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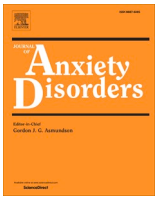

Crisis response planning rapidly reduces suicidal ideation among U.S. military veterans receiving massed cognitive processing therapy for PTSD

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ABSTRACT

Posttraumatic stress disorder (PTSD) is common among U.S. military veterans and is associated with increased risk of suicidal thoughts and behaviors. Crisis response planning (CRP), a brief safety planning-type intervention, has been shown to rapidly reduce suicidal ideation and suicide attempts in emergency and acute care settings. CRP's effectiveness when combined with trauma-focused therapies remains unknown. In this randomized pragmatic clinical trial with one-year follow-up, 157 U.S. military personnel and veterans were randomly assigned to receive CRP or self-guided safety planning (SP) prior to beginning massed cognitive processing therapy (CPT) for PTSD. Among 51 (32.5 % of sample) participants endorsing suicidal ideation at baseline, reductions in the severity of suicidal ideation were significantly larger and faster in CRP ($F(11,672) = 15.8$, $p < .001$). Among 106 participants denying suicidal ideation at baseline, 8.5 % of CRP participants versus 11.9 % of SP participants (OR=0.69, 95 % CI=0.19–2.52) reported new-onset suicidal ideation during any follow-up assessment. PTSD symptoms significantly reduced over time with no differences between groups. Results support the effectiveness of CRP for rapidly reducing suicidal ideation and managing suicide risk during outpatient treatment for PTSD.

1. Introduction

Posttraumatic stress disorder (PTSD) is the most frequently diagnosed mental health condition among military veterans (Seal et al., 2007; Tanielian et al., 2008). The estimated rate of PTSD among military personnel and veterans is approximately 23 % (Fulton et al., 2015), though reported rates range widely across studies (Fulton et al., 2015; Ramchand et al., 2011; Ramchand et al., 2015; Wisco et al., 2014; Wisco et al., 2022). Although combat exposure is the strongest predictor of PTSD among military personnel and veterans (Ramchand et al., 2015), many military personnel and veterans experience PTSD because of non-military traumas like transportation accidents, sexual assault, domestic abuse, and/or early life trauma including child abuse (Wisco et al., 2022). Regardless of the associated event, PTSD is associated with a host of functional problems and negative outcomes among military personnel including occupational and marital dissatisfaction, violence, alcohol and substance abuse, and impaired social functioning (Hoge et al., 2004; Hoge et al., 2007; Jakupcak et al., 2009; Jakupcak et al., 2011; Panagioti et al., 2012). PTSD also increases the risk of suicidal thoughts, behaviors, and death (Gradus et al., 2010; Jakupcak et al., 2009; Jakupcak et al., 2011; May & Klonsky, 2016; Nock et al., 2014).

Considerable research shows that trauma-focused cognitive behavioral treatments are highly efficacious for reducing PTSD symptoms and associated sequelae. Cognitive processing therapy (CPT) is one trauma-focused treatment that has garnered a significant amount of empirical support (Watts et al., 2013), typically yielding 50 % or larger reductions in PTSD symptoms from pre- to posttreatment (Chard et al., 2010; Forbes et al., 2010; Monson et al., 2006; Morland et al., 2014; Resick et al., 2002; Resick et al., 2017; Resick et al., 2015). Long-term follow-up studies also suggest the beneficial effects of CPT can endure for up to 10 years posttreatment (Resick et al., 2012). In addition to reducing PTSD symptoms, multiple studies indicate CPT is also associated with significant reductions in suicide ideation (Bryan et al., 2016; Gradus et al., 2013; Resick et al., 2017). Recent studies show that CPT's effects on

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PTSD symptoms and suicidal ideation are accelerated when sessions are scheduled daily for 2 weeks (called "massed" CPT) instead of weekly for several months (Bryan, Leifker et al., 2018; Bryan et al., 2022; Held, Kovacevic et al., 2022; Held, Smith et al., 2022; Post et al., 2021; Wachen et al., 2019), indicating massed CPT achieves similar reductions in PTSD symptoms and suicidal ideation in a fraction of the time.

Because of the heightened risk of suicidal behavior among PTSD patients, researchers have proposed integrating safety planning-type interventions like crisis response planning (CRP) or the safety planning intervention into trauma-focused therapies to efficiently manage suicide risk during PTSD treatment (Bryan, 2016; Holliday et al., 2019; Rozek et al., 2021). Safety planning-type interventions have demonstrated preliminary effectiveness for the reduction of suicidal behaviors (Nuij et al., 2021) although the overall quality of evidence remains low due to a limited number of studies (Workman et al., 2021). Safety planning-type interventions also have not yet been tested in clinical settings outside emergency departments and acute care settings (Workman et al., 2021), highlighting the need for more research in outpatient clinical settings.

Despite the limited evidence supporting their effectiveness, safety planning-type interventions are recommended (or required) for the short-term management of patient suicide risk (Department of Veterans Affairs, & Department of Defense, 2019; National Action Alliance for Suicide Prevention, 2018; The Joint Commission, 2022). Clinicians and healthcare systems have increasingly implemented safety planning-type interventions in a variety of forms; a recent survey found that nearly 90 % of mental health clinicians report using a safety planning type intervention in their practice, the most common being the adoption and use of the Stanley-Brown safety planning form (Rozek et al., 2023), which utilizes a fill-in-the-blank design (Stanley et al., 2008). Although safety planning-type interventions are intended to be conducted collaboratively between patients and clinicians, safety planning forms are often implemented in a "self-guided" manner wherein patients are directed to create a plan with only limited (if any) input from a clinician or healthcare professional (Boudreaux et al., 2016). Results of a non-randomized clinical trial testing self-guided safety plans found statistically significant reductions in follow-up suicidal behaviors among emergency department patients who create these plans relative to patients who did not (Miller et al., 2017), suggesting self-guided safety planning can be an efficient procedure for reducing patient risk of suicide in usual care.

CRP is a brief (<30 min on average) safety planning-type intervention in which the patient and clinician collaboratively identify the patient's personal warning signs and early indicators of an emerging crisis and a list of self-regulatory strategies that can be used to help patients effectively cope with acutely elevated emotional distress and suicidal crises (Rudd et al., 2006). Results of a randomized clinical trial found that acutely suicidal patients who received CRP reported significantly faster reductions in suicidal ideation and were significantly less likely than patients who received treatment as usual to attempt suicide during follow-up (Bryan et al., 2017). Subsequent research has found that CRP rapidly reduces suicidal ideation, with effects being seen within one hour of administration (Bryan, Jim Mintz, et al., 2018). Rapid reductions in suicidal ideation are associated with reductions in suicidal behaviors (Czyz & King, 2015; Prinstein et al., 2008; Rudd et al., 2015), suggesting CRP's effect on reducing suicide attempts may be related to its rapid effects on suicidal ideation. The rapid effects of CRP on suicidal ideation make it especially well-suited for massed CPT's compressed timeframe. Although the integration of CRP with trauma-focused therapies like CPT have been proposed and case reports support the feasibility, acceptability, and potential effectiveness of this integrated approach with high-risk PTSD patients (Rozek & Bryan, 2020), this combination of procedures has not yet been empirically tested.

The primary aim of this study was to determine if the integration of CRP into massed CPT would result in faster and/or larger reductions in suicidal ideation as compared to massed therapy with usual care suicide risk management procedures. To achieve this aim, we conducted a pragmatic randomized effectiveness clinical trial in a sample of treatment-seeking U.S. military personnel and veterans diagnosed with PTSD or subthreshold PTSD. We hypothesized that reductions in suicidal ideation would be larger in CRP as compared to SP among participants endorsing suicidal ideation at baseline. We also hypothesized that CRP would prevent the onset of suicidal ideation among participants initially denying suicidal ideation at baseline.

2. Methods

2.1. Study design

This study used a pragmatic parallel-arm randomized effectiveness clinical trial design. Pragmatic designs allow for the evaluation of treatment effects under conditions that more closely approximate "real-world" practice circumstances. The Pragmatic-Explanatory Continuum Indicator Summary-2 (Loudon et al., 2015), a tool developed to characterize clinical trials on the explanatory-pragmatic continuum, is displayed in Fig. 1.

2.2. Participants and procedures

Participants were 157 U.S. military personnel and veterans seeking treatment for PTSD recruited using a combination of strategies including digital advertisements on social media pages and websites, television commercials, referrals from veteran support organizations, and referrals from community-based mental health clinicians. Participants were enrolled from January 2020 to October 2022. Inclusion criteria were (1) being $\geq$ 18 years old; (2) current or past service in the U.S. military; (3) meeting diagnostic criteria for full PTSD (i.e., having 4 of 4 symptom criteria at or above threshold levels) or subthreshold PTSD (i.e., having 3 of 4 symptom criteria at or above threshold levels) within the past month; (4) ability to speak and understand the English language; and (5) ability to complete the informed consent process. Exclusion criteria were (1) having a substance use disorder requiring medical management; (2) imminent suicide risk warranting inpatient psychiatric hospitalization or suicide-focused treatment (e.g., brief cognitive behavioral therapy for suicide prevention (Bryan & Rudd, 2018) or dialectical behavior therapy (Linehan, 2018); or (3) impaired mental status that precluded the ability to provide informed consent.

Participants first completed an online self-report assessment battery that measured a wide range of psychiatric symptoms and historical variables. Participants were next contacted by phone or a web-based communication platform and provided consent to complete an eligibility interview. The eligibility interview included the Diagnostic Interview for Anxiety, Mood, and OCD and Related Neuropsychiatric Disorders (DIAMOND; Tolin et al., 2018), a semi-structured diagnostic interview with established reliability and validity that assesses mood, anxiety, and trauma-related psychiatric disorders commonly seen in mental health clinical settings. The DIAMOND was used to confirm the diagnosis of PTSD. Diagnostic interviews were conducted by clinical psychologists, postdoctoral psychology trainees, and predoctoral psychology interns. Current medical issues, prior mental health treatment, and current medication use were also assessed during the eligibility interview. Participants meeting eligibility criteria next completed the informed consent process for treatment.

After consenting for treatment, participants were randomized by a member of the research team and scheduled for a 60-minute intake appointment with their assigned therapist. Participants were allowed to choose if they wanted to attend the intake appointment and therapy sessions in-person or remotely. During the intake session, participants received information about the massed CPT schedule, discussed expectations for participating in remote video-based therapy sessions (for participants choosing to participate remotely), and scheduled their therapy sessions. Participants received their randomly assigned suicide

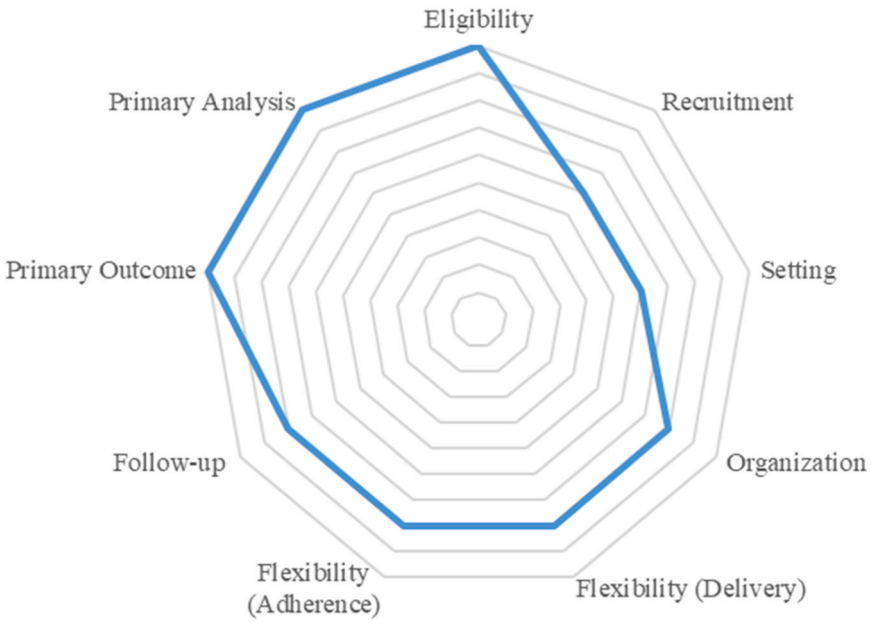

Fig. 1. PRECIS-2 wheel domain scores with score rationales.

risk intervention, either CRP or SP (described below), during the intake session. Participants were then scheduled to receive 10 one-hour sessions of CPT (Resick et al., 2016) scheduled daily for 10 consecutive business days, with treatment starting the same week. Treatment length was the same across both conditions.

Participants completed assessments at the beginning of session 1 (treatment start), session 5 (mid-treatment), and session 10 (treatment end), and were contacted via automated email at 6 and 12 months to complete follow-up assessments. Participants received up to 3 emails with an embedded link to complete follow-up assessments online. Email notifications were preprogrammed at the time of enrollment to be delivered automatically, thereby ensuring researcher masking to treatment group assignment.

All study procedures were approved by The Ohio State University Institutional Review Board (#2020H0431) and preregistered at www.clinicaltrials.gov (NCT04690582).

2.3. Treatment conditions

All participants were scheduled to receive 10 sessions of massed CPT. The content of each CPT session is summarized in Table 1. If a session was missed or another schedule conflict occurred (e.g., holidays), therapists included the content from the missed session with the next session's content to preserve the two-week massed CPT timeline. In CPT, participants first learn about the relationship between their thoughts and emotions and how to identify thoughts and beliefs that may exacerbate their symptoms (called "stuck points"). Next, participants write an impact statement that describes the impact of their index trauma(s) on their beliefs about themselves, others, and the world. As participants progress through the therapy, the therapist helps them challenge and identify alternatives to their trauma-related stuck points. Once the participant can identify and address their unhelpful thinking, they are encouraged to apply their newly acquired skills in real-life situations associated with five key themes: safety, trust, power/control, esteem, and intimacy. In addition to massed CPT, participants were randomly assigned to receive one of two suicide risk management procedures: usual care or crisis response planning.

Because enrollment for this study started during the first year of the global COVID-19 pandemic, the treatment was initially delivered only via remote online platforms. Once public health and local university guidelines allowed for face-to-face encounters, participants were allowed to choose between remote/virtual or face-to-face therapy. Consistent with the pragmatic effectiveness trial design, no restrictions on medication use or changes were imposed. Medication prescriptions were managed by participants' existing healthcare providers.

Table 1
Content of 10 massed CPT sessions.

Session #	Content
Intake	Suicide risk assessment and intervention, schedule massed CPT sessions
1	Overview of PTSD and CPT, review index trauma
2	Impact statement
3	ABC worksheets
4	Challenging questions worksheets
5	Patterns of problematic thinking worksheets
6	Challenging beliefs worksheets, safety module
7	Trust module
8	Power & control module
9	Self-esteem module
10	Esteem module, impact statement

2.3.1. Self-guided safety plan (SP)

SP was based on the Emergency Department Safety Assessment and Follow-up Evaluation protocol (Boudreaux et al., 2016). Participants were directed to handwrite their safety plan on a pre-printed, fill-in--the-blank form received from their therapist (if attending in-person) or via email (if attending remotely). The form included the following sections: (1) warning signs of a crisis; (2) internal coping strategies; (3) people and social settings that provide distraction; (4) people who can be contacted for help; (5) professionals or agencies that can be contacted during a crisis; and (6) steps for making the environment safe. Therapists answered participants' questions about the intervention but otherwise did not actively assist participants in developing a plan. Participants were informed that their safety plan would be reviewed and maintained by the study clinician.

2.3.2. Crisis response planning (CRP)

CRP included a collaborative and interactive discussion, guided by the therapist, to create a personalized plan for responding to acutely elevated emotional distress and suicidal crises based on the Crisis Response Planning protocol (Bryan et al., 2017; Bryan & Rudd, 2018).

CRP begins with a narrative assessment in which the therapist asked the participant to "tell the story" of a recent suicidal crisis or suicide attempt (if endorsing suicidal ideation at baseline), or a recent period of intense emotional distress (if denying suicidal ideation at baseline). During the narrative assessment, the therapist asked questions to clarify what the participant was thinking, feeling, and doing. After completing the narrative assessment, the therapist helped the participant create a handwritten plan organized around the following sections: (1) warning signs of a crisis; (2) internal coping strategies; (3) reasons for living; (4) people who can be contacted for help or can provide distraction; and (5) professionals or agencies that can be contacted during a crisis. Participants were directed to handwrite their plan on a blank index card received from their therapist (if attending in-person) or via mail (if attending remotely). A copy of each participant's CRP was maintained by the study clinician.

2.4. Randomization procedures

Participants were randomized to either SP or CRP using the Research Electronic Data Capture (REDCap) randomization module. Three strata were used to minimize group differences: biological sex (male vs. female), self-reported suicidal ideation at baseline (yes vs. no), and treatment delivery format (in-person vs. remote/virtual). For stratification purposes, suicidal ideation was defined as positive endorsement of item 4 (active suicidal ideation) or item 5 (passive suicidal ideation) of the Scale for Suicidal Ideation (Beck et al., 1979), described below.

2.5. Therapists

Therapy sessions were conducted by clinical psychologists, social workers, postdoctoral psychology trainees, and predoctoral psychology interns. All research therapists completed a two-day CPT training workshop and a one-day CRP training workshop conducted by approved trainers and consultants. Research therapists participated in weekly team meetings to review cases, receive consultation, and support treatment fidelity. Owing to the study's pragmatic design, therapy sessions were not recorded and fidelity ratings were not conducted. Therapists maintained a copy of each participant's randomly assigned intervention (either CRP or SP) to ensure the intervention was completed by participants and to manage suicide risk during massed CPT.

2.6. Outcome assessments

2.6.1. Suicidal ideation

Severity of suicidal ideation was our primary outcome and was measured using the Scale for Suicide Ideation (SSI; Beck et al., 1979), a 19-item scale that assesses the severity of suicidal thoughts, urges, plans, and behaviors within the past week using a 3-point ordinal scale. All participants are administered the first 5 items and the remaining 14 items are administered only if a participant positively endorses active suicidal ideation (item 4) or passive suicidal ideation (item 5). Item responses are summed to provide a metric of suicide risk severity, with higher scores indicating more severe suicidal ideation. The SSI's reliability and validity are established (Beck et al., 1988). In this sample, internal consistency ranged from $\alpha = 0.73–0.92$ across assessments.

2.6.2. Suicide attempts

Suicide attempts were our secondary outcome. Suicide attempts were defined as self-directed behavior that deliberately results in injury or the potential for injury to oneself with evidence, whether implicit or explicit, of suicidal intent (Crosby et al., 2011). To distinguish suicide attempts from nonsuicidal self-injury and interrupted suicidal behaviors, we used the self-report version of the Self-Injurious Thoughts and Behaviors Interview-Revised (SITBI-R; Fox et al., 2020). The SITBI-R's reliability and validity are established (Fox et al., 2020).

2.6.3. PTSD symptoms

PTSD symptom severity was also a secondary outcome and was measured using the National Stressful Events Survey PTSD Short Scale (NSESS-PTSD; LeBeau et al., 2014), a 9-item self-report scale that assesses the severity of PTSD symptoms within the past week using a 5-point rating scale. Items are summed to provide an overall metric of PTSD symptom severity, with higher scores indicating more severe symptoms. The scale's reliability and validity are established (Kim et al., 2022; LeBeau et al., 2014). In this study, internal consistency ranged from $\alpha = 0.84–0.94$ across assessments.

2.7. Data analyses

This study was powered to detect a small to medium between-within difference in severity of suicidal ideation with 6 planned assessments, assuming half of the sample reported suicidal ideation at baseline. Our assumptions for sample size estimation were based on the results of two previously published studies finding moderate pre-post reductions in suicidal ideation during massed CPT (Bryan, Leifker et al., 2018; Bryan et al., 2022) and the results of an RCT comparing CRP to treatment as usual (Bryan et al., 2017), which found small to moderate differences in suicide ideation between treatment groups over time (d=0.3–0.7). Assuming a two-tailed $\alpha < .05$, a small correlation ($r = 0.1$) among repeated measures, and a within-between interaction (i.e., treatment*time), a total sample size of 112 ($n = 66$ per group) provided 80 % power to detect a minimum effect size of $d > 0.38$ among participants endorsing suicidal ideation at baseline. To account for missing data from an estimated 25 % of assessments, we set an enrollment goal of at least 150 participants.

We used generalized linear mixed effects regression models with repeated measures using an unstructured covariance matrix, selected based on likelihood criteria (Akaike's Information Criterion). Baseline SSI score was treated as a continuous covariate, and follow-up SSI scores as the dependent variable. SSI scores were log-transformed prior to analyses to reduce positive skew. Because our hypotheses imply different trajectories of SSI scores among participants endorsing suicidal ideation at baseline (i.e., decreasing scores) as compared to participants denying suicidal ideation at baseline (i.e., increasing scores), we created a binary dummy variable to distinguish these two subgroups (1 =endorsed SSI item 4 at baseline, 0 =denied SSI item 4 at baseline). Participant subgroup, treatment (SP or CRP), time, and their interaction terms were entered as fixed effect predictors. To assess rates of new-onset suicidal ideation among participants denying suicidal ideation at baseline, we calculated the number and percent who positively endorsed SSI item 4 during each assessment postbaseline. To assess the robustness of our primary outcome findings, we conducted a sensitivity analysis with an alternate dummy coding method, wherein we assigned a value of 1 to participants who positively endorsed either SSI item 4 (active suicidal ideation) or SSI item 5 (passive suicidal ideation) at baseline, thereby providing a broader definition of suicidal ideation.

Although the treatment groups did not differ at baseline with respect to suicidal ideation, as reported in the Results section below, they significantly differed on several covariates including biological sex (and gender), Hispanic/Latino ethnicity, and treatment format (i.e., remote versus in-person). To minimize the possibility of these confounding our outcomes, we added these variables as model covariates. We also repeated our primary analysis in the following sample subgroups: (1) male participants, (2) female participants, (3) non-Hispanic/Latino participants, and (4) participants choosing remote therapy. We were unable to run sensitivity analyses among Hispanic/Latino participants and participants choosing in-person therapy due to the small number of cases in each subgroup, however.

With respect to suicide attempts, we tabulated frequencies and rates of follow-up suicide attempts across treatment groups but did not perform statistical tests because we did not power the study for this outcome. With respect to PTSD symptom severity, we used the same

generalized linear mixed effects modeling approach described above with NSESS-PTSD scores as the outcome variable.

To assess the clinical significance of findings, we calculated within- and between-group effect sizes (i.e., Cohen's d) and rates of clinically reliable change across treatments. Clinically reliable change was calculated for both the SSI and NSESS-PTSD using the procedures described by Jacobson and Truax (1991). Using this method, reliable improvement in suicidal ideation was defined as an SSI score decrease $\geq$ 5.5 points and reliable improvement in PTSD symptoms was defined as an NSESS-PTSD score decrease $\geq$ 3.5 points.

3. Results

The flow of participants through the study is summarized in Fig. 2. Sample characteristics are summarized in Table 2. At baseline, the sample mean SSI score was 6.4 (SD=7.7, range=0–19), the mean NSESS-PTSD score was 26.5 (SD=7.2, range=5–36), and 75 (47.8 %) participants endorsed either active (n = 51, 32.5 %) or passive (n = 60, 38.2 %) suicidal ideation. Treatment groups did not differ on any clinical variable at baseline. Participants randomized to CRP were more likely to be male ($\chi^2(1) = 9.0$, p = .003) and Latino/Hispanic ($\chi^2(1) = 4.6$, p = .032), however, and were more likely to choose in-person therapy ($\chi^2(1) = 5.7$, p = .017) than participants randomized to SP. Follow-up analyses indicated all 13 Latino/Hispanic participants were men; no female participants identified as Latino/Hispanic. Neither Latino/Hispanic ethnicity ($\chi^2(1) = 0.0$, p = .992) nor sex ($\chi^2(1) = 0.5$, p = .477) were correlated with in-person versus virtual treatment format, however.

With respect to index traumas (i.e., the traumatic event most directly related to PTSD), the most frequently reported traumas involved military- or combat-related events (n = 42, 26.8 %), sexual assault and/or unwanted sexual experiences (n = 39, 24.9 %), sudden violent death of someone (n = 17, 13.3 %), and physical assault (n = 16, 10.2 %). In most cases, the traumas happened to participants directly (n = 120, 76.4 %) or were witnessed (n = 24, 15.3 %), involved danger to their lives (n = 99, 63.1 %) or someone else's life (n = 44, 28.0 %), and resulted in the participant (n = 32, 20.4 %) or someone else (n = 82, 52.2 %) being seriously injured or killed.

3.1. Treatment dropout

Of those who received the randomly assigned intervention and started massed CPT, early dropout did not differ between groups ($\chi^2(1) = 0.9$, p = .343): 5 of 75 (6.7 %) SP participants and 8 of 72 (11.1

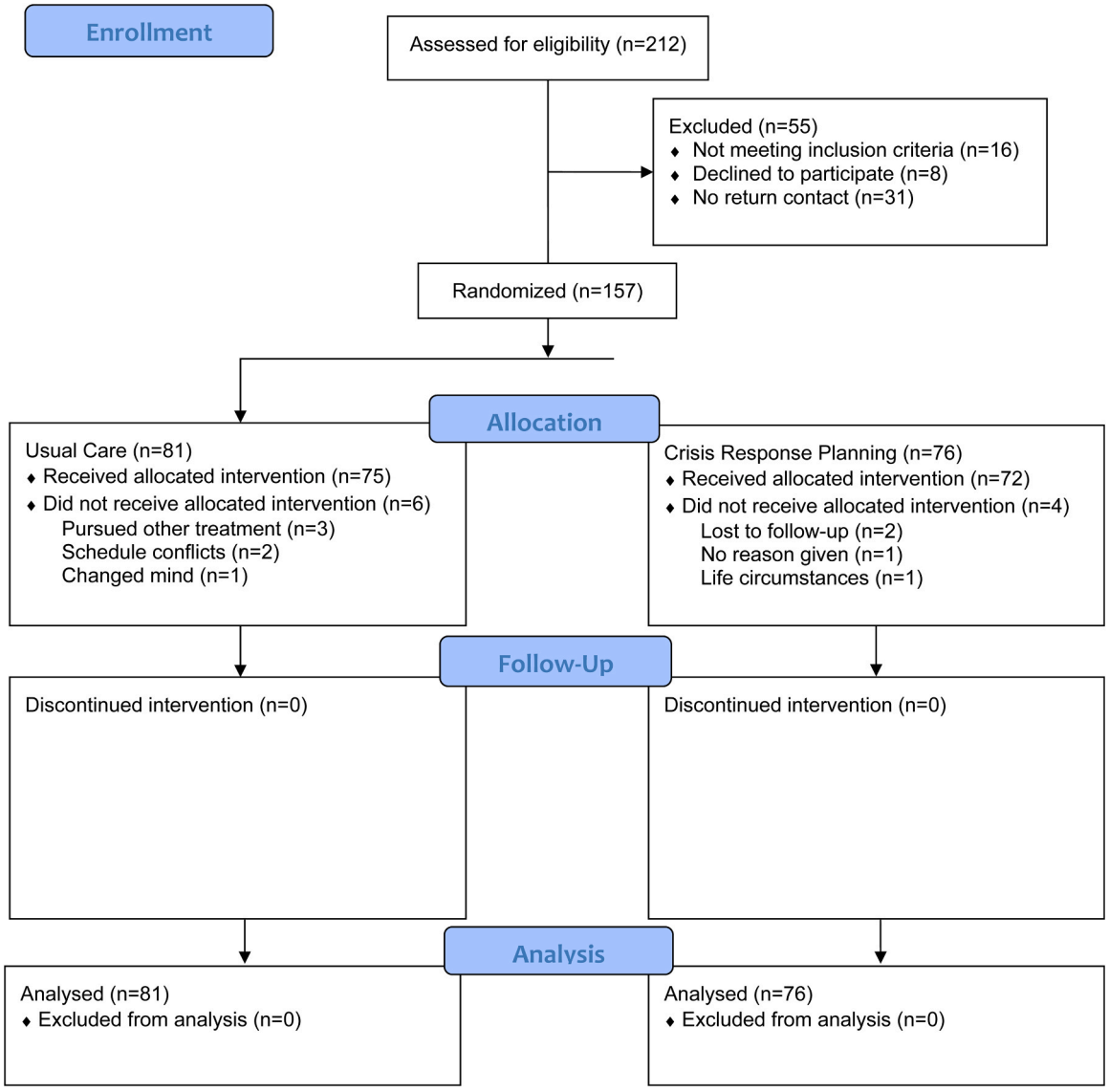

Fig. 2. Flow of participants through the study.

Table 2
Sample characteristics by treatment group.

	SP		CRP			
	(n = 81)		(n = 76)		t / χ^2	p
Age, M (SD)	45.9	(13.0)	48.3	(12.1)	1.2	.245
Sex, n (%)					9.0	.003
Male	51	(63.0)	64	(84.2)		
Female	30	(37.0)	12	(15.8)		
Gender, n (%)					9.9	.020
Male	50	(61.7)	62	(81.6)		
Female	30	(37.0)	13	(17.1)		
Trans	0	(0.0)	1	(1.3)		
Non-binary	1	(1.2)	0	(0.0)		
Race, n (%)					1.3	.859
White	63	(77.8)	58	(76.3)		
Black	9	(11.1)	7	(9.20)		
Native Amer.	3	(3.7)	2	(2.6)		
Asian	2	(2.5)	2	(2.6)		
Other	4	(4.9)	7	(9.2)		
Latino/Hispanic, n (%)					4.6	.032
No	78	(96.3)	66	(86.8)		
Yes	3	(3.7)	10	(13.2)		
Sexual Orientation, n (%)					3.6	.303
Straight	70	(86.4)	70	(92.1)		
Gay/Lesbian	2	(2.5)	3	(3.9)		
Bisexual	8	(9.9)	2	(2.6)		
Other	1	(1.2)	1	(1.2)		
Military Branch, n (%)					0.7	.953
Army	45	(55.6)	45	(59.2)		
Navy	14	(17.3)	13	(17.1)		
Marines	11	(13.6)	8	(10.5)		
Air Force	9	(11.1)	9	(11.8)		
Coast Guard	2	(2.5)	1	(1.3)		
Component, n (%)						
Active Duty	71	(87.7)	67	(88.2)	0.0	.923
National Guard	13	(16.0)	19	(25.0)	1.9	.164
Reserve	16	(19.8)	13	(17.8)	0.2	.669
Treatment Format, n (%)					5.7	.017
In-person	7	(8.6)	17	(22.4)		
Virtual	74	(91.4)	59	(77.6)		
Prior Suicide Risk, n (%)						
Suicidal Ideation	19	(23.5)	13	(17.1)	1.0	.323
Suicide Attempt	62	(76.5)	63	(82.9)	0.6	.450

%) CRP participants discontinued massed CPT early. Participants who discontinued early did not differ demographically or clinically from those who completed massed CPT.

3.2. Change in suicidal ideation

Among the 51 participants endorsing active suicidal ideation at baseline, severity of suicidal ideation reduced in both treatment conditions (Fig. 3a and Table 3) but more so during the active treatment phase for those receiving CRP (treatment*time interaction: F(11,672)= 15.8, p < .001). During the active treatment phase, SSI scores were lower in CRP with moderate to large between-group differences at mid-treatment (F(1,672)= 8.9, p = .004, $d_{between}$= 0.79) and end of treatment (F (1,672)= 4.4, p = .037, $d_{between}$= 0.48). A larger percentage of participants also showed reliable improvement in SSI scores by mid-treatment in CRP (60.0 %) versus SP (47.1 %). SSI scores were similar across treatments and rates of reliable improvement were similar at 6 (F (1,672)= 0.7, p = .396, $d_{between}$= 0.11; 62.5 % vs. 57.9 % reliable improvement) and 12 months (F(1,672)= 0.2, p = .636, $d_{between}$= 0.19; 54.5 % vs. 56.3 % reliable improvement), however After the end of treatment, SSI scores remained unchanged in SP at 6 months (t(672) = 0.4, p = .695) and 12 months (t(672) = 1.1, p = .292) but in CRP, suicidal ideation significantly increased from end of treatment to 6 months (t(672) = 2.3, p = .022) and 12 months (t(672) = 2.7, p = .008), eventually "catching up" to SP. Across both groups, SSI scores at 6 and 12 months were significantly reduced as compared to baseline.

Among the 106 participants denying active suicidal ideation at baseline, change in severity of suicidal ideation did not differ between treatment conditions (Fig. 3b and Table 3; F(11,672)= 1.6, p = .098). The percentage of participants endorsing new-onset suicidal ideation during treatment (4.9 % vs. 10.4 %; OR=0.44, 95 % CI=0.08–2.41, p = .344) or during the full one-year follow-up period (8.5 % vs. 11.9 %; OR=0.69, 95 % CI=0.19–2.52, p = .575) also did not differ between groups.

The pattern of results was unchanged across the subgroup analyses (Table 4).

3.3. Sensitivity analysis

Results of our sensitivity analysis using an alternative subgroup classification system yielded similar results to our primary analysis. At baseline, 75 (47.8 %) participants endorsed either active or passive suicidal ideation and 82 (52.2 %) denied both active and passive suicidal ideation. Among the 75 endorsing suicidal ideation at baseline, severity of suicidal ideation reduced in both treatment conditions but more so in CRP (treatment*time interaction: F(11672)= 19.3, p < .001). Among the 82 denying suicidal ideation at baseline, change in severity of suicidal ideation did not differ between treatment conditions (F(11672)= 0.8, p = .674). Mean SSI scores over time are available in a Supplemental file.

3.4. Incidence of suicidal behavior

Among participants endorsing active suicidal ideation at baseline, three participants in SP (13.6 %) made 7 suicide attempts (1 attempt during treatment, 6 attempts posttreatment) and two participants in CRP (6.9 %) made 3 suicide attempts (0 attempts during treatment, 3 attempts posttreatment). Among participants denying active suicidal ideation at baseline, one participant in SP (1.9 %) made one suicide attempt posttreatment and one participant in CRP (1.9 %) made one suicide attempt posttreatment.

3.5. Change in PTSD symptom severity

Among participants endorsing active suicidal ideation at baseline, severity of PTSD symptoms reduced in both treatment conditions (Fig. 3c and Table 3) but more so in CRP (treatment*time interaction: F (11,676)= 11.6, p < .001). NSESS-PTSD scores were lower in CRP with moderate but statistically nonsignificant between-group differences at mid-treatment (F(1,676)= 1.5, p = .228, $d_{between}$= 0.69), end of treatment (F(1676)= 3.3, p = .069, $d_{between}$= 0.57), and 12 months (F (1676)= 1.0, p = .310, $d_{between}$= 0.50). A larger percentage of participants showed reliable improvement in NSESS-PTSD scores by mid-treatment in SP (64.7 %) versus CRP (47.6 %) but a larger percentage of participants showed reliable improvement by the end of treatment in CRP (85.0 %) than SP (62.5 %). Rates of reliable improvement were similar across treatments thereafter.

Among participants denying active suicidal ideation at baseline, severity of PTSD symptoms reduced in both treatment conditions (Fig. 3d and Table 3). Although the statistically significant treatment*time interaction (F(11676)= 25.4, p < .001) indicated the trajectories of change differed across treatments, mean NSESS-PTSD scores did not differ between treatments at any time point. Rates of reliable improvement in NSESS-PTSD scores varied across time points, with larger percentages of participants in SP showing reliable improvement by mid-treatment and 6 months but comparable rates of reliable improvement across treatments at end of treatment and 12 months.

4. Discussion

Although safety planning-type interventions are commonly used by mental health professionals to manage their patients' suicide risk, the overall level of evidence supporting their effectiveness remains limited

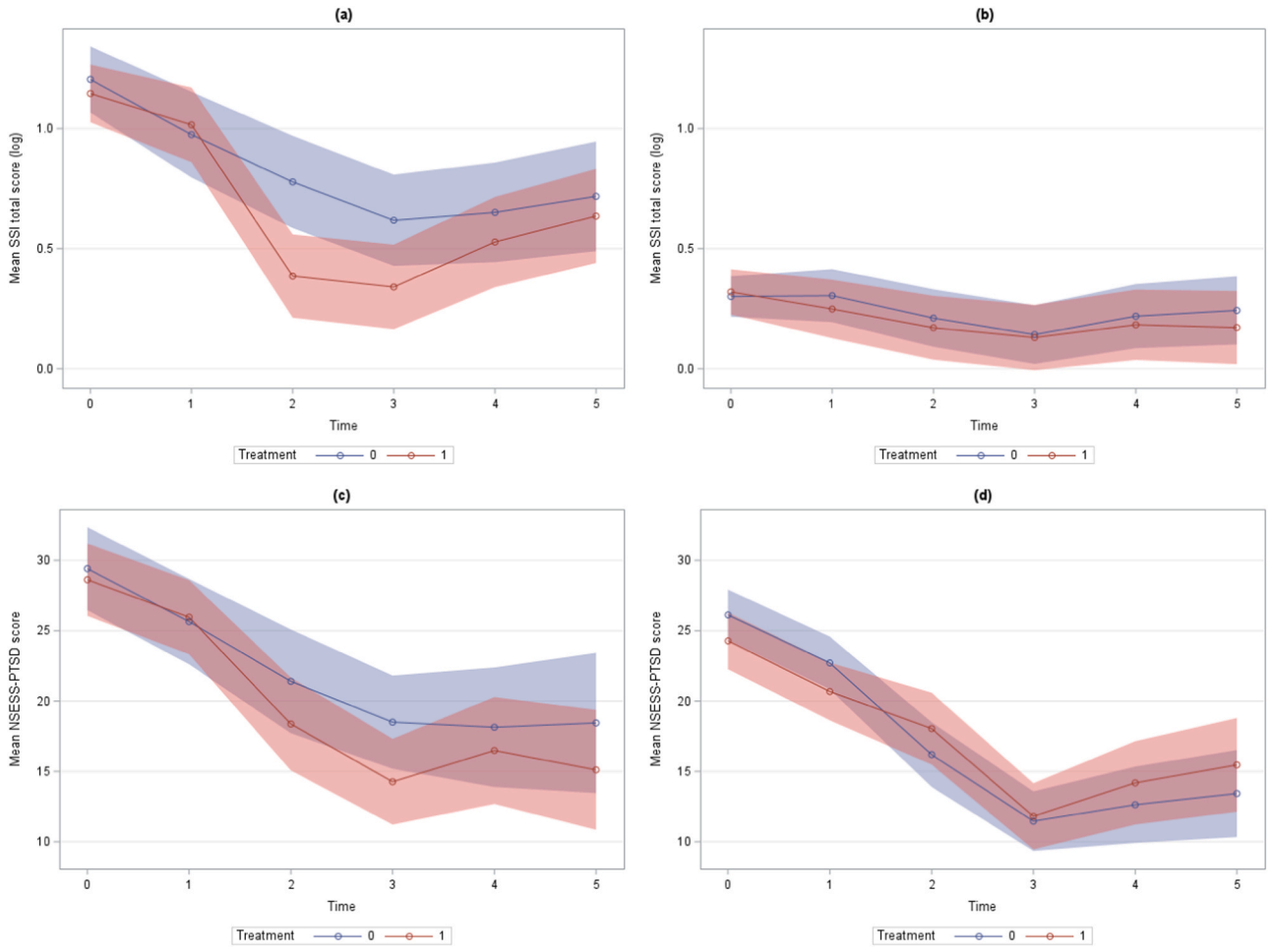

Fig. 3. Change in suicidal ideation and PTSD symptoms across treatment groups, by participant subgroup: (a) mean log-transformed SSI scores among participants endorsing active suicidal ideation at baseline, (b) mean log-transformed SSI scores among participants denying active suicidal ideation at baseline, (c) mean NSESS-PTSD scores among participants endorsing active suicidal ideation at baseline, and (d) mean NSESS-PTSD scores among participants denying active suicidal ideation at baseline. Safety planning (SP) is plotted in blue and crisis response planning (CRP) is plotted in red. Outcomes were assessed at the following time points: baseline (0), start of treatment (1), mid-treatment (2), end of treatment (3), 6 months (4), and 12 months (5).

Table 3
Effect size estimates and rates of clinically reliable improvement by treatment group and participant subgroup.

			SP		CRP		
Baseline Subgroup	Outcome	Time	d_{within}	% reliably improved	d_{within}	% reliably improved	$d_{between}$
Endorsed SI	SSI	Mid-Treatment	1.08	47.1	1.68	60.0	0.79
		End of Treatment	1.32	61.1	1.62	65.0	0.48
		6 Months	1.12	62.5	1.07	57.9	0.11
		12 Months	1.37	54.5	1.28	56.3	0.19
	NSESS-PTSD	Mid-Treatment	1.19	64.7	1.60	47.6	0.69
		End of Treatment	1.62	66.7	2.66	85.0	0.57
		6 Months	1.46	62.5	1.87	70.0	0.17
		12 Months	2.04	72.7	2.55	75.0	0.50
Denied SI	SSI	Mid-Treatment	0.13	6.8	0.20	8.6	0.03
		End of Treatment	0.28	9.5	0.26	9.1	-0.03
		6 Months	0.09	2.7	0.37	6.5	0.22
		12 Months	0.03	17.2	0.21	7.7	0.11
	NSESS-PTSD	Mid-Treatment	1.41	68.2	0.74	48.6	-0.28
		End of Treatment	2.05	78.6	1.53	78.8	-0.19
		6 Months	1.78	81.1	1.19	62.5	-0.17
		12 Months	1.51	65.5	0.98	61.5	-0.17

(Workman et al., 2021). In this study, we examined the effect of one specific form of this intervention, crisis response planning (CRP), on suicidal ideation among military personnel and veterans receiving massed CPT for PTSD. The present results indicate CRP led to faster reductions in suicidal ideation than self-guided safety planning, a commonly used suicide risk management procedure, with differences between treatment groups occurring by the midpoint of massed CPT, which typically occurred within a few weeks of CRP. This pattern aligns

Table 4
Results of subgroup analyses.

		Endorsed SI at baseline			Denied SI at baseline		
Subgroup	N	df	F	p	df	F	p
Male participants	115	11, 488	11.7	<.001	11, 488	1.3	.221
Female participants	42	11, 163	30.5	<.001	11, 163	1.4	.158
Non-Hispanic/Latino participants	144	11, 615	17.0	<.001	11, 615	1.6	.091
Remote therapy format	133	11, 555	12.6	<.001	11, 555	1.0	.415

with prior studies of CRP showing significant between-group differences in suicidal ideation within hours to weeks of intervention (Bryan, Mintz et al., 2018; Bryan et al., 2017) and provide further evidence supporting the rapid effects of CRP on suicidal ideation relative to other commonly used suicide risk management strategies.

The early benefits of CRP should be considered within the context of longer-term trajectories of suicidal ideation in this sample. As seen in Fig. 3a, the early superiority of CRP decayed during follow-up owing to a posttreatment increase in suicidal ideation among CRP participants over time. Suicidal ideation therefore appeared to "rebound" to some certain extent in CRP, a pattern that has been observed previously in massed PTSD treatments (Brown et al., 2019; Bryan et al., 2016; Bryan, Leifker et al., 2018). Despite this rebound, suicidal ideation nonetheless remained lower in CRP than SP and lower during follow-up than baseline. This pattern implicates the need for additional research to identify strategies for maintaining early reductions in suicidal ideation after the acute treatment phase ends. One possibility is that patients stopped reviewing or using their plans after the end of treatment. Previous research shows that more frequent use of CRP by patients is associated with larger reductions in suicidal ideation post-intervention (Bryan, May et al., 2018). Explicitly reinforcing the continued use of CRPs after the end of treatment could be integrated into routine end-of-treatment discussions between clinicians and patients.

With respect to secondary outcomes, a smaller percentage of participants who endorsed suicidal ideation at baseline made a follow-up suicide attempt in CRP (6.9 %) than SP (13.6 %). Although this reduction in suicide attempts converges with previous findings (Bryan et al., 2017), definitive conclusions specific to suicidal behavior should not be made because this study was not powered to detect differences in suicide attempt rates. Despite this limitation, these results are encouraging and suggest CRP may provide a practical strategy for reducing the risk of suicide attempts during trauma-focused treatment. Finally, over two-thirds of participants also showed reliable improvements in PTSD symptom severity, mirroring previously reported findings of massed CPT (Bryan, Leifker et al., 2018; Bryan et al., 2022; Held, Kovacevic et al., 2022; Held, Smith et al., 2022; Wachen et al., 2019) and other massed trauma-focused therapies (Foa et al., 2018; Wachen et al., 2019) and providing further evidence to support the effectiveness of PTSD therapies when delivered in compressed timeframes.

The present results build on previous research in at least two ways. First, they provide further evidence supporting the effectiveness of CRP for the reduction of suicidal ideation. Although the effects of CRP on suicidal ideation have been previously demonstrated, a recent meta-analysis of safety planning-type interventions concluded there was insufficient evidence across studies to support the effectiveness of these interventions for the reduction of suicidal ideation (Nuij et al., 2021); the present results therefore address this knowledge gap. Second, this study is the first to examine the effectiveness of CRP or any other safety planning-type intervention in an outpatient psychiatric setting. Previous research has primarily been conducted in emergency department and acute care settings, where patients are more likely to present during or soon after an acute suicidal crisis and/or a suicide attempt. These results therefore support the effectiveness of CRP in lower acuity clinical settings.

Our findings also hold several clinical implications related to the delivery of suicide risk management strategies and procedures. In this study, the two treatment conditions shared many features and components: identifying personal warning signs, self-management or coping strategies, sources of social support, and sources of professional help. The two conditions differed, however, in at least two ways. First, CRP included a narrative approach to suicide risk assessment wherein the patient is asked to "tell the story" of a recent suicidal crisis or suicide attempt. The narrative approach prioritizes the building of a strong therapeutic alliance (Hawton et al., 2022) and facilitates the development of a highly customized handwritten plan. Previous research suggests that a narrative assessment approach is associated with higher empathy ratings of clinicians and may improve emotion regulation among suicidal patients (Bryan, Baucom et al., 2018), both of which may facilitate reductions in suicide risk. Second, CRP includes an additional component focused on identifying the patient's reasons for living. Previous research suggests that brief discussions of a patient's reasons for living during CRP leads to faster reductions in suicidal ideation, especially with repeated use (Bryan et al., 2019; Bryan, May et al., 2018). Our results therefore implicate the potential incremental value of the narrative assessment and reasons for living. Future studies should further tease apart these and other individual components of suicide-focused interventions to identify how different treatment components differentially impact reductions in suicide risk, both of which may facilitate reductions in suicide risk.

Conclusions based on the present findings should be made cautiously considering several important limitations. First, despite our use of randomization, our two intervention groups differed with respect to several covariates: sex (and gender), Latino/Hispanic ethnicity, and preference for in-person versus virtual therapy format. Importantly, our groups did not differ at baseline with respect to the outcome variables, however. To mitigate the potential of confounding effects, we included these variables as model covariates and repeated our primary analyses in multiple sample subgroups. Although these analyses indicated our results were not adversely impacted by these group differences in covariates, we cannot completely rule out the possibility of confounding secondary to some other unobserved variable. Second, our sample included only U.S. military personnel and veterans. Results therefore may not generalize to other populations. Third, because we employed a pragmatic clinical trial design, we did not record therapy sessions to assess clinician fidelity or assess outcomes using methods other than self-report. We therefore could not assess the quality of interventions implemented by the clinicians and relied on assessment methods that are vulnerable to response bias. These sacrifices in internal validity are offset by the considerable gains in external validity that accompany pragmatic clinical trial designs, namely the close approximation of "real-world" practices and context. From that perspective, our results provide valuable insight regarding the effectiveness of CRP when used by clinicians with their patients in outpatient clinical settings.

5. Conclusions

CRP, a brief safety planning-type intervention, is effective for rapidly reducing suicidal ideation among patients receiving massed therapy for PTSD in outpatient clinical settings. CRP may also reduce suicide attempts and prevent new-onset suicidal ideation, though additional research with larger samples is needed to confirm this possibility. Future studies should not only seek to replicate these findings but also determine if the integration of CRP into other diagnosis-specific treatments can similarly reduce suicidal ideation and suicide attempts across patient subgroups and clinical settings. CRP is a low-cost and effective strategy for managing suicide risk among patients with PTSD.

Declaration of Competing Interest

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Data availability

Data will be made available on request.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.janxdis.2023.102824.

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