Received: 8 October 2017 | Revised: 1 March 2018 | Accepted: 8 March 2018

DOI: 10.1002/da.22753

RESEARCH ARTICLE

WILEY ADAA ANXIETY AND DEPRESSION ASSOCIATION OF AMERICA

Use of crisis management interventions among suicidal patients: Results of a randomized controlled trial

Craig J. Bryan PsyD, ABPP[1] | Alexis M. May PhD[1] | David C. Rozek PhD[1] | Sean R. Williams LCSW[1] | Tracy A. Clemans PhD[1] | Jim Mintz PhD[2] | Bruce Leeson PhD[3] | T. Scott Burch PsyD[3]

[1]National Center for Veterans Studies, University of Utah, Salt Lake City, UT, USA

[2]Health Science Center, University of Texas, San Antonio, TX, USA

[3]U.S. Army MEDDAC, Fort Carson, CO, USA

Correspondence
Craig J. Bryan, PsyD, ABPP, National Center for Veterans Studies, The University of Utah, 332 S 1400 E, Room 4, Salt Lake City, UT 84112, USA.
Email: craig.bryan@utah.edu

Funding information
Medical Research and Materiel Command, Grant/Award Number: W81XWH-10-2-0181

Background: Previous research supports the efficacy of the crisis response plan (CRP) for the reduction of suicidal behaviors as compared to treatment as usual (TAU). Patient perspectives and use of the CRP, and their relationship to later suicidal thoughts, remain unknown.

Methods: A secondary analysis of a randomized clinical trial comparing a standard CRP (S-CRP), a CRP enhanced with reasons for living (E-CRP), and TAU in a sample of 97 active-duty U.S. Army personnel was conducted. Participants were asked about their use, perceptions, and recall of each intervention. Generalized estimating equations were used to test the conditional effects of intervention use, perceptions, and recall on severity of suicide ideation during follow-up.

Results: Across all treatment groups, over 80% of participants retained their written CRP up to 6 months later, but less than 25% had the written plan in their physical possession at the time of each assessment. Participants in S-CRP and E-CRP were more likely to recall self-management strategies and sources of social support. Participants in TAU were more likely to recall use of professional healthcare services and crisis management services. All three interventions were rated as highly useful. More frequent use of the E-CRP and recall of its components were associated with significantly reduced suicide ideation as compared to TAU.

Conclusions: Both CRPs have high acceptability ratings. The effect of both CRPs on reduced suicide ideation is associated with patient recall of components. More frequent use of the E-CRP is associated with larger reductions in suicide ideation.

KEYWORDS
acceptability, crisis response plan, military, psychotherapy, safety plan, suicide

1 | INTRODUCTION

Despite historical trends reflecting a lower suicide rate among U.S. Army personnel compared to the U.S. general population, the Army's suicide rate surpassed the adjusted general population rate for the first time in 2008 and continued to rise for several more years (Pruitt et al., 2016; Reger, Luxton, Skopp, Lee, & Gahm, 2009). Suicides in the general population have also increased during the past decade, although at a slower pace than in the military (Centers for Disease Control and Prevention, 2017). In response to these alarming trends, increased attention has focused on identifying effective strategies for reducing suicidal behavior, especially strategies that are highly transportable across healthcare systems and settings. Consistent with this focus, the Joint Commission recently released an updated Sentinel Event Alert focused on the assessment and treatment of suicidal patients across all healthcare settings, and specifically recommended the use of risk management strategies, such as the crisis response plan (CRP) and safety planning intervention (Joint Commission, 2016).

The CRP was developed as a procedure to help suicidal patients to manage acute periods of affective arousal (Rudd, Joiner, & Rajab, 2004). Typically handwritten on an index card or business card, the CRP provides specific instructions for the patient to follow during periods of intense emotional distress and/or suicidal crises when these skills are often hard to access (Rudd, Mandrusiak, & Joiner, 2006). In order to build the patient's crisis management skills, the first few steps of the CRP emphasize self-management and the final steps include external sources of intervention (e.g., going to the emergency department). These central tenets of the CRP were preserved in the

safety planning intervention later described by Stanley and Brown (2012), who added an additional component focused on means restriction counseling. The CRP and the safety planning intervention therefore share several components: identification of the patient's personal warning signs for emerging crises, identification of self-management strategies or coping skills that can be employed by the patient, identification of significant others (e.g., family members, friends) to obtain support and assistance, seeking out professional assistance from healthcare providers, and accessing crisis services (e.g., crisis hotlines, visiting the emergency department, contacting law enforcement).

Despite recommendations against their use (Joint Commission, 2016; Reid, 1998; Rudd et al., 2006), procedures like the no-suicide contract and contract for safety continue to be widely used across healthcare and research settings (Belnap et al., 2015; Puskar & Urda, 2011). This trend seems to be due, at least in part, to the absence of empirical evidence supporting the superiority of the CRP as compared to these methods (Hogan, 2016). It is also possible that some clinicians confuse "contracting for safety" with "safety planning," a possibility supported by a recent study finding that one-third of clinicians believed the former was a component of the latter (Berman, Stark, Cooperman, Wilhelm, & Cohen, 2015). Data supporting the CRP's efficacy have recently emerged, however. In a randomized clinical trial conducted in a military emergency department and several outpatient behavioral health clinics (Bryan, Mintz, Clemans, Leeson, et al., 2017), active-duty U.S. soldiers who collaboratively created a CRP were 76% less likely to make a suicide attempt during follow-up than soldiers receiving treatment as usual (TAU).

Although that study found no differences in suicide ideation and attempts between a standard CRP (S-CRP) and a CRP enhanced with a facilitated discussion of reasons for living (E-CRP), subsequent analyses indicate the E-CRP leads to significantly larger decreases in negative affective state combined with significantly larger increases in positive affective state (Bryan, Mintz, Clemans, Burch, et al., 2017). In a separate study utilizing a quasi-experimental, interrupted time series design (Miller et al., 2017), patients presenting to one of several emergency departments were 20% less likely to engage in suicidal behavior during follow-up if they received the Coping Long-Term with Active Suicide Program, which entailed a self-guided safety plan combined with several follow-up phone calls (Boudreaux et al., 2013) as compared to patients who received TAU and patients who received enhanced suicide risk screening as a part of TAU.

Although emerging evidence supports the efficacy of the CRP and related interventions, very little is known about how suicidal patients use these interventions, what information they retain, and their perceptions of such interventions. The CRP, whether enhanced or not, is intended to serve as a technique that facilitates self-regulation and cognitive flexibility during periods of intense affective arousal characterized by cognitive rigidity and declines in problem solving. At its core, the CRP therefore helps suicidal patients to identify when a suicidal crisis is emerging and to effectively use strategies designed to prevent further escalation of emotional distress (Rudd et al., 2006). If used as intended, patients would be expected to employ self-regulatory strategies upon recognizing early indicators of an emerging suicidal episode and only seek out professional assistance/crisis services if the suicidal episode continues to intensify. This is in contrast with more widely used strategies that encourage suicidal patients to access professional assistance or emergency services as the primary methods for responding to suicidal crises. Examining how patients use suicide risk management interventions could provide clues for understanding the mechanisms by which CRPs reduce suicidal thoughts and behaviors.

To this end, the primary aim of the current study was to examine patient perceptions, retention, and patterns of use of the standard and enhanced CRPs as compared to TAU. We hypothesized that (1) participants in both CRP conditions will report significantly more positive perceptions of the CRP, as well as significantly greater recall and use of components specific to the CRP (i.e., personal warning signs, self-management strategies, social support networks, and reasons for living); and (2) participants who recall and/or report the use of components specific to the CRP will report significantly less severe suicide ideation. To test these hypotheses, we conducted secondary data analyses of a randomized clinical trial testing the efficacy of the S-CRP and E-CRP in a sample of active-duty military personnel (Bryan, Mintz, Clemans, Leeson, et al., 2017).

2 | MATERIALS AND METHODS

2.1 | Participants

Soldiers presenting to the emergency department or a behavioral health clinic for an unscheduled emergency behavioral health evaluation were referred to research staff for eligibility determination. Inclusion criteria included suicide ideation within the past week (assessed using the Beck Scale for Suicide Ideation, Beck and Steer (1991), described below), and/or a lifetime history of suicide attempt (assessed using the Suicide Attempt Self-Injury Interview, Linehan et al. (2006), described below). The only exclusion criterion was an inability to complete the informed consent process owing to impaired mental status (e.g., intoxication, psychosis, mania). Soldiers meeting eligibility criteria were invited to participate in the study and completed informed consent procedures.

Participants were 97 active-duty U.S. Army soldiers who were predominantly (78%) male and had a mean age of 26.1 years (SD = 6.4). Racial distribution was 74% White, 18% Black, 4% Asian, 3% Pacific Island, 8% Native American, and 2% other. Hispanic ethnicity was endorsed by 7% of participants. Rank distribution was 75% junior enlisted (E1–E4), 16% noncommissioned officer (E5–E6), 4% senior noncommissioned officer (E7–E9), and 5% officer. Participants had served in the military a mean of 5.4 years (SD = 5.2) and had been deployed a mean of 1.2 times (SD = 1.2). A history of suicide attempt was reported by 56% of participants at baseline and 97% reported suicide ideation during the preceding week on the Scale for Suicide Ideation (described below).

2.2 | Procedures

Study procedures with a CONSORT diagram are described in detail elsewhere (Bryan, Mintz, Clemans, Leeson, et al., 2017). Soldiers who

TABLE 1 Components and strategies contained in treatment as usual (TAU), standard crisis response plan (S-CRP), and enhanced crisis response plan (E-CRP)

Component	Definition	TAU	S-CRP	E-CRP
Warning signs	Indicators or clues that things are not going well and that the plan may need to be used; warning signs can be behaviors, thoughts, emotions, or physical sensations	No	Yes	Yes
Self-management	Things the individual has done in the past that help him or her to feel less stressed	No	Yes	Yes
Reasons for living	Reasons for not killing oneself	No	No	Yes
Social support	Someone who has helped during times of stress in the past, and/or who can be contacted when in crisis	No	Yes	Yes
Healthcare professionals	Contact information for medical providers and other professional sources of help	Yes	Yes	Yes
Crisis services	Contact information for crisis hotlines, emergency response, and/or going to an emergency department	Yes	Yes	Yes
Verbal contract for safety	Asking the patient "If you were to go home today, do you think you would be able to keep yourself safe?"	Yes	No	No

consented to participate completed self-report questionnaires and were randomized to one of three intervention conditions: TAU, S-CRP, or E-CRP. To preserve patient blinding, interventions were referred to by number (i.e., intervention #1, #2, or #3). All interventions were audio recorded and reviewed by an investigator and trained clinical supervisor to ensure reliability and fidelity. Follow-up assessments were conducted at 1, 3, and 6 months postbaseline by an independent evaluator who conducted phone interviews from a separate location.

2.3 | Interventions

Two versions of the CRP were examined: standard and enhanced. The S-CRP included the following components: identifying personal warning signs, self-management strategies, and sources of social support, and providing contact information for healthcare professionals and crisis services. The E-CRP added one additional component: identifying reasons for living. These components were collaboratively identified by the clinician and patient, and were handwritten on an index card. The control condition entailed TAU, which was composed of the following components: providing contact information for healthcare professionals and crisis services, provided to the patient by the clinician on an index card, and a verbal contract for safety in which the clinician asked the following question: "If you were to go home today, do you think you would be able to keep yourself safe?" Similarities and differences in the constituent components of each intervention are summarized in Table 1.

To minimize the potential for confounding associated with design features of the interventions, all participants were told by the clinician that their intervention was designed "to help you during these times of stress, so that you have some alternatives to suicide and know what to do instead of attempting suicide." All participants also received an index card containing their assigned intervention's components. Finally, at the conclusion of the intervention, all participants were also asked to verbally describe how they would use their intervention via the following prompt: "If you find yourself in a crisis and wanting to kill yourself, what will you do?"

2.4 | Measures

Suicide attempts were assessed with the Suicide Attempt Self-Injury Interview (Linehan, Comtois, Brown, Heard, & Wagner, 2006), a structured interview that assesses several aspects of self-directed violence including intent, method, and lethality. Suicide attempt was defined as behavior that is self-directed and deliberately results in injury or the potential for injury for which there is evidence of suicidal intent (Crosby et al., 2011). The interview was administered at baseline and at each follow-up assessment. Interrater reliability in the present study was 0.94.

Suicide ideation was assessed with the Scale for Suicide Ideation (Beck & Steer, 1991), a clinician-administered scale that assesses the individual's thoughts, urges, and intentions regarding suicidal behavior. Items are then summed, with higher scores indicating more severe suicidal thoughts. At baseline, participants were directed to consider the past week when responding to items. During follow-up assessments, however, participants were directed to consider their worst-point suicidal episode during the most recent assessment period when responding to items (Beck, Brown, Steer, Dahlsgaard, & Grisham, 1999). Internal reliability in the present sample exceeded 0.84 at each assessment.

Patient perceptions and use of crisis interventions were assessed with a structured interview created for the present study. Participants were first prompted to recall the baseline appointment and were oriented to the interview with the following statement: *When you first met with our clinician, you talked about a plan that you could follow if you were feeling like killing yourself; this plan was written on a piece of paper or an index card.* Participants were then asked the following questions:

1. Do you remember that plan?
2. What was on that plan?
3. Do you still have that paper or card?
4. Do you have that paper or card with you right now?
5. Have you used that plan at all since we last talked?
6. If yes, what have you specifically done?

TABLE 2 Coding criteria for patient recall of intervention components

Component	Criterion
Warning signs	Patient explicitly states something about one or more warning signs or indicators of an emerging crisis.
Self-management	Patient explicitly describes talking about a strategy, skill, or activity that can be performed on their own to manage stress.
Reasons for living	Patient explicitly describes writing or discussing one or more reasons for living.
Social support	Patient explicitly describes identifying one or more individuals who can be contacted or called to obtain support.
Healthcare professionals	Patient explicitly describes receiving contact information for a medical or mental healthcare professional.
Crisis services	Patient explicitly describes receiving contact information for a crisis hotline, 911, and/or going to a hospital.

7. How many times have you used this plan?
8. On a scale of 0–10, how useful would you say this plan was (0 = not at all useful, 10 = extremely useful)?

Items 1, 3, 4, and 5 were scored as either yes or no. Item 2 and item 6 responses were coded by the evaluator as either endorsed or not using the guidelines specified in Table 2. Items 7 and 8 entailed numeric values. All participants in all groups were asked the same questions to preserve the blinding of both evaluators and participants to treatment group assignment, and to ensure equivalent assessment methods across groups.

2.5 | Data analyses

Our primary data analytic method involved generalized estimating equations (GEEs). GEEs were used for several reasons. First, our outcomes entailed repeated categorical and continuous response data that were likely correlated with each other and clustered within individual patients. Second, our research questions were aimed at understanding the average effects of predictors at the population level, as opposed to individual-level effects. For dichotomous outcomes, a binary distribution was specified. For continuous variables, a Poisson distribution was specified because this modeling approach provides more accurate estimates for positively skewed data. A robust estimator was used to mitigate bias associated with overdispersed data.[1] An autoregressive covariance matrix was specified because scores from adjacent time points were more strongly correlated with each other than scores from more distal time points, and because this matrix yielded the best fit statistics.

For GEE models testing the conditional effects of intervention perception, recall, and use on severity of suicide ideation, scores from the three follow-up assessments were selected as the outcome because intervention-specific variables were available only during follow-up, *after* the interventions were received. Primary results of the parent trial (Bryan, Mintz, Clemans, Leeson, et al., 2017) indicated severity of suicide ideation dropped significantly from baseline to the 1-month assessment. Baseline severity of suicide ideation was therefore included as a covariate in all models. After this initial drop in suicide ideation, severity of suicide ideation was found to change minimally during follow-up. Consistent with this previously reported trend, an initial series of analyses conducted for the present study aimed at testing the effect of time as a predictor of each outcome yielded nonsignificant effects, suggesting there was little variation in outcomes across the three follow-up assessments. Nonetheless, time was included as a covariate in all models. Overall results therefore reflect average effects across the entire 6-month follow-up period, accounting for time, baseline suicide ideation, and clustering within participants.

The first hypothesis was evaluated using GEEs with treatment group as a predictor variable and time as a covariate. Separate models were constructed for each of the following outcome variables: remembering the plan, retaining the written plan, having the written plan in their physical possession, usefulness rating, component recall, and component use. The second hypothesis was evaluated by testing the interaction effects for treatment group with each of the following variables as predictors of BSSI total score: remembering the plan, retaining the written plan, having the written plan in their physical possession, usefulness rating, component recall, and component use. Statistically significant between-group effects were followed by planned group comparisons. The false discovery rate (Benjamini & Hochberg, 1995) was used to reduce the risk of Type I error associated with multiple comparisons. Regarding statistical power, the planned analyses had 80% power to detect small differences in mean scores (Cohen's $d > 0.29$) and medium-sized differences in proportions (Cohen's $\omega > 0.32$) for two-tailed $P < .05$. All analyses were conducted using the SPSS 24 software.

3 | RESULTS

There were no differences in demographic variables or severity of suicide ideation at baseline (see Bryan, Mintz, Clemans, Leeson, et al., 2017 for detailed report). During follow-up, there were no differences across treatment conditions with respect to the proportion of participants who remembered their intervention (Wald $\chi^2(2) = 3.70$, $P = .157$), were still in possession of their written intervention (Wald $\chi^2(2) = 2.05$, $P = .358$), and had their written intervention in their physical possession at the time of the assessment interviews (Wald $\chi^2(2) = 2.20$, $P = .333$). There were also no differences across conditions with respect to the perceived usefulness of the intervention (Wald $\chi^2(2) = 1.64$, $P = .440$) or the average number of times the written interventions were used (Wald $\chi^2(2) = 1.61$, $P = .447$). Proportions and estimated means across treatment groups are reported in Table 3.

3.1 | Patient recall of intervention components

When asked about what they remember from their written intervention, there were significant differences across groups with respect to recall of warning signs (Wald $\chi^2(2) = 7.91$, $P = .019$), self-management

TABLE 3 Differences in recall, use, and perceptions of treatment as usual (TAU), standard crisis response plan (CRP), and enhanced crisis response plan (E-CRP) among active-duty U.S. soldiers presenting for an emergency behavioral health appointment

Item	TAU ($n = 32$)	S-CRP ($n = 32$)	E-CRP ($n = 33$)	
	%	%	%	*P*
Do you remember the plan?	92.2	98.3	87.8	.157
Do you still have the plan?	82.7	89.9	78.9	.358
Do you have the plan with you right now?	13.2	24.5	15.9	.333
What was on that plan?				
Warning signs	8.0_{a}	28.9_{a}	13.7	.019*
Self-management	$21.1_{a,b}$	56.2_{a}	41.5_{b}	.003*
Social support	$47.9_{a,b}$	77.2_{a}	78.1_{b}	.004*
Reasons for living	8.3	16.1	26.8	.059
Professional help	$66.0_{a,b}$	36.9_{a}	46.1_{b}	.006*
Crisis management	$58.8_{a,b}$	31.6_{a}	28.1_{b}	.006*
What have you specifically done?				
Warning signs	4.0	8.6	1.8	.257
Self-management	12.6	23.9	20.8	.364
Social support	19.4	37.2	32.7	.097
Reasons for living	1.4	4.8	10.6	.139
Professional help	12.6	7.8	8.7	.666
Crisis management	7.2	3.3	4.9	.708
	M (SE)	M (SE)	M (SE)	*P*
How useful would you say the plan was?	6.7 (0.6)	7.5 (0.3)	7.2 (0.6)	.440
How many times have you used the plan?	1.8 (0.4)	2.2 (0.3)	2.5 (0.5)	.447

*P-values designated by an asterisk are statistically significant using the false discovery rate method.

strategies (Wald $\chi^2(2) = 11.57$, $P = .003$), sources of social support (Wald $\chi^2(2) = 11.22$, $P = .004$), professional services (Wald $\chi^2(2) = 10.36$, $P = .006$), and crisis management services (Wald $\chi^2(2) = 10.36$, $P = .006$). Planned comparisons indicated the S-CRP and E-CRP had higher recall rates for self-management and social support strategies, but lower recall rates for professional services and crisis management services. The S-CRP and E-CRP did not differ from each other, however. The differences across groups for recall of reasons for living fell shy of statistical significance (Wald $\chi^2(2) = 5.67$, $P = .059$). Recall rates are summarized for each treatment group in Table 3.

3.2 | Patient use of intervention components

When asked to describe what specific components of their plans had been used, there were no differences across groups for any component (see Table 3).

3.3 | Conditional effects of intervention perception, recall, and use on later suicide ideation

We next examined the conditional effects of remembering the plan, retaining the written plan, having the written plan in their physical possession, component recall, and component use on follow-up suicide ideation severity across treatment groups by calculating and testing a series of 3 (treatment group) × 2 (endorsement vs. nonendorsement) GEE models. Interaction terms for treatment group by usefulness rating and frequency of intervention use, two continuous predictor variables, were also tested. Results are summarized in Table 4. The following conditional effects were statistically significant when adjusting for the false discovery rate, indicating the association of each variable with severity of suicide ideation significantly differed across treatment groups: still having the written plan, number of times using the intervention, recall of warning signs, recall of self-management, recall of social support, recall of reasons for living, use of warning signs, use of social support, use of professional services, and use of crisis management services.

To clarify the nature of these interactions, mean suicide ideation scores by treatment group and predictor are summarized in Table 5. Regarding recall of components, participants in the E-CRP group who could recall self-management strategies and sources of social support reported significantly less severe suicide ideation than participants in TAU who could recall these same components. Participants in the S-CRP who could recall warning signs reported significantly less severe suicide ideation than participants in TAU, regardless of warning signs recall ability, and significantly less severe suicide ideation than participants in S-CRP who could not recall warning signs. Regarding use of components, participants in S-CRP and E-CRP who used professional services and crisis management services reported significantly more severe suicide ideation than participants who did not use these components, regardless of treatment group. In contrast, participants in TAU who used professional services and crisis management services did not significantly differ from participants in the other groups.

TABLE 4 Results of generalized estimating equations predicting severity of follow-up suicide ideation

	Treatment group			Component			Treatment × component		
	B	SE	*P*	B	SE	*P*	B	SE	*P*
Do you remember the plan?	1.58	2	.454	0.05	1	.829	0.43	2	.807
Do you still have the plan?	14.05	2	.001	4.87	1	.027	**11.66**	**2**	**.003**
Do you have the plan with you right now?	30.31	2	<.001	0.84	1	.359	7.02	2	.030
How useful would you say the plan was?	6.65	2	.036	44.68	1	<.001	3.39	2	.184
How many times have you used the plan?	1.09	2	.580	2.96	1	.086	**32.39**	**2**	**<.001**
What was on that plan?									
Warning signs	37.60	2	<.001	27.74	1	<.001	**39.62**	**2**	**<.001**
Self-management	0.63	2	.728	10.10	1	.001	**58.64**	**2**	**<.001**
Social support	3.29	2	.193	32.54	1	<.001	**69.41**	**2**	**<.001**
Reasons for living	30.62	2	<.001	10.76	1	.001	**18.53**	**2**	**<.001**
Professional help	31.68	2	<.001	13.30	1	<.001	1.13	2	.568
Crisis management	9.02	2	.011	0.22	1	.640	9.02	2	.011
What have you specifically done?									
Warning signs	29.70	2	<.001	5.00	1	.025	**8.14**	**1**	**.004**
Self-management	16.15	2	<.001	0.08	1	.774	**15.70**	**2**	**<.001**
Social support	21.01	2	<.001	9.39	1	.002	**12.17**	**2**	**.002**
Reasons for living[a]	–	–	–	–	–	–	–	–	–
Professional help	22.21	2	<.001	390.42	1	<.001	**58.28**	**2**	**<.001**
Crisis management[a]	–	–	–	–	–	–	–	–	–

Notes: Interaction effects highlighted in bold are statistically significant when adjusting for the false discovery rate.
[a]Use of reasons for living could not be estimated owing to low cell counts in one of the treatment group.

To clarify the nature of the interaction between treatment group and frequency of intervention use on suicide ideation, we plotted the estimated marginal means for suicide ideation severity across subgroups (see Figure 1). Participants who did not use their intervention reported relatively low suicide ideation severity, regardless of treatment group (Wald $\chi^2(2) = 2.64$, $P = .267$). In the TAU and S-CRP conditions, mean suicide ideation was lowest among those who did not use their interventions at all, which likely indicates a subgroup for whom there was less need for intervention use. Among those who used their interventions, frequency of use was associated with a statistically significant decline in suicide ideation severity only in the E-CRP condition. The difference between those who used the E-CRP once or twice and those who used it three to six times was statistically significant and large in magnitude ($\Delta M = 5.8$, $SE = 0.8$, $P < .001$, $d = 2.9$), and the difference between those who used the E-CRP three to six times and those who used it seven or more times was also statistically significant and large in magnitude ($\Delta M = 1.6$, $SE = 0.5$, $P < .001$, $d = 1.3$).

4 | DISCUSSION

Prior research supports the efficacy of the CRP for reducing rates of suicidal behavior and intensity of suicide ideation among high-risk soldiers as compared to TAU (Bryan et al., 2017), but little is known about how soldiers perceive, retain information about, or use the CRP. Results of the present study indicate the large majority of suicidal soldiers reported remembering and retaining their CRP, regardless of version (i.e., standard or enhanced), although these proportions were not significantly larger than those observed in the TAU condition. Given the brief nature of the CRP—a single session occurring within the context of an emotional crisis—the very large proportion of soldiers who recalled (>87%) and retained a physical copy (>78%) of their CRP up to 6 months later is noteworthy.

All three interventions were comparable to each other with respect to perceived usefulness, but there were significant differences across groups with respect to recall of each intervention's components and use of each intervention. As expected, soldiers were significantly more likely to recall those components that were specific to the intervention they received: those who received an S-CRP or E-CRP were more likely to recall self-management strategies and sources of social support, whereas those who received TAU were more likely to recall contacts for professional and crisis services. Results further indicated that the ability to recall self-management strategies, sources of social support, and professional services among participants in E-CRP was associated with less severe suicide ideation, especially as compared to TAU. E-CRP and S-CRP participants who recalled these components did not significantly differ from each other, however.

As previously reported (Bryan, Mintz, Clemans, Leeson, et al., 2017), suicide ideation severity in the present study was lower on average in S-CRP and E-CRP as compared to TAU. Across all three treatment groups, participants who did not use their intervention had significantly less severe suicide ideation than participants who did use their intervention. The low level of suicide ideation observed in this subgroup likely reflects a low need for intervention use (i.e., participants

TABLE 5 Estimated marginal means for total scale for suicide ideation scores during follow-up by the treatment group and intervention component endorsement, with results of planned group comparisons

	Treatment as usual				Standard crisis response plan				Enhanced crisis response plan			
	Yes		No		Yes		No		Yes		No	
	M	SE	M	SE	M	SE	M	SE	M	SE	M	SE
Remember plan	8.8	2.0	6.3	1.2	5.1	1.3	4.0	0.9	3.5	1.1	3.7	2.1
Still have plan	5.7	1.3	5.5	1.3	5.0	1.4	2.1	2.0	2.9	1.0	3.4	3.3
Plan in possession	5.8	2.6	5.5	1.2	4.0	1.5	4.7	1.2	3.7	2.0	2.7	1.1
What was on that plan?												
Recall warning signs	$3.1_{a,b}$	0.6	$5.6_{a,c}$	1.2	$1.2_{b,c,d}$	0.5	6.1_{d}	1.5	3.5	1.3	2.8	1.0
Recall self-management	7.8_{a}	1.6	4.7	1.2	4.0	1.2	4.8	1.8	1.4_{a}	0.9	4.3	1.7
Recall social support	5.9_{a}	1.3	5.2	1.4	4.3	1.3	5.9	1.7	2.1_{a}	0.9	6.6	2.6
Recall reasons for living	1.9_{a}	0.4	5.8_{a}	1.2	4.1	1.9	4.6	1.3	3.3	1.3	2.8	1.1
Recall professional support	5.0	1.1	6.8_{a}	1.4	3.9	1.4	4.8	1.3	2.6_{a}	0.9	3.1	1.3
Recall crisis services	6.0	1.3	5.2	1.8	5.1	2.0	4.3	1.4	2.1	1.0	3.2	1.1
What have you specifically done?												
Use warning signs	5.8_{a}	1.2	1.4_{a}	0.9	5.4	1.8	4.6	1.2	–*	–*	3.1	1.0
Use self-management	7.3	2.2	5.2	1.2	5.3	1.5	4.2	1.3	1.9	1.5	3.2	1.4
Use social support	7.8	2.7	5.0	1.3	4.4	1.2	4.5	1.3	3.3	1.6	2.7	1.0
Use reasons for living	–*	–*	5.8_{a}	1.2	4.1	4.1	4.6	1.2	2.3_{a}	0.6	3.1	1.0
Use professional support	9.2	4.0	4.8_{a}	1.2	$18.1_{a,b}$	4.1	4.0	1.2	12.5_{c}	3.5	$2.6_{b,c}$	1.0
Use crisis services	12.5	5.3	4.7_{a}	1.1	–*	–*	4.3_{b}	1.1	$14.8_{a,b,c}$	3.4	2.7_{c}	1.0

Notes: Values that share subscripts significantly differ from each other when adjusting for the false discovery rate.
*Values could not be estimated owing to empty cells.

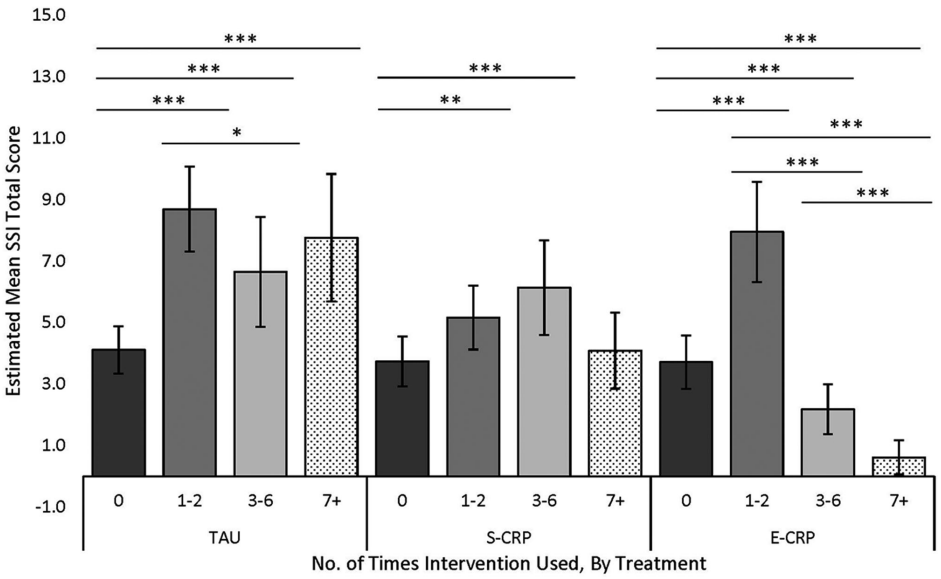

FIGURE 1 Severity of follow-up suicide ideation across treatment as usual (TAU), standard crisis response plan (S-CRP), and enhanced crisis response plan (E-CRP) groups by frequency of intervention use. Values indicated estimated marginal means based on GEE analyses adjusted for baseline suicide ideation severity, with 95% confidence intervals. SSI, scale for suicide ideation; $^{*}P < .05$, $^{**}P < .01$, $^{***}P < .001$. Using the false rate discovery method, only differences with *P*-values smaller than $P < .01$ are statistically significant

did not use their interventions because they did not experience severe suicide ideation). Among those participants who did use their intervention, results indicate an inverse relationship between frequency of intervention use and severity of suicide ideation in E-CRP but not S-CRP or TAU. This pattern in E-CRP was generally consistent with a "dose effect," such that greater use of the E-CRP was associated with incrementally larger reductions in suicide ideation. Because we could not experimentally manipulate dosage, however, it is important to note that factors other than frequency of use may account for these observed reductions in the E-CRP condition. Taken together, these findings suggest that participants who received either the S-CRP or E-CRP benefited relative to TAU with respect to reduced suicide risk, and that repeated use of the E-CRP was correlated with relatively larger declines in risk.

From a clinical perspective, our findings suggest that a patient's ability to recall CRP-specific components is associated with decreased risk. Furthermore, clinicians may be able to augment the benefits associated with a suicidal patient's ability to recall self-management strategies and sources of social support by asking the patient to identify and discuss his or her reasons for living during an acute crisis. Unfortunately, our study was unable to determine the direction of this association. For example, one possibility is that suicide ideation was reduced because patients remembered self-management strategies and sources of social support. Another possibility is that patients were able to remember these components because they were less suicidal. Although additional studies are needed to disentangle temporal precedence, both possibilities implicate a role for cognitive flexibility and emotion regulation, self-regulatory mechanisms hypothesized to underlie the efficacy of the CRP (Bryan & Rozek, 2018).

Specifically, in the present study, worst-point suicide ideation was significantly lower among those participants who recalled and used intervention components that were designed to facilitate self-regulatory processes. Worst-point suicide ideation refers to the period of time during the assessment period during which the participant most strongly experienced the desire for suicide or death (Beck et al., 1999; Joiner et al., 2003). This approach to measuring the severity of suicide ideation is useful not only because it has been shown to be a stronger correlate of suicide attempts than recent (or "current") suicide ideation, but also because it provides a method for estimating the magnitude of greatest deviation from an individual's homeostatic set point. Larger deviations in psychological variables (e.g., mood state) from a system's homeostatic set point therefore reflect decreased regulation (or, conversely, increased dysregulation) as compared to a system with smaller deviations. Consider, for example, the regulation of temperature by a climate control system. Highly regulated systems experience relatively small fluctuations in temperature over time, but less regulated systems experience larger fluctuations. The overall self-regulatory capacity of the climate control system could be estimated by measuring the temperature when it has deviated the most from the system's homeostatic set point. This perspective of self-regulatory processes has been applied to a range of psychological phenomena including mood and, more recently, suicide risk (Bänziger, Patel, & Scherer, 2014; Bryan & Rudd, 2016; Bryan et al., in press; Bryan, Rudd, Peterson, Young-McCaughan, & Wertenberger, 2016; Butler, 2011; Butner, Gagnon, Geuss, Lessard, & Story, 2015; Chow, Ram, Boker, Fujita, & Clore, 2005). As applied to the present study, measuring worst-point suicide ideation during follow-up provides an estimate of each participant's self-regulatory capacity with respect to suicide risk. Our finding that some intervention components are associated with significantly reduced worst-point suicide ideation therefore suggests the possibility that these components facilitate self-regulatory processes. Additional studies are needed to further examine and test self-regulation as possible mechanisms of action underlying the CRP and other treatments with demonstrated efficacy for reducing suicidal behaviors. Such research would provide important information about how to best maximize the impact of the CRP and other suicide-focused interventions.

Several limitations of the present study warrant discussion. First, our sample was entirely active-duty soldiers, which may restrict generalizability of results to other populations including other branches of the military and/or the veteran community more broadly. Second, despite the study's prospective design, the assessment methods used in our study prohibit a more refined understanding of how participants used their interventions relative to the experience of emotional distress and/or suicidal thoughts. For example, it is likely that some soldiers used their intervention before the onset of active suicidal ideation, whereas others used the intervention only after experiencing severe suicidal thoughts. Similarly, some soldiers may have used one particular strategy repeatedly, whereas others used multiple strategies. Additional studies are needed to understand the emergence and resolution of suicidal crises relative to intervention use. Third, the low proportion of female participants restricts our ability to consider gender differences with respect to intervention use. Fourth, our method for assessing recall of intervention components used an open-ended, free recall task without the use of directed prompts and/or recognition-based approaches. This method was selected to reduce the likelihood of bias associated with the blinding of the evaluator and participants, but restricted our ability to obtain a more nuanced understanding of what patients remember (and do not remember) about various suicide-focused interventions. Finally, the present study was insufficiently powered to examine the associations among intervention use and suicidal behavior. Because suicidal thoughts and behaviors can have differential response patterns following an intervention (e.g., Brown et al., 2005; Linehan et al., 2006; Rudd et al., 2015), it is possible that the observed relationships do not generalize to suicidal behavior.

5 | CONCLUSIONS

Results of the present study indicate the CRP is favorably viewed by suicidal patients in both its standard and enhanced formats, and suggest that both CRPs enhance recall of self-management strategies and sources of social support. Consistent with its intended use and design, CRP-specific components are associated with less severe suicidal ideation for up to 6 months following intervention, especially when the CRP includes an enhancement designed to identify and elicit reasons for living. In contrast to TAU and the S-CRP, repeated use of the E-CRP is associated with incremental reductions in suicide ideation.

ACKNOWLEDGMENTS

This study was supported in part by the Military Suicide Research Consortium (MSRC), an effort supported by the Office of the Assistant Secretary of Defense for Health Affairs under award #W81XWH-10-2-0181. Opinions, interpretations, conclusions, and recommendations are those of the authors and are not necessarily endorsed by the U.S. Government, the Department of Defense, the Department of the Army, or the MSRC.

ENDNOTE

[1] To further assess the potential impact of overdispersion of suicide ideation, we also analyzed the data using a negative binomial distribution. Four of the models failed to converge, with diagnostic checks suggesting a high likelihood for model misspecification. All other models converged without problem, with the pattern of results being no different from those obtained from the robust Poisson models. We therefore report the results of these models.

ORCID

Craig J. Bryan PsyD, ABPP http://orcid.org/0000-0002-9714-0733

REFERENCES

Bänziger, T., Patel, S., & Scherer, K. R. (2014). The role of perceived voice and speech characteristics in vocal emotion communication. *Journal of Nonverbal Behavior*, *38*, 31–52.

Beck, A. T., Brown, G. K., Steer, R. A., Dahlsgaard, K. K., & Grisham, J. R. (1999). Suicide ideation at its worst point: A predictor of eventual suicide in psychiatric outpatients. *Suicide and Life Threatening Behavior*, *29*, 1–9.

Beck, A. T., & Steer, R. A. (1991). *BSS: Beck scale for suicide ideation*. San Antonio, TX: Psychological Corporation.

Belnap, B. H., Schulberg, H. C., He, F., Mazumdar, S., Reynolds, C. F., & Rollman, B. L. (2015). Electronic protocol for suicide risk management in research participants. *Journal of Psychosomatic Research*, *78*, 340–345.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society. Series B (Methodological)*, *57*, 289–300.

Berman, N. C., Stark, A., Cooperman, A., Wilhelm, S., & Cohen, I. G. (2015). Effect of patient and therapist factors on suicide risk assessment. *Death Studies*, *39*, 433–441.

Boudreaux, E. D., Miller, I., Goldstein, A. B., Sullivan, A. F., Allen, M. H., Manton, A. P.,…Camargo, C. A. (2013). The emergency department safety assessment and follow-up evaluation (ED-SAFE): Method and design considerations. *Contemporary Clinical Trials*, *36*, 14–24.

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. *JAMA*, *294*, 563–570.

Bryan, C. J., Baucom, B. R., Crenshaw, A. C., Imel, Z., Atkins, D. C., Clemans, T. A.,…Rudd, M. D. (in press). Associations of patient-rated emotional bond and vocally encoded emotional arousal among clinicians and acutely suicidal military personnel. *Journal of Consulting and Clinical Psychology*.

Bryan, C. J., Mintz, J., Clemans, T. A., Burch, T. S., Leeson, B., Williams, S., & Rudd, M. D. (2017). Effect of crisis response planning on patient mood and clinician decision making: A clinical trial with suicidal US soldiers. *Psychiatric Services*, *69*, 108–111.

Bryan, C. J., Mintz, J., Clemans, T. A., Leeson, B., Burch, T. S., Williams, S. R.,…Rudd, M. D. (2017). Effect of crisis response planning vs. contracts for safety on suicide risk in US Army soldiers: A randomized clinical trial. *Journal of Affective Disorders*, *212*, 64–72.

Bryan, C. J., & Rozek, D. C. (2018). Suicide prevention in the military: A mechanistic perspective. *Current Opinion in Psychology*, *22*, 27–32.

Bryan, C. J., & Rudd, M. D. (2016). The importance of temporal dynamics in the transition from suicidal thought to behavior. *Clinical Psychology: Science and Practice*, *23*, 21–25.

Bryan, C. J., Rudd, M. D., Peterson, A. L., Young-McCaughan, S., & Wertenberger, E. G. (2016). The ebb and flow of the wish to live and the wish to die among suicidal military personnel. *Journal of Affective Disorders*, *202*, 58–66.

Butler, E. A. (2011). Temporal interpersonal emotion systems: The "TIES", that form relationships. *Personality and Social Psychology Review*, *15*, 367–393.

Butner, J. E., Gagnon, K. T., Geuss, M. N., Lessard, D. A., & Story, T. N. (2015). Utilizing topology to generate and test theories of change. *Psychological Methods*, *20*, 1–25.

Centers for Disease Control and Prevention. (2017). *Web-based injury statistics query and reporting system (WISQARS)*. Atlanta, GA: National Center for Injury Prevention and Control, Centers for Disease Control and Prevention.

Chow, S. M., Ram, N., Boker, S. M., Fujita, F., & Clore, G. (2005). Emotion as a thermostat: Representing emotion regulation using a damped oscillator model. *Emotion*, *5*, 208–225.

Crosby, A., Ortega, L., & Melanson, C. (2011). *Self-directed violence surveillance; uniform definitions and recommended data elements*. Atlanta: Centers for Disease Control and Prevention.

Hogan, M. F. (2016). Better suicide screening and prevention are possible. *JAMA Psychiatry*, *73*, 1111–1112.

Joiner, E. T. Jr., Steer, R. A., Brown, G., Beck, A. T., Pettit, J. W., & Rudd, M. D. (2003). Worst-point suicidal plans: A dimension of suicidality predictive of past suicide attempts and eventual death by suicide. *Behaviour Research and Therapy*, *41*, 1469–1480.

Joint Commission. (2016). Detecting and treating suicide ideation in all settings. *Sentinel Event Alert*, *56*, 1–7.

Linehan, M. M., Comtois, K. A., Brown, M. Z., Heard, H. L., & Wagner, A. (2006). Suicide Attempt Self-Injury Interview (SASII): Development, reliability, and validity of a scale to assess suicide attempts and intentional self-injury. *Psychological Assessment*, *18*, 303–312.

Linehan, M. M., Comtois, K. A., Murray, A. M., Brown, M. Z., Gallop, R. J., Heard, H. L.,…Lindenboim, N. (2006). Two-year randomized controlled trial and follow-up of dialectical behavior therapy vs therapy by experts for suicidal behaviors and borderline personality disorder. *Archives of General Psychiatry*, *63*, 757–766.

Miller, I. W., Camargo, C. A., Arias, S. A., Sullivan, A. F., Allen, M. H., Goldstein, A. B.,…Boudreaux, E. D. (2017). Suicide prevention in an emergency department population: The ED-SAFE Study. *JAMA Psychiatry*, *74*, 563–570.

Pruitt, L. D., Smolenski, D. J., Bush, N. E., Skopp, N. A., Hoyt, T. V., & Grady, B. J. (2016). *DoDSER: Department of defense suicide event report: Calendar year 2015 annual report*, Washington, DC: Department of Defense.

Puskar, K., & Urda, B. (2011). Examining the efficacy of no-suicide contracts in inpatient psychiatric settings: Implications for psychiatric nursing. *Issues in Mental Health Nursing*, *32*, 785–788.

Reger, M. A., Luxton, D. D., Skopp, N. A., Lee, J. A., & Gahm, G. A. (2009). *Department of Defense Suicide Event Report (DoDSER): Calendar year 2008 annual report*. Washington, DC: Department of Defense.

Reid, W. H. (1998). Promises, promises: Don't rely on patients' no-suicide/no-violence "contracts." *Journal of Practical Psychiatry and Behavioral Health*, *4*, 316–318.

Rudd, M. D., Bryan, C. J., Wertenberger, E. G., Peterson, A. L., Young-McCaughan, S., Mintz, J.,…Wilkinson, E. (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*, 441–449.

Rudd, M. D., Joiner, T. E., & Rajab, M. H. (2004). *Treating suicidal behavior: An effective, time-limited approach*. New York, NY: Guilford Press.

Rudd, M. D., Mandrusiak, M., & Joiner, T. E. (2006). The case against no-suicide contracts: The commitment to treatment statement as a practice alternative. *Journal of Clinical Psychology*, *62*, 243–251.

Stanley, B., & Brown, G. K. (2012). Safety planning intervention: A brief intervention to mitigate suicide risk. *Cognitive and Behavioral Practice*, *19*, 256–264.

How to cite this article: Bryan CJ, May AM, Rozek DC, et al. Use of crisis management interventions among suicidal patients: Results of a randomized controlled trial. *Depress Anxiety*. 2018;35:619–628. https://doi.org/10.1002/da.22753