing all 14 items. Considered in conjunction with criterion validity findings in the current study, these results do not support the organization of the CRS into its current subscales, and suggest that these subscales could be eliminated in future iterations of the measure. Furthermore, the comparatively low factor loadings and communalities for the two general process items suggest that they do not perform as well as the CAMS-specific items, and could also be eliminated in future iterations of the measure given its intended purpose of assessing adherence to CAMS. It should be noted, however, that the CRS subscales could have clinical utility despite their lack of statistical support. For example, organizing data on treatment delivery into relevant theoretical domains could improve the provision of feedback to the clinicians. This, in turn, could increase the quality of CAMS care delivered both with research studies and across various clinical settings.

Internal consistency evaluations in the current study assisted with establishing the validity of the CRS as a measure that assesses adherence to CAMS, as well as providing information about the quality of the items included in the measure. The α coefficient for CAMS-specific CRS items within the CAMS group was 0.89, whereas this coefficient for the same items in the E-CAU group was 0.74. The higher α coefficient for CRS scores among clinicians delivering CAMS suggested that the measure performs better when measuring its intended intervention (i.e., CAMS) than it does when measuring another intervention. However, item-level statistics indicated that two CAMS-specific items could be performing less optimally than others when assessing CAMS clinicians (Table 3). These statistics indicate that Items 6 and 11 are weakly correlated with other CRS items among CAMS clinicians, and that consistency would increase in this group if these two items were eliminated. Descriptive statistics for Item 6 ("the dyad followed the framework for initiating and completing the Suicide Status Form assessment at the beginning of the session") indicate minimal variance in scores on this item among CAMS clinicians (range: 0–6; $M = 5.69$; $SD = 1.00$), and suggested that a dichotomous response scale (i.e., yes or no) could be more appropriate for assessing this aspect of CAMS should this item be retained. An alternative modification to this item could include rewriting the prompt in a manner that is better aligned with a Likert rating scale and thus elicited more variance in ratings. Furthermore, the language comprising Item 11 ("the session included a discussion about hope, reasons for living, plans, goals, purpose, and meaning") suggested that this item was attempting to capture many disparate constructs, and could be more cohesively written, split into separate items, or eliminated.

4.1 | Study limitations and future directions

One notable limitation was the absence of blind raters. Limited study resources allowed for the recruitment of only a small team of raters, and this team was responsible for rating sessions from both the treatment groups to ensure that requirements related to fidelity (i.e., regularly spot-checking sessions) were met. In addition, no formal training was provided to raters in the current study because all had substantial familiarity with the CAMS framework. Moving forward, studies evaluating the CRS should consider incorporating blind raters, as well as formally training members of the rating team to minimize threats to both internal and external validity.

Another issue relevant to the current study is the EFA sample size. It has been argued that researchers should be wary of strict guidelines for sample size in EFA due to their lack of supporting theoretical and empirical foundations, as well as evidence suggesting that such guidelines may be flawed (Fabrigar & Wegener, 2012). Furthermore, De Winter, Dodou, and Wieringa (2009) argue that EFA with sample sizes <50 can yield valid results when carried out using "well-conditioned" data (i.e., high factor loadings, a small number of factors, and a high item-to-factor ratio). Finally, regarding case-to-item ratios, MacCallum, Widaman, Zhang, and Hong (1999) cite a wide range of recommended ratios (the lowest being 3:1), and argue that the inconsistency found in these recommendations is indicative of their lack of support. The researchers also argue that, in instances where communalities are high (i.e., >0.6), the extent to which this ratio impacts the validity of the results is substantially reduced. Whereas the data in the current study fit all criteria mentioned above, future studies would ideally include a larger sample. If doing so is not possible, then methods recommended for EFA with small samples (e.g., regularized EFA) should be considered (Jung & Lee, 2011).

Also worth reiterating are important differences already discussed between the WAI-SR and the CRS. Studies aiming to further evaluate the validity of the CRS should consider using comparison measures that are delivered in a format similar to the CRS (i.e., observational and independently rated). Furthermore, future studies should incorporate additional latent variable analyses (i.e., a confirmatory factor analysis) to further test the factor structure identified in the current study. Finally, future studies of the CRS would be strengthened by designs that incorporate other comparison groups (i.e., control treatment groups delivering interventions other than E-CAU) in the interest of generalizability.

5 | CONCLUSION

Results of the current study indicate that the CRS is an effective CAMS adherence measure. However, the organization of the CRS into its current subscales was not supported. Whereas, these subscales are not statistically valid and could be eliminated from future iterations of the measure, there may be clinical utility in retaining them. Furthermore, the measure could be strengthened by eliminating two items that do not capture essential CAMS elements, and by eliminating or refining two CAMS-specific items that did not perform well in the current study.

ORCID

Christopher D. Corona http://orcid.org/0000-0002-4608-5287
Peter M. Gutierrez http://orcid.org/0000-0001-8981-8404

REFERENCES

Andreasson, K., Krogh, J., Wenneberg, C., Jessen, H. K. L., Krakauer, K., Gluud, C., ... Nordentoft, M. (2016). Effectiveness of dialectical behavior therapy versus collaborative assessment and management of suicidality treatment for reduction of self-harm in adults with borderline personality traits and disorder—a randomized observer-blinded clinical trial. *Depression and Anxiety, 33*(6), 520–530.

Arkov, K., Rosenbaum, B., Christiansen, L., Jønsson, H., & Münchow, M. (2008). Treatment of suicidal patients: The collaborative assessment and management of suicidality. *Ugeskrift For Laeger*, 170(3), 149–153.

Arney, F. M. (2004). *A comparison of dire ct observation and self-report measures of parenting behaviour* (Unpublished doctoral dissertation). Adelaide, AUS: The University of Adelaide.

Bay, K. S. (1973). The effect of non-normality on the sampling distribution and standard error of reliability coefficient estimates under an analysis of variance model. *British Journal of Mathematical and Statistical Psychology*, 26(1), 45–57.

Beck, A. T., Steer, R. A., & Ranieri, W. F. (1988). Scale for suicide ideation: Psychometric properties of a self-report version. *Journal of Clinical Psychology*, 44(4), 499–505.

Brown, G. K., Ten have, T., Henriques, G. R., Xie, S. X., Hollander, J. E., & Beck, A. T. (2005). Cognitive therapy for the prevention of suicide attempts: A randomized controlled trial. *Journal of the American Medical Association*, 294(5), 563–570.

Comtois, K. A., Jobes, D. A., S. O'Connor, S., Atkins, D. C., Janis, K., E. chessen, C., ... Yuodelis-Flores, C. (2011). Collaborative assessment and management of suicidality (CAMS): Feasibility trial for next-day appointment services. *Depression and Anxiety*, 28(11), 963–972.

Comtois, K. A., & Linehan, M. M. (2006). Psychosocial treatments of suicidal behaviors: A practice-friendly review. *Journal of Clinical Psychology*, 62(2), 161–170.

Conrad, A. K., Jacoby, A. M., Jobes, D. A., Lineberry, T. W., Shea, C. E., Arnold Ewing, T. D., ... Kung, S. (2009). A psychometric investigation of the suicide status form II with a psychiatric inpatient sample. *Suicide & Life-Threatening Behavior*, 39(3), 307–320.

Corona, C. D., & Jobes, D. A. (2015). *The psychometric properties of the CAMS rating scale: A preliminary evaluation*. Paper session presented at the 48th Annual Conference of the American Association of Suicidology, Atlanta, GA.

Costello, A. B., Down, T. E., Pollard, S. M., Pacas, C. J., & Taylor, E. B. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, 10(7), 1–9.

Dobson, K. S., Shaw, B. F., & Vallis, T. M. (1985). Reliability of a measure of the quality of cognitive therapy. *British Journal of Clinical Psychology*, 24(4), 295–300.

Drapeau, C. W., & McIntosh, J. L. (2017). *U.S.A. suicide 2016: Official final data*. American Association of Suicidology: Washington, DC. Retrieved from http://www.suicidology.org/resources/facts-statistics

Ellis, T. E., Green, K. L., Allen, J. G., Jobes, D. A., & Nadorff, M. R. (2012). Collaborative assessment and management of suicidality in an inpatient setting: Results of a pilot study. *Psychotherapy*, 49(1), 72–80.

Ellis, T. E., Rufino, K. A., Allen, J. G., Fowler, J. C., & Jobes, D. A. (2015). Impact of a suicide-specific intervention within inpatient psychiatric care: The collaborative assessment and management of suicidality. *Suicide and Life-Threatening Behavior*, 45(5), 556–566.

Fabrigar, L. R., & Wegener, D. T. (2012). *Exploratory factor analysis*. New York, NY: Oxford University Press.

Hatcher, R. L., & Gillaspy, J. A. (2006). Development and validation of a revised short version of the working alliance inventory. *Psychotherapy Research*, 16(1), 12–25.

Jobes, D. A. (2012). The collaborative assessment and management of suicidality (CAMS): An evolving evidence-based clinical approach to suicidal risk. *Suicide and Life-Threatening Behavior*, 42(6), 640–653.

Jobes, D. A. (2016). *Managing suicidal risk: A collaborative approach* (2nd ed.). New York, NY: Guilford Press.

Jobes, D. A., Comtois, K. A., Gutierrez, P. M., Brenner, L. A., Huh, D., Chalker, S. A., ... Crow, B. (2017). A randomized controlled trial of the collaborative assessment and management of suicidality versus enhanced care as usual with suicidal soldiers. *Psychiatry: Interpersonal and Biological Processes*, 80(4), 339–356.

Jobes, D. A., Comtois, K. A., Gutierrez, P. M., Brenner, L. A., Huh, D., Chalker, S. A., & Crow, B. (2015). Lessons learned from clinical trials of the collaborative assessment and management of suicidality (CAMS). In R., O'Connor, S., Platt, & J., Gordon (Eds.), *International handbook of suicide prevention: Research, policy, & practice* (2nd ed., 80, pp. 383–400). West Sussex: Wiley-Blackwell.

Jobes, D. A., Jacoby, A. M., Cimbolic, P., & Hustead, L. A. T. (1997). Assessment and treatment of suicidal clients in a university counseling center. *Journal of Counseling Psychology*, 44(4), 368–377.

Jobes, D. A., Kahn-Greene, E., Greene, J. A., & Goeke-Morey, M. (2009). Clinical improvements of suicidal outpatients: Examining suicide status form responses as predictors and moderators. *Archives of Suicide Research*, 13(2), 147–159.

Jobes, D. A., Wong, S. A., Conrad, A. K., Drozd, J. F., & Neal-Walden, T. (2005). The collaborative assessment and management of suicidality versus treatment as usual: A retrospective study with suicidal outpatients. *Suicide and Life-Threatening Behavior*, 35(5), 483–497.

Jung, S., & Lee, S. (2011). Exploratory factor analysis for small samples. *Behavior Research Methods*, 43, 701–709.

Kachapova, F., & Kachapov, I. (2010). Measuring monotony in two-dimensional samples. *International Journal of Mathematical Education in Science and Technology*, 41(3), 418–427.

Leenaars, A. A. (2011). Evidence-based psychotherapy with suicide people: A systematic review. In M., Pompili, & R., Tatarelli (Eds.), *Evidence-based practice in suicidology: A source book* (pp. 89–123). Cambridge, MA: Hogrefe Publishing.

Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.

Linehan, M. M. (2003). *DBT global rating scale.* Unpublished manuscript.

Linehan, M. M. (2015). *DBT skills training manual* (2nd ed.). New York, NY: Guilford Press.

MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, 4, 84–99.

Munder, T., Wilmers, F., Leonhart, R., Linster, H. W., & Barth, J. (2010). Working alliance inventory-short revised (WAI-SR): Psychometric properties in outpatients and inpatients. *Clinical Psychology & Psychotherapy*, 17(3), 231–239.

Nielsen, A. C., Alberdi, F., & Rosenbaum, B. (2011). Collaborative assessment and management of suicidality method shows effect. *Danish Medical Bulletin*, 58(8), A4300.

O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instrumentation, and Computers*, 32, 396–402.

Perepletchikova, F., Treat, T. A., & Kazdin, A. E. (2007). Treatment integrity in psychotherapy research: Analysis of the studies and examination of the associated factors. *Journal of Consulting and Clinical Psychology*, 75(6), 829–841.

Rudd, M. D., Bryan, C. J., Wertenberger, E. G., Peterson, A. L., Young-McCaughan, S., Mintz, J., ... Bruce, T. O. (2015). Brief cognitive-behavioral therapy effects on post-treatment suicide attempts in a military sample: Results of a randomized clinical trial with 2-year follow-up. *American Journal of Psychiatry*, 172(5), 441–449.

Schembari, B. C., Jobes, D. A., & Horgan, R. J. (2016). Successful treatment of suicidal risk. *Crisis*, 37(3), 218–223.

Vallis, T. M., Shaw, B. F., & Dobson, K. S. (1986). The cognitive therapy scale: Psychometric properties. *Journal of Consulting and Clinical Psychology*, 54(3), 381–385.

Ward-Ciesielski, E. F., & Linehan, M. M. (2014). Psychological treatment of suicidal behaviors. In M. K., Nock (Ed.), *The oxford handbook of suicide and self-injury* (pp. 367–384). New York, NY: Oxford University Press.

Webb, C. A., DeRubeis, R. J., & Barber, J. P. (2010). Therapist adherence/competence and treatment outcome: A meta-analytic review. *Journal of Consulting and Clinical Psychology*, 78, 200–211.

Wenzel, A., Brown, G. K., & Beck, A. T. (2009). Cognitive therapy for suicidal patients: Scientific and clinical applications. Washington, DC: American Psychological Association.

De Winter, J. C. F., Dodou, D., & Wieringa, P. A. (2009). Exploratory factor analysis with small sample sizes. *Multivariate Behavioral Research*, 44, 147–181.

World Health Organization. (2014). *Preventing suicide: A global imperative.* Geneva, Switzerland. Retrieved from http://www.who.int/mental_health/suicide-prevention/world_report_2014/en/

Young, J., & Beck, A. T. (1980). Cognitive therapy scale: Rating manual. Bala Cynwyd, PA: Beck Institute for Cognitive Behavior Therapy.