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BRIEF REPORT **Open Access**

Posttraumatic stress disorder in the preconception period: an open pilot feasibility study

Leah Danson[1], Marissa J. Ward[2], Lily J. Jiang[3] and Michelle L. Miller[2*]

Abstract

Background Posttraumatic stress disorder (PTSD) symptoms are associated with poorer direct and downstream health outcomes for reproductive-aged individuals. There is limited literature targeting treatment of PTSD symptoms during reproductive time periods, especially the *preconception* period, yet effective and acceptable interventions are needed.

Objective The current study is an open pilot feasibility study that aimed to explore acceptability, feasibility, and preliminary efficacy of a 4-week virtual Acceptance and Commitment Therapy (ACT) psychotherapy group for trauma-exposed reproductive aged women with PTSD.

Methods A trauma-exposed treatment-seeking sample ($N=8$, mean age = 30, 60% White) participated in an ACT for PTSD group (two cohorts). Participants completed self-report measures assessing PTSD symptoms at baseline, 1-week post-intervention, and 1-month post-intervention.

Results Participation in the group was feasible, with most participants (87.5%) attending most sessions (≥ 75%). Participants reported high levels of acceptability and satisfaction. The intervention demonstrated preliminary efficacy in the preconception period as participants showed clinically meaningful reduction in PTSD symptoms (≥ 10 points on PTSD Checklist for DSM-5 (PCL-5)) from baseline ($M=46.25$, $SD=24.04$) to post-intervention ($M=27.33$, SD = 22.35, $d=0.82$) and baseline to follow-up ($M=34.25$, $SD=31.58$, $d=0.43$).

Conclusion This is the first study to look at a group intervention to reduce PTSD for individuals in the preconception period. The protocol was acceptable, feasible, and efficacious, although there were challenges to consider for future tailoring.

Keywords Acceptance and commitment therapy, Posttraumatic stress disorder (PTSD), Preconception, Reproductive period

*Correspondence:
Michelle L. Miller
mlm41@iu.edu
[1]Department of Graduate Clinical Psychology, University of Indianapolis, Indianapolis, USA
[2]Department of Psychiatry, Indiana University School of Medicine, Indianapolis, USA
[3]Department of Psychological and Brain Sciences, Indiana University, Bloomington, USA

Introduction

Trauma exposure and posttraumatic stress disorder (PTSD) symptoms can have a uniquely damaging effect on mental and physical health outcomes in reproductive-aged individuals. Women who experience interpersonal traumas are more likely to develop sexually transmitted infections, unintended pregnancies, chronic pain, worsening chronic illness, and recurrent vaginal pain [1]. Negative or traumatic experiences during childbirth can have short- and long-term negative effects on one's health as well as significant implications for overall maternal mental health and future pregnancies [2, 3]. Critically, maternal mental health history, especially PTSD, is strongly implicated in the developmental trajectory of a child's behavioral, emotional, and social development, as well as psychopathology risk [4, 5]. Therefore, it is important to understand the most effective ways to reduce PTSD's effects during reproductive-based time periods. The current study aimed to examine a novel group Acceptance and Commitment Therapy (ACT) intervention targeting PTSD symptoms occurring during an understudied area of women's health, *the preconception period*.

Defining the preconception period poses many challenges [6]. Some have proposed the preconception period to be the few days to weeks before implantation while others have defined the period as several weeks or months prior to conception [7, 8]. However, these definitions lack practical application as they are often only identified after conception and don't identify a specific preconception population [6, 9]. Public health definitions of this period are more practical as they take a longer perspective (e.g., months to years) that focuses on biomedical and social behaviors during sensitive periods of life (e.g., adolescence, early adulthood) that may have downstream effects on women's health or pregnancy outcomes [6, 10]. Therefore, preconception health focuses on the health of individuals during their reproductive years, as reproductive systems are affected by health prior to conception [11]. We have defined the preconception period to mirror the reproductive period for most females (18–45 years old) [6, 10]. However, there are no studies to date targeting treatment of PTSD during the preconception period [12]. As individuals experience PTSD symptoms before, during, and after pregnancies, more research is needed to identify evidence-based trauma-focused treatments across the reproductive life span.

ACT interventions may hold promise for reproductive aged women. ACT is an empirically supported psychological intervention, which aims to increase one's ability to encounter thoughts and feelings without significant struggle (e.g., acceptance), in the service of their values (e.g., commitment) [13]. ACT has been shown to be an effective treatment for PTSD, both in individual and group formats, and a good alternative to exposure-based PTSD treatments that have high dropout rates such as Prolonged Exposure and Cognitive Processing Therapy [14–16]. Importantly, ACT has been shown to effectively address common concerns of perinatal and postpartum individuals, such as stigma associated with experiencing psychiatric symptoms, postpartum intrusive thoughts, and difficulties with transitioning into motherhood, further indicating its potential acceptability with individuals in the broader preconception period [17]. However, despite ACT's robust evidence base, to date, ACT interventions have not been routinely tested with individuals in the preconception period who have experienced trauma, or more generally, adapted to meet the specific clinical needs of reproductive aged individuals [18]. Therefore, this study aims to fill a critical gap in the literature by implementing and evaluating the feasibility, acceptability, and preliminary efficacy of a four-week virtual group ACT intervention for women with PTSD in the preconception period.

Method

Participants & procedures

The current study was part of an open pilot feasibility study offered to reproductive-aged individuals that met criteria for probable PTSD at an urban academic medical center in the Midwestern United States. A virtual 4-week group protocol was created utilizing existing ACT resources tailored for reproductive-aged individuals with PTSD (for full group protocol, see Appendix A). Recruitment occurred from June to August of 2022. Participants were referred directly to the study by medical providers as well as recruited from an ongoing longitudinal research study of individuals who had previously had children [19]. Of the 22 potential participants, 10 individuals consented to participation and completed the baseline assessment, and 8 participants completed group sessions (see Fig. 1). Only data from participants who completed ≥ 1 group session ($N = 8$) is reported.

Inclusion criteria: 1) ≥ 18 years old; 2) between the reproductive ages of 18–45; 3) able to read and speak English; 4) met criteria for a diagnosis of PTSD or subthreshold PTSD symptoms on the PCL-5 (endorsement of Criterion A trauma exposure and at least one symptom endorsed in all other clusters); and 5) not currently pregnant or delivered within the last 24 months. Participants were excluded if they endorsed current symptoms of mania or psychosis, had serious cognitive impairment, were being treated with concurrent trauma-focused therapy, were at high-risk for suicide, or had recently started taking a new psychotropic medication or changed the dose of one of their current psychotropic medications.

Participants completed electronic written consent through the REDCap electronic data capture tool, a secure web-based application designed for research

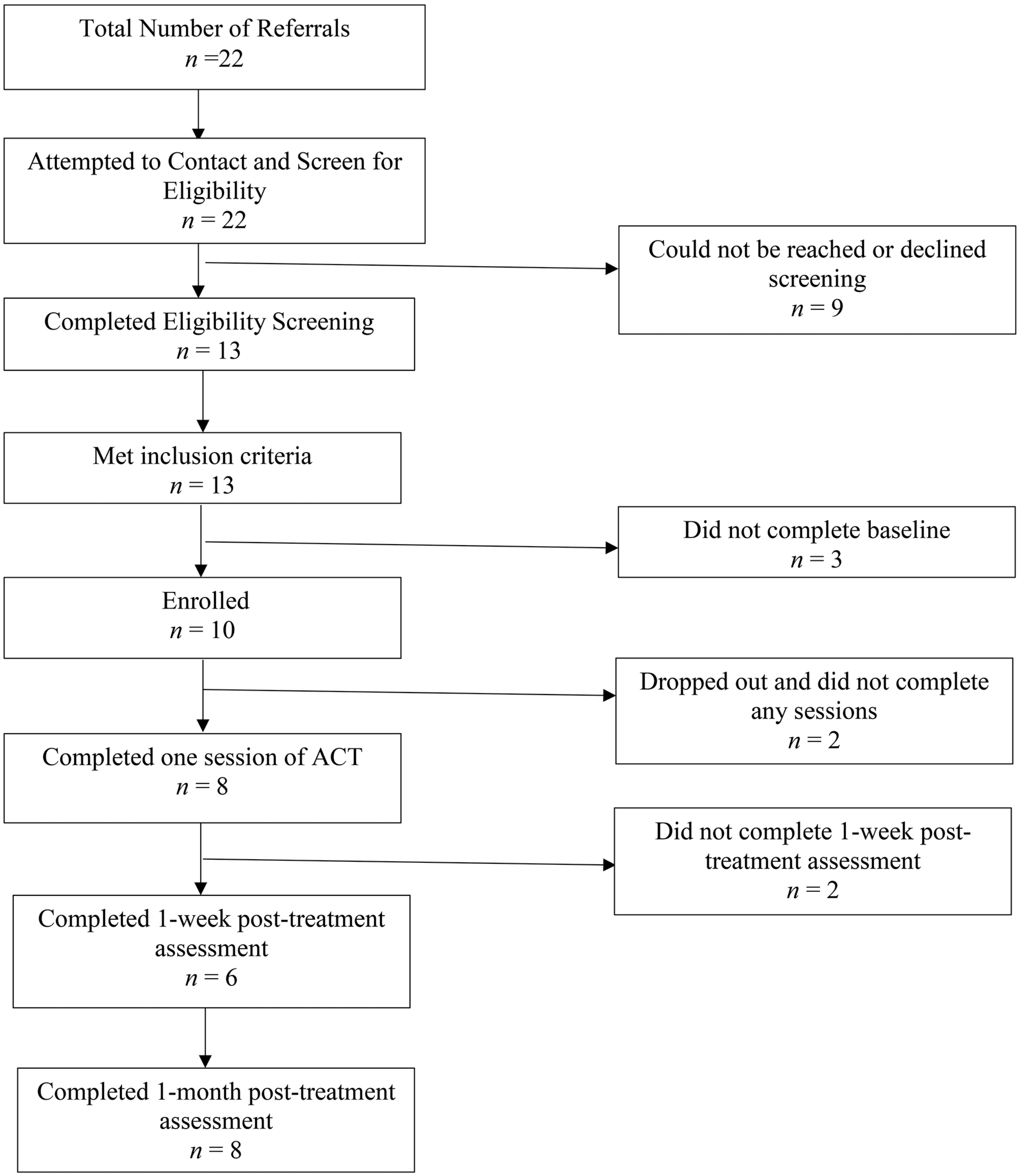

Fig. 1 Recruitment Flow Chart

[20], before beginning the study. Before each group session, participants were asked to complete brief electronic questionnaires on current depressive and PTSD symptoms using REDCap. At the completion of each session, participants were emailed resources that were discussed during the session to practice as homework. After all group sessions, participants were emailed two assessments, a 1-week post-intervention assessment and 1-month follow-up assessment. Participants were compensated for their completion of the questionnaires ($25/

questionnaire, $75 total). All procedures were approved by the University Institutional Review Board.

Measures

The Acceptability of the ACT Group is a 7-item study-specific measure that assessed the acceptability of different aspects of participating in an ACT group (e.g., "I feel that participating in this group was a good use of my time"). It utilized a 6-point Likert scale (1 = 'strongly disagree' to 6 = 'strongly agree') as well as 3 open-ended questions for participant feedback. Reliability was good (Cronbach's $\alpha = 0.79$).

The PTSD Checklist for DSM-5 (PCL-5) [21] was used to assess for the presence of an index trauma and symptoms consistent with a DSM-5 PTSD diagnosis. The Life Events Checklist first asks if 17 types of extremely stressful or traumatic experiences were experienced. After selecting an index trauma, participants answer a 20-item questionnaire on the severity of PTSD symptoms on a 5-point Likert Scale (0 = 'not at all' to 4 = 'a little bit'). Higher scores indicated more severe PTSD symptoms. Reliability was excellent (baseline $\alpha = 0.87$; 1-week post-intervention $\alpha = 0.95$; 1-month post-intervention $\alpha = 0.98$).

Table 1 *Participant characteristics*

Variable	Frequency (%)
Age	30.13 (1.81)
Race	
Asian/Pacific Islander	1(10.0%)
Black or African American	1(10.0%)
White	6(60.0%)
Ethnicity	
Not Hispanic or Latino	7(70.0%)
Hispanic or Latino	1(10.0%)
Education	
Some High School/Graduated High School	2(20.0%)
Some College	2(20.0%)
Graduated College	4(40.0%)
Employment Status	
Full-Time	4(40.0%)
Part-Time	1(10.0%)
Stay-at-home mom	2(20.0%)
Unemployed	1(10.0%)
Relationship Status	
Single	1(10.0%)
Partnered/Cohabitating	1(10.0%)
Married	5(50.0%)
Divorced	1(10.0%)
Child Status	
Has children	5(50.0%)
Does not have children	2(20.0%)
Number of Traumatic Events Endorsed	8.75(4.06)
1	0(0.0%)
2	1(10.0%)
3	0(0.0%)
4+	7(70.0%)

Note. $N=8$. M=mean; SD=standard deviation; % = % of total sample of 8 participants

Data analytic plan

Statistical analyses were performed using IBM SPSS version 28. Due to sample size, only descriptive statistics and score change from pre- to post-intervention and follow-up was calculated for all measures. Clinically meaningful change from pre- to post-intervention and pre-treatment to follow-up was calculated as reduction of ≥ 9 points on PCL-5 [22].

Results

Participants

The results describe the 8 participants who completed at least one ACT group session across the two cohorts. The average age of participants was 30.13 years of age ($SD = 1.8$) and the majority of participants were White, non-Latina women with some graduate college education. Most participants attended some or graduated college and half of the participants were employed full time. Five participants had children (all participant information in Table 1). The median number of lifetime traumatic events was 6.5 (range 1–16). The most common trauma exposure type was interpersonal or assault with a weapon. Additionally, four participants endorsed a traumatic birth experience (for all trauma type information, see Appendix B).

Feasibility

The overall proportion of patients who met eligibility criteria and consented to participate compared to those that engaged in at least one session was 61.5%. However, 80% of participants that consented and completed baseline assessments ultimately engaged in the intervention. Patients who were eligible but not yet consented or those who did not attend the first session were contacted multiple times by phone, email, and/or text. The participants that could not be reached to consent or re-engage did not follow up with study staff. Thus, we were unable to determine barriers to engaging in the ACT group. Once engaged, most participants attended most sessions; seven of eight (87.5%) participants attended ≥ 75% of intervention sessions and 4 (50%) participants completed every session. All eight participants (100%) completed the follow-up assessment measures.

Acceptability

Participants reported on various facets of acceptability with the ACT group (for individual participant comments, see Table 2). On average, participants reported that they agreed at least somewhat with the following

Table 2 *Participant feedback*

Question	Comments
What aspects of the group did you find helpful?	• "The review of techniques and hearing others share similar struggles was nice." • "Recognizing the different behaviors." • "Just knowing everyone was going through something and that I could just let my guard down and not rethink what I'm going to say." • "The breathing exercises."
What aspects of the group did you find unhelpful or less helpful?	• "The group aspect. It was great and would be beneficial to someone else, but group therapy makes me too hyper aware, and comparison kicks it. For me it does more harm than good. But it is a great resource, and I would absolutely recommend it to anyone else. It's a me not you kind of thing."
Since participating in the group, what ways do you feel like you have changed your behavior or respond differently?	• "I try to passively notice the emotions instead of feeling I have to engage with them." • "I am able to stop and reflect when I recognize behaviors that take me away from my values or what I want to spend my energy on." • "I think about my values more and how actions that align with those values would lead me towards the person I want to be and the life I want to live." • "Remembering stress or our thoughts don't control me"

Note. Comments were derived from the post-intervention assessment

statements: they were satisfied with the group ($M = 5.00$, $SD = 1.55$); participating in the group was a good use of their time ($M = 5.17$, $SD = 1.60$); they were better able to respond to PTSD symptoms in an effective way ($M = 4.67$, $SD = 1.51$); they were more likely to consider their values ($M = 5.00$, $SD = 0.63$); they changed their behavior based on what they learned ($M = 3.33$, $SD = 1.75$); and they would recommend the group to another individual struggling with PTSD (M = 5.50, $SD = 0.55$). The only statement there was not agreement on was "4 sessions was too short for this group", suggesting that some participants wished for a longer or more comprehensive intervention.

Preliminary efficacy

All means, standard deviations, and effect sizes for all time points along with individual participant's scores can be found in Table 3. Between the eligibility interview and the baseline assessment, one of the eight participants exhibited reduced PTSD symptom severity to subthreshold scores (< 33 on the PCL-5). On average, participants showed reduction in PTSD symptoms from baseline ($M = 46.25$, $SD = 24.04$) to post-intervention ($M = 27.33$, SD = 22.35, $d = 0.82$) and to follow-up ($M = 34.25$, $SD = 31.58$, $d = 0.43$). At post-intervention, 5 participants endorsed clinically meaningful reductions of PTSD symptoms (≥ 9 points on PCL-5). There were 4 participants who no longer met criteria for PTSD (< score of 33; range: 5–32) and 1 participant scored above clinical threshold but had an 18-point decrease from baseline. One participant endorsed a 4-point increase, and 2 participants did not complete the assessment.

At the 1-month follow-up, there were 6 participants whose scores decreased from baseline; 4 of the 6 participants no longer met criteria for PTSD. There were 2 participants that had increased scores. Participant #3 only completed two group sessions and endorsed PTSD symptoms in a wide range of severity across the intervention (scores ranged from 39 to 76). Participant #1 endorsed consistently high scores throughout weekly symptom measures and assessments (scores 32–49), with a particularly high score at the 1-month follow-up. Change in PTSD symptoms can be seen in Fig. 2.

Discussion

This study demonstrated the feasibility, acceptability, and preliminary efficacy of a four-week group ACT intervention for trauma-exposed reproductive aged women with PTSD, consistent with the literature demonstrating the potential of ACT in targeting PTSD symptom reduction, including in groups [14, 23]. There often is not a focus on reducing PTSD in individuals who may become pregnant soon or again. Creating a continuum of care for individuals who have PTSD and may enter the perinatal period could be a vital step forward to improving the downstream health of mothers, children, and families. Our study demonstrated acceptability with a brief,

Table 3 *PTSD symptoms as measured by the PCL-5 across time*

	Baseline	Post-Treatment	Follow-Up	Week 1	Week 2	Week 3	Week 4
Participant #1	45.00	49.00	80.00	38.00	43.00	32.00	38.00
Participant #2	75.00	57.00	50.00	63.00	55.00	62.00	61.00
Participant #3	56.00		76.00		72.00	39.00	
Participant #4	62.00	5.00	11.00	3.00	3.00	1.00	4.00
Participant #5	52.00	16.00	10.00	19.00	35.00	23.00	27.00
Participant #6	68.00	32.00	37.00	57.00	45.00	44.00	33.00
Participant #7	18.00		10.00	9.00	7.00	8.00	12.00
Participant #8	52.00	5.00	0.00	17.00	17.00	9.00	1.00

All participants 53.50 (17.27) 27.33 (22.35) 34.25 (31.58) 29.43(23.59) 34.63(24.10) 27.25(20.91) 25.14 (21.29)

(M/SD)

Note. PCL-5=PTSD Checklist-5; M = mean; SD = standard deviation. N = 8 for Baseline, Follow-Up, Week 2, and Week 3. N = 6 for Post-Tx, N = 7 for Week 1 and Week 4.

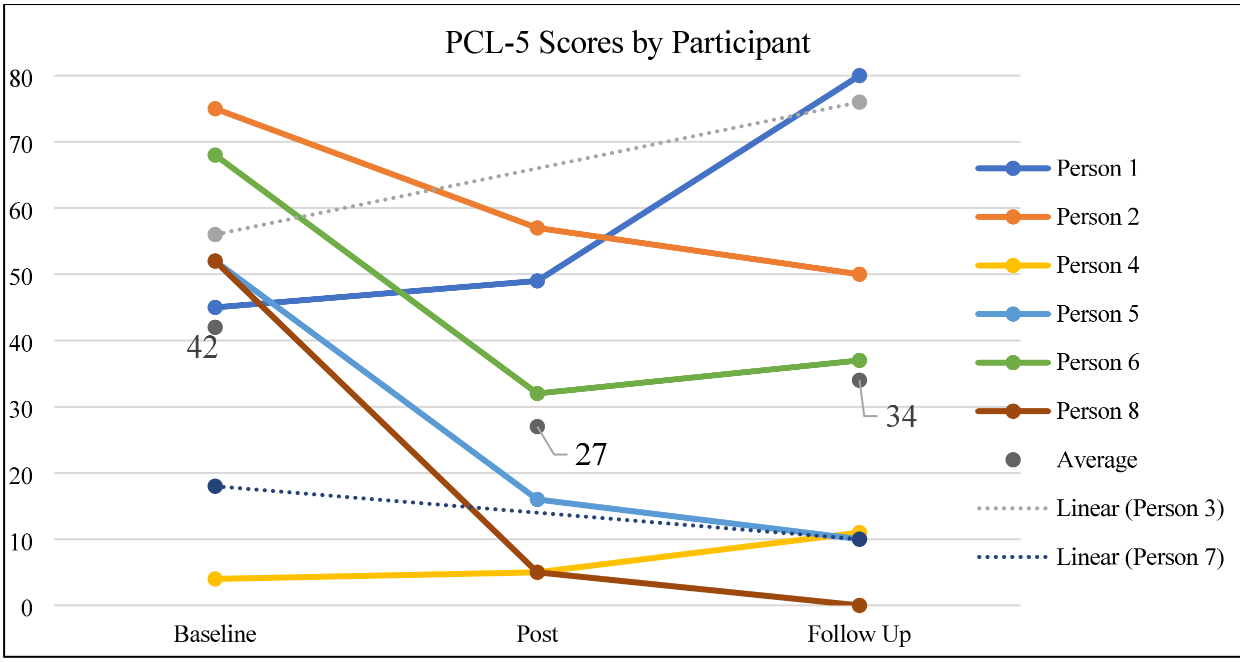

Fig. 2 PTSD Symptoms Across Timepoints
This figure demonstrates individual participant's PTSD Checklist-5 (PCL-5) scores as well as the trend in average PCL-5 scores across all three timepoints: baseline, post-intervention, and one-month post-intervention. Linear lines were added for participants # 3 and #7 to indicate their trend as they did not fill out the post-treatment assessment but did complete the one-month follow-up assessment

virtual group protocol, which can increase access and reduce subject burden compared to in-person groups and increase the number of individuals seen at once [24]. Participants reported enjoying the group aspect specifically, noting that it was helpful to see others experience the same struggles and then learn skills together. This feedback speaks to the need to offer more group-based, trauma-informed resources for reproductive-aged individuals with PTSD.

There were high levels of trauma exposure and accompanying distress in our sample. Participants endorsed more than eight lifetime trauma exposures on average. All participants endorsed a history of physical assault and all but one endorsed a history of sexual assault, in addition to experiencing other types of traumas. Treatment engagement can be difficult in highly traumatized populations [25]; there are often high levels of avoidance, even when there is strong motivation to improve PTSD symptoms. While we were unable to assess full trauma histories on individuals who choose not to participate, only about 60% of eligible individuals (who met criteria for PTSD) choose to participate. Given our participants' collective trauma history, those who were eligible but choose to not participate may also have had robust trauma histories and accompanying distress. Our protocol directly targets reducing avoidance behaviors, which participants may not have been willing to engage in, even after reviewing informed consent. From a feasibility standpoint, we are missing a large group of individuals who could benefit from a brief PTSD intervention without fully understanding the barriers to participation. Future research needs to continue to focus on how to engage the highly traumatized, which this study demonstrates includes individuals in the preconception period.

Additionally, even some individuals who did participate could have benefited from more care beyond this brief protocol. Some participants agreed that "4 sessions were too short" and two participants endorsed elevated PTSD scores from baseline to follow-up. These scores indicate that a brief trauma-informed group intervention may not be sufficient to reduce PTSD symptoms for every patient, especially if there are ongoing traumatic stressors that lead to heightened distress across time. While this intervention is a start to increasing preconception care options for reproductive-aged individuals with PTSD, future research needs to identify who may benefit from a brief virtual protocol and who may benefit from more comprehensive care.

Limitations

First, the small sample size limits generalizability and statistical power; a much larger sample size is needed to replicate findings now that acceptability, feasibility, and preliminary efficacy have been established and reduce the potential for Type II errors. Secondly, our broad definition of the preconception period focused mostly on the reproductive-age criteria. We did not assess how soon participants were interested in becoming pregnant or if they were actively trying to become pregnant. Future research should target individuals who are considering or are actively trying to become pregnant to determine if the results are similar to our findings. Lastly, our sample was primarily White, non-Latina, married women. Future research should explore with a more diverse sample to determine if there are changes to the acceptability, feasibility, or efficacy of the intervention.

Conclusions

Posttraumatic stress disorder symptoms can have adverse effects on individuals, their children, and the whole family. This brief ACT group protocol was found to be acceptable and feasible to treatment-seeking reproductive-aged individuals. Future research should implement PTSD interventions with individuals actively trying to become pregnant to determine how reduction of PTSD symptoms before entering the perinatal period could improve maternal and infant outcomes.

Appendix A

ACT Group Protocol

A 4-week group protocol was created that utilized existing ACT resources, tailored for reproductive-aged individuals with PTSD. ACT focuses on experiential avoidance, or an individual's unwillingness be present with bodily sensations, emotions, thoughts, and/or memories, leading them to alter the form, frequency, or intensity of these experiences [26]. Subsequently, ACT conceptualizes experiential avoidance as the primary maintaining force for posttraumatic symptoms and aims to treat PTSD through increasing experiential acceptance and psychological flexibility [15]. Rather than challenging and modifying negative trauma-related cognitions, ACT uses one of its core processes, diffusion, to help individuals change the function of their thoughts, thereby seeing them as internal stimuli to be noticed rather than reacted to [27].

Considerations include group discussions centered on children, pregnancies, and partnerships, as well as discussions specifically on how trauma affected life domains. There was minimal variation between cohorts, with variation seen only in ordering in the session or choice of exercise to illustrate the skill. Psychoeducation on mindfulness was provided in the first session. Each session started with a mindfulness activity and ended with an assignment to practice the skills reviewed. Psychoeducation on how to use each skill to reduce PTSD symptoms was introduced and specific experiential activities were conducted at each session [28, 29]. Group sessions were led virtually by a clinical psychologist and co-facilitated by clinical psychology internship and/or practicum students.

Session 1. Introductions and group rules were reviewed. Participants were asked to keep the group material confidential, treat others with respect, and to avoid sharing too much detail of their trauma history to avoid causing distress in other members who may have similar trauma experiences. The ACT Triflex was introduced and used to introduce the themes of the next three sessions, namely *Be Present* (Session 2), *Open Up* (Session 3), and *Do What Matters* (Session 4), respectively. Next, brief psychoeducation on trauma exposure and PTSD was reviewed, including how experiential avoidance can perpetuate symptoms. Then, a creative hopelessness activity (the Choice Point) was introduced as a framework that identified and prioritized value-based activity rather than avoidance behavior, which was created collectively and used throughout the group.

Session 2. This session focused on introducing contact with the present moment and self-as-context skills. Participants completed Dropping Anchor, an activity designed to reduce the impact of difficult thoughts and feelings and help participants to stay in control to act more effectively. These skills were strengthened with more practice in session, including mindfulness of a difficult emotion, to practice being present and stepping back and seeing thoughts as separate from self.

Session 3. This session focused on acceptance and defusion skills. Participants were introduced to the concept of workability of thoughts rather than absolute truths (e.g., "What happens if you believe that negative thought? How will you behave?") as well as willingness to experience difficult internal imagery rather than attempt to get rid of them. Several defusion techniques were discussed and practiced, including Leaves on the Stream and saying a word until it became meaningless ("milk") and then practicing with a judgment word (e.g., "worthless").

Session 4. This session focused on values and committed action. A values clarification exercise was conducted (Big Life, Small Life, review of Choice Point) and then an experiential exercise focused on the feeling of pursuing values (Moment of Sweetness) or the cost of not pursuing values (Lost Values). This was followed by an explanation of committed action and introduction to SMART goals, along with a discussion of how to approach barriers to pursuing value-based action by using new ACT skills (e.g., mindfulness, defusion, acceptance). The group ended with all participants "standing and committing" to value-based action, even in the face of difficult thoughts and emotions.

Appendix B

Frequency of Traumatic Events

Type of Event	Frequency
Natural Disaster	4(50.0%)
Fire or Explosion	1(12.5%)
Serious Accident at Work or Home During Recreational Activity	2(25.0%)
Exposure to Toxic Substance	2(25.0%)
Transportation Accident	6(75.0%)
Physical Assault	*8(100.0%)*
Assault with a Weapon	*6(75.0%)*
Sexual Assault	*7(87.5%)*
Other Unwanted Uncomfortable Sexual Experience	*5(62.5%)*
Combat or Exposure to War-Zone	*1(12.5%)*
Captivity	*2(20.0%)*
Life-Threatening Illness or Injury	4(50.0%)
Severe Human Suffering	1(12.5%)
Sudden Violent Death	5(62.5%)
Sudden Accidental Death	6(75.0%)
Serious Injury, Harm or Death You Caused to Someone Else	4(50.0%)
Any Other Very Stressful Event or Experience	5(50.0%)

Note. $N=8$. % = % of sample who endorsed traumatic events on the Life Event Checklist.

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Author contributions
MLM designed the study, wrote the protocol, and conducted statistical analyses. LJJ helped conduct the study and assisted with statistical analyses. LD conducted literature searches, wrote the Introduction, and provided substantial edits to all drafts of the manuscript. MJW helped to administer the study and composed the Methods section. MLM wrote the first draft of the manuscript, and all authors contributed to and have approved the final manuscript.

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Data availability
Deidentified data and materials are available upon reasonable request from corresponding author.

Declarations

Ethics approval and consent to participate
This study was approved by the University's Institutional Review Board (#10245, received 3/23/2021). All study procedures were performed in compliance with relevant laws and institutional guidelines and regulations for human research. Informed consent was obtained from each participant. All effort was taken to ensure the privacy of each participant.

Consent for publication
Not applicable.

Competing interests
The corresponding author is an Associate Editor for the journal. All other authors declare that they have no conflicts of interest.

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