Trauma informed interventions: A systematic review

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Abstract

Background
Health inequities remain a public health concern. Chronic adversity such as discrimination or racism as trauma may perpetuate health inequities in marginalized populations. There is a growing body of the literature on trauma informed and culturally competent care as essential elements of promoting health equity, yet no prior review has systematically addressed trauma informed interventions. The purpose of this study was to appraise the types, setting, scope, and delivery of trauma informed interventions and associated outcomes.

Methods
We performed database searches—PubMed, Embase, CINAHL, SCOPUS and PsycINFO—to identify quantitative studies published in English before June 2019. Thirty-two unique studies with one companion article met the eligibility criteria.

Results
More than half of the 32 studies were randomized controlled trials (n = 19). Thirteen studies were conducted in the United States. Child abuse, domestic violence, or sexual assault were the most common types of trauma addressed (n = 16). While the interventions were largely focused on reducing symptoms of post-traumatic stress disorder (PTSD) (n = 23), depression (n = 16), or anxiety (n = 10), trauma informed interventions were mostly delivered in an outpatient setting (n = 20) by medical professionals (n = 21). Two most frequently used interventions were eye movement desensitization and reprocessing (n = 6) and cognitive behavioral therapy (n = 5). Intervention fidelity was addressed in 16 studies. Trauma informed interventions significantly reduced PTSD symptoms in 11 of 23 studies. Fifteen studies found improvements in three main psychological outcomes including PTSD symptoms (11 of 23), depression (9 of 16), and anxiety (5 of 10). Cognitive behavioral therapy
consistently improved a wide range of outcomes including depression, anxiety, emotional
dysregulation, interpersonal problems, and risky behaviors (n = 5).

Conclusions

There is inconsistent evidence to support trauma informed interventions as an effective
approach for psychological outcomes. Future trauma informed intervention should be
expanded in scope to address a wide range of trauma types such as racism and discrimina-
tion. Additionally, a wider range of trauma outcomes should be studied.

Background

Despite the United States’ commitment to health equity, health inequities remain a pressing
concern among some of the nation’s marginalized populations, such as racial/ethnic or gender
minority populations. For example, according to the 2016 National Health and Nutrition
Examination Survey (NHANES), 29.1% of Mexican Americans and 24.3% of African Ameri-
cans with diabetes had hemoglobin A1C greater than 9% (the gold standard of glucose control
with levels ≤7% deemed adequate), compared to 11% in non-Hispanic whites [1]. The 2016
survey also revealed that 40.9% and 41.5% of Mexican Americans and African Americans with
hypertension, respectively, had their blood pressure under control, compared to 51.7% in non-
Hispanic whites. In 2014, 83% of all new diagnoses of HIV infection in the United States
occurred among gay, bisexual, and other men who have sex with men, with African American
men having the highest rates [2].

Several factors have been discussed as root causes of health inequities. For example, Farmer
et al. [3] noted structural violence—the disadvantage and suffering that stems from the cre-
tion and perpetuation of structures, policies and institutional practices that are innately unjust
—as a major determinant of health inequities. According to Farmer et al., because systemic
exclusion and disadvantage are built into everyday social patterns and institutional processes,
structural violence creates the conditions which sustain the proliferation of health and social
inequities. For example, a recent analysis [4] using a sample including 4,515 National Health
and Nutrition Examination Survey participants between 35 and 64 years of age revealed that
black men and women had fewer years of education, were less likely to have health insurance,
and had higher allostatic load (i.e., accumulation of physiological perturbations as a result of
repeated or chronic stressors such as daily racial discrimination) compared to white men (2.5
vs 2.1, p < .01) and women (2.6 vs 1.9, p < .01). In the analysis, allostatic load burden was associ-
ated with higher cardiovascular and diabetes-related mortality among blacks, independent of
socioeconomic status and health behaviors.

Browne et al. [5] identified essential elements of promoting health equity in marginalized
populations such as trauma-informed and culturally competent care. In particular, trauma-
informing care is increasingly getting closer attention and has been studied in a variety of con-
texts such as addiction treatment [6–8] and inpatient psychiatric care [9]. While there is a
growing body of the literature on trauma-informed care, no prior review has systematically
addressed trauma-informed interventions; one published review of literature [10] limited its
scope to trauma survivors in physical healthcare settings. As such, the purpose of this paper is
to conduct a systematic review and synthesize evidence on trauma-informed interventions.

For the purpose of this paper, we defined trauma as physical and psychological experiences
that are distressing, emotionally painful, and stressful and can result from “an event, series of
events, or set of circumstances” such as a natural disaster, physical or sexual abuse, or chronic

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adversity (e.g., discrimination, racism, oppression, poverty) [11,12]. We aim to: 1) describe the types, setting, scope, and delivery of trauma informed interventions and 2) evaluate the study findings on outcomes in association with trauma informed interventions in order to identify gaps and areas for future research.

Methods

Five electronic databases—PubMed, Embase, Cumulative Index to Nursing and Allied Health Literature (CINAHL), SCOPUS and PsycINFO—were searched from the inception of the databases to identify relevant quantitative studies published in English. The initial literature search was conducted in January 2018 and updated in June 2019 using the same search strategy.

Review design

We conducted a systematic review of quantitative evidence to evaluate the effects of trauma informed interventions. Due to heterogeneity relative to study outcomes, designs, and statistical analyses approaches among the included studies, we qualitatively synthesized the study findings. Three trained research assistants extracted study data. Specifically, we used the PICO framework to extract and organize key study information. The PICO framework offers a structure to address the following questions for study evidence [13]: Patient problem or population (i.e., patient characteristics or condition); Intervention (type of intervention tested or implemented); Comparison or control (comparison treatment or control condition, if any), and Outcome (effects resulting from the intervention).

Eligibility

Inclusion criteria. Articles were screened for their relevance to the purpose of the review. Articles were included in this review if the study was: about trauma informed approach (i.e., an approach to address the needs of people who have experienced trauma) or an aspect of this approach, published in English language and involved participants who were 18 years and older. Also, only quantitative studies conducted within a primary care or community setting were included.

Exclusion criteria. Exclusion criteria were: studies in or with military populations, refugee or war-related trauma populations, studies with mental health experts and clinicians as research subjects or studies of incarcerated and inpatient populations. Conference abstracts that had limited information on study characteristics were also excluded.

Search strategy and selection of studies

Search strategy. Following consultation with a health science librarian, peer-reviewed articles were searched in PubMed, Embase, CINAHL, SCOPUS and PsycINFO using MeSH and Boolean search techniques. Search terms included: “trauma focused” OR “trauma-focused” OR “trauma informed” OR “trauma-informed.” We also searched for the term trauma within three words of informed or focus ((trauma W/3 informed) OR (trauma W/3 focused), or (traumaN3 (focused OR informed)). Detailed search terms for each database are provided in Appendix 1.

Study selection. The initial electronic search yielded 7,760 references and the follow-up search yielded 5,207 which were all imported into the Covidence software for screening [14]. Screening of the references was conducted by 2 independent reviewers and disagreements were resolved through consensus. There were 4,103 duplicates removed from the imported
articles and 8,864 studies were forwarded to the title and abstract screening stage. Eight thousand five hundred and twenty-one studies were excluded because they were irrelevant. Three hundred and forty-three abstracts were identified to be read fully. Following this, 311 articles were excluded for focusing on other psychological conditions (n = 120), were non-experimental studies (n = 78) and were in inpatient or incarcerated populations (n = 46). One additional companion article was identified during full text review. Therefore, thirty-three articles met the inclusion criteria and are reported in this review. Fig 1 provides details of the selection process and identifies the reasons why articles were excluded at each stage.

Quality assessment

We used the Joanna Briggs Institute quality appraisal tools [15] for randomized controlled trials (RCTs), quasi-experimental studies, and retrospective studies to assess the rigor of each study included in this review. The Joanna Briggs Institute quality appraisal tools [15] include items asking about methodological elements that are critical to the rigor of each type of study designs. In particular, one of the items for RCTs addresses participant blinding to treatment assignment. Due to the nature of trauma-informed interventions included in our review, it was decided that participant blinding is not relevant and hence was removed from the appraisal list for RCTs. No studies were excluded on the basis of the quality assessment. The quality assessment process was conducted independently by two raters. Inter-rater agreement rates ranged from 56% to 100% with the resulting statistic indicating substantial agreement (average inter-rater agreement rate = 77%). Discrepancies between raters were resolved via inter-rater discussion.

Results

Overview of studies

Table 1 summarizes the main characteristics of the 32 unique studies included in the review, with one companion article [16] for a study which was later reported with a more thorough examination of findings [17] totaling 33 articles. More than half (n = 19) of the 32 studies were RCTs [17–35] whereas twelve studies were quasi-experimental [36–47] and one was retrospective study [48]. Thirteen studies were conducted in the U.S. [17–19,22,26,27,29,35,39–41,45,47]; five in the Netherlands [30,31,33,38,48]; three in Canada [23,25,46]; two in Australia [21,24]; two in the United Kingdom [36,44]; two in Sweden [42,43]; on study in Chile [20]; Iran [32]; Haiti [37]; South Africa [34]; and Germany [28]. Fourteen of the studies only included females in their sample [18,20,21,23–25,27,28,38–41,45,48]. The average sample size was 78 participants, with a range from 10 participants [38] to 297 participants [48]. Of the studies included, 67% had a sample size above 50 [18–22,26,29–34,36,37,39–42,46–48].

The studies included in this review recruited their study populations largely based on the type of trauma they were aiming to address, such as individuals that experienced interpersonal traumatic event such as child abuse, sexual assault, or domestic violence [16–18,20–22,24–26,35,40–43,45,46], individuals with substance abuse disorders [19,47,48], couples experiencing clinically significant marital issues [23], individuals with limb amputations [38], dental phobia [28], or fire service personnel suffering from post-traumatic stress disorder [44].

Trauma was self-reported in eight articles [16,17,20,21,23–25,27,28,38–41,45,48]. In contrast, nine studies clearly identified a measurement of trauma; the Trauma History Questionnaire [19,45], the Childhood Trauma Questionnaire [23,25], the Childhood Maltreatment Interview Schedule [23], the Revised Conflict Tactics Scale adapted for sex work [39], the Traumatic Events Screening Instrument for Adults [27], the Life Events Checklist [46], and the Adverse Childhood Experiences [18]. Two studies used a clinical tool (e.g. eye movement desensitization and
reprocessing [38] and Diagnostic and Statistical Manual of Mental Disorders, 4th edition [41] to identify or diagnose trauma. Fifteen studies did not include direct measurements for trauma [21,24,28–33,36,37,40,42–44,48].

Quality ratings

Tables 2–4 shows final scores of quality assessment. Quality of the 32 unique studies included in this review varied across individual studies. Twelve of 19 RCTs included in the review were of high quality (i.e., 9 to 11) [17,18,20,21,24,26,28,29,31,33–35] and six were of medium quality (i.e., 5 to 8) [19,22,23,25,27,30]. One study scored 4 of 12 [32]. The low rating study [32] lacked
Table 1. Characteristics of the studies included in the review.

| First author (yr) [ref] [country] | Purpose | Research design/Data points | Sample | Measurement of Trauma | Main outcomes/Measures |
|---------------------------------|---------|-----------------------------|--------|-----------------------|------------------------|
| Beaumont (2016) [44] / United Kingdom | Investigate the effectiveness of using compassion focused therapy in reducing symptoms of PTSD, anxiety, and depression and increasing self-compassion in fire service personnel | Quasi experimental, a 2×2 mixed-group design with repeated measures/Pre and post intervention | Fire service personnel suffering from PTSD (N = 17; 29% female) | Not directly measured | PTSD symptoms, self-compassion, anxiety and depression/Impact of Events Scale, Self-Compassion Scale–Short Form, Hospital Anxiety and Depression Scale |
| Booshehri (2018) [18] / United States | Test effectiveness of financial empowerment combined with trauma-informed peer support against standard Temporary Assistance for Needy Families (TANF) programming | RCT/Baseline and follow-up surveys every 3 months over 15 months | Primary caregivers of young children (<6 yrs) and receiving TANF (financial assistance and working at least 20 hours weekly) (N = 103) | Adverse Childhood Experiences and community violence | Family behavioral health, depression, self-efficacy, child’s developmental risks, economic hardship, labor market outcomes/Center for Epidemiological Studies—Depression scale, General Self-Efficacy, Parent’s Evaluation of Developmental Status Scale, US Household Food Security Survey Module, Self-reported employment status and hourly earnings |
| Bowland (2012) [35] / United States | Evaluate the effectiveness of an 11-session, spiritually focused group intervention with older women survivors of interpersonal trauma | RCT/Baseline, at the end of the 11-week intervention, and 3-month follow up | Females age of 55 and older (N = 43) | Self-reported history of ≥ 1 interpersonal traumatic event (child abuse, sexual assault, or domestic violence) | PTSD symptoms, depression, anxiety, somatic symptoms/Posttraumatic Stress Diagnostic Scale, Geriatric Depression Scale, Beck Anxiety Inventory, Patient Health Questionnaire |
| Bryant (2008) [21] / Australia | Determine the efficacy of exposure therapy or trauma-focused cognitive restructuring in preventing chronic PTSD relative to a wait-list control group | RCT/Baseline, immediately post-intervention and 6 months | Trauma survivors (non-sexual or vehicle) meeting diagnostic criteria for Acute Stress Disorder (N = 90) | Not directly measured | Symptoms of acute stress disorder, PTSD, and other psychopathological assessments/Acute Stress Disorder Interview, Clinician-Administered PTSD Checklist—Specific, Sexual Experiences Survey, Drug and Alcohol Use Interview, and Sexual Risk Behavior Assessment Schedule, Inventory of Interpersonal Problems-32, Trauma Symptom Inventory, Beck Depression Inventory, Impact of Event Scale, Posttraumatic Cognition Inventory |
| Classen (2011) [26] / United States | Compare trauma-focused group psychotherapy with present focused group psychotherapy and a waitlist condition | RCT/Baseline, immediately post-intervention and 6 months | Females with PTSD as a result of childhood sexual abuse (N = 166) | ≥ 1 explicit memory of childhood sexual abuse involving genital or anal contact between ages 4-17 | PTSD symptoms, total HIV risk, sexual victimization experiences, interpersonal problems/PTSD Checklist—Specific, Sexual Experiences Survey, Drug and Alcohol Use Interview, and Sexual Risk Behavior Assessment Schedule, Inventory of Interpersonal Problems-32, Trauma Symptom Inventory, Posttraumatic Growth Inventory |
| Dalton (2013) [23] / Canada | Examine the impact of emotionally focused therapy on relationship distress in couples in which the female partner had a history of childhood abuse | RCT/Pre and post intervention | Heterosexual couples experiencing clinically significant marital stress (N = 32) | Childhood Trauma Questionnaire, Childhood Maltreatment Interview Schedule | Relationship satisfaction, Therapeutic alliance, Trauma symptoms, childhood trauma symptoms, PTSD symptoms, dissociative experiences/Dyadic Adjustment Scale, Couple Therapeutic Alliance Scale, Childhood Trauma Questionnaire, Childhood Maltreatment Interview Schedule, Trauma Symptom Inventory, Dissociative Experience Scale, Couple Therapeutic Alliance Scale |

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| 1<sup>st</sup> author (yr) [ref]/country | Purpose | Research design/Data points | Sample | Measurement of Trauma | Main outcomes/Measures |
|-------------------------------------|---------|----------------------------|--------|-----------------------|------------------------|
| D’Andrea (2012)[45]/United States  | Examine the relationship between trauma-focused psychotherapy processes in real-world therapies with complex trauma survivors | Quasi experimental/Pre and post intervention | Females with intimate partner violence (IPV) (N = 27) | Trauma History Questionnaire | PTSD symptoms, dissociative experiences, psychological symptoms, general psychiatric distress/Brief Symptom Inventory, Dissociative Experiences Scale, PTSD Checklist, Trauma History Questionnaire, Psychotherapy Process Q set, respiratory sinus arrhythmia, Skin conductance level |
| Decker (2017) [40]/United States   | Describe the impact of a brief, trauma-informed, universal IPV and reproductive coercion assessment and education | Quasi-experimental single group/Baseline, 3 months post-intervention | Females aged 18-36 who had suffered from partner violence (N = 132) | Not directly measured | Interpersonal violence and reproductive coercion/Questions from previous family planning clinic-based studies (Revised Conflict Tactics Scale 2, Perception of Abuse), reproductive coercion measured by 10 questions |
| Decker (2017) [39]/United States   | Develop and test a trauma-informed intervention to improve safety and reduce HIV among female sex workers | Quasi-experimental, single group/Baseline, and 10-12 week follow up | Female sex workers (traded sex for drugs, money, or other resources in the past 3 months; N = 60) | Revised Conflict Tactics Scale adapted for sex work | Depressive symptoms, PTSD symptoms, harm reduction/Revised Conflict Tactics Scale, Sex Work-specific Rape Myths Scale, Sex Work Safety Behavior Scale, Condom Confidence scale, Center for Epidemiologic Studies Depression Scale, PTSD Checklist |
| de Roos (2010)[38]/Netherlands      | Test the effectiveness of a trauma focused psychological approach in the treatment of chronic phantom limb pain using a standardized EMDR protocol | Quasi-experimental/2 weeks before and after intervention, 3 mo after intervention and long-term (mean time: 2.8 years) | Individuals with limb amputation from accidents, cancer, medical failures or complex regional pain syndrome (N = 10; 60% female) | EMDR assessment to identify target traumatic memory | Pain intensity, psychological distress, fatigue, PTSD symptoms, health related quality of life/Pain intensity diary, Symptom Checklist 90, Checklist Individual Strength-Revised, Impact of Events Scale and Self-Inventory List, Short Form-36 Health Survey |
| Doering (2013)[28]/Germany         | Investigate the effectiveness of EMDR treatment on reducing dental phobia | RCT/Baseline, 4 weeks, 3 months, and 1 year | Individuals diagnosed with dental phobia (N = 31) | Not directly measured | Dental stress and anxiety/Dental Anxiety Scale, Dental Fear Survey |
| Dutton (2016) [41]/United States   | Examine differential response trajectories to trauma-related imaginal exposure as a function of affective lability | Quasi-experimental/During sessions | Females with sexual victimization (N = 72) | Sexual victimization that satisfied the definition of a traumatic event as specified in DSM–IV–TR | PTSD symptoms/Clinician-administered PTSD scale, Responses to script-driven imagery scale, Affec Lability Scale-18 |
| Ford (2018) [27]/United States     | Test an emotion enhancement to cognitive therapy TARGET (Trauma Affect Regulation: Guide for Education and Therapy) | RCT/Baseline, immediately post-intervention and 1 month follow up | College student problem drinkers and had a history of traumatic childhood stressor or trauma (N = 29) | Traumatic Events Screening Instrument for Adults | Alcohol use and abuse, PTSD, therapy expectancy and working alliance/Global Assessment of Individual Needs-Short Screen alcohol use subscales, Negative Mood Regulation Scale, Stress Reactions Checklist for disorders of extreme stress, PTSD checklist, Expectancy of therapeutic outcome, Brief Working Alliance Inventory |

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Table 1. (Continued)

| First author (yr) [ref/country] | Purpose | Research design/Data points | Sample | Measurement of Trauma | Main outcomes/Measures |
|-------------------------------|---------|-----------------------------|--------|----------------------|------------------------|
| Gawande (2019)[29]/United States | Determine if Mindfulness Training for Primary Care impact health behavior change for primary care patients randomized versus a low-dose comparator | RCT/Baseline, 8-week and 24-week follow up | Individuals with a DSM-V diagnosis (N = 136) | Not directly measured | Behavior change related to self-management of health, anxiety and depressive symptoms, stress, self-emotional regulation, interoceptive awareness, mindfulness, self-compassion/ Self-reported level of action plan initiation, Patient-Reported Outcomes Information System (PROMIS) Anxiety and Depression short forms, Perceived Stress Scale, Difficulties in Emotional Regulation Scale, Multidimensional Assessment of Interceptive Awareness, Five-Facet Mindfulness Questionnaire, Self-Compassion Scale short form, Self-Efficacy for Chronic Disease, Perceived Control Questionnaire |
| Ginzburg (2009)[22]/United States | Evaluate the effectiveness of group psychotherapy in reducing levels of shame and guilt in adult survivors of childhood sexual abuse at risk for HIV | RCT/Baseline, immediately post-intervention, 6 mo post intervention | Females that experienced childhood sexual abuse between (N = 166; 100% female) | Self-report of ≥ 2 explicit memories of sexual abuse involving genital contact between age 4 - 15 | Guilt, shame, PTSD/Guilt Subscale of the Abuse-Related Beliefs Questionnaire, Shame Subscale of the Abuse-Related Beliefs Questionnaire, Posttraumatic Stress Disorder Checklist |
| James (2013)[37]/Haiti | Evaluate an evidence-based culturally appropriate lay-person intervention for PTSD experienced by post-Haiti earthquake victims | Quasi-experimental/Pre and post-test | Individuals with PTSD from the 2010 Haitian earthquake (N = 60; 73% female) | Not directly measured | PTSD symptoms, compassion fatigue, posttraumatic growth/ Harvard Trauma Questionnaire, Professional Quality of Life Scale, Posttraumatic Growth Inventory |
| Kelly (2015)[16]; (2016)[17]/United States | Evaluate a trauma-informed model of mindfulness-based stress reduction as a phase I trauma intervention for female survivors of IPV | RCT/Baseline and post-intervention | Female IPV survivors (N = 45) | Self-reported history of IPV (physical or sexual abuse) | PTSD symptoms, depressive symptoms, attachment patterns/ Post-Traumatic Stress Disorder Checklist-Civilian Version, Beck Depression Inventory, Relationship Structures Questionnaire |
| Lundqvist (2006)[42]/Sweden | Compare psychological symptoms, symptoms for PTSD, and the sense of coherence across three groups | Quasi-experimental with 3 arms (long-term group therapy, wait list, and short-term group)/Baseline, 12 months (for psychological symptoms and sense of coherence), 2 years after treatment (for inpatient days and sick listing days) | 100% Swedish female who were sexually abused in childhood (N = 77; n = 45 for long-term therapy group, n = 10 for wait list group, and n = 22 for short-term therapy group) | Not directly measured | Symptoms of PTSD, psychological symptoms, current psychological health, life attitudes in response to stress, sense of coherence and life events./ DSM-IV, Symptom Checklist-90 and Global Severity Index, Sense of Coherence Scale, Life Events Checklist |
| Lundqvist, (2009)[43]/Sweden | Evaluate changes after a two-year-long trauma-focused group therapy program for adult females who had been sexually abused in childhood | Quasi-experimental/Pre and post-test | Female outpatients sexually abused in childhood (N = 45) | Not directly measured | Social interaction, social adjustment, perceived family climate/Interview Schedule of Social Interaction, Social Adjustment scale, Family Climate Test |
| MacIntosh (2018)[46]/Canada | Describe the implementation of the Skills Training in Affective and Interpersonal Regulation | Quasi-experimental/Pre and post intervention | Individuals that experience childhood sexual abuse (N = 85) | Life Events Checklist for trauma history | Emotion regulation, interpersonal problems, PTSD symptoms/Difficulties in Emotion Regulation Scale, Inventory of Interpersonal Problems, ICD-11 Trauma Questionnaire, Life Events Checklist |

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Table 1. (Continued)

| First author (yr) [ref]/country | Purpose | Research design/Data points | Sample | Measurement of Trauma | Main outcomes/Measures |
|----------------------------------|---------|-----------------------------|--------|-----------------------|------------------------|
| Masin-Moyer (2019) [47]/United States | Compare clinical outcomes of a 16-week version of the Trauma Recovery and Empowerment Model (TREM) for women and an attachment-informed adaptation (ATREM) | Quasi-experimental/Pre and post-test | Patients diagnosed with a mental health and/or substance use condition (N = 69; n = 37 in ATREM group, n = 32 in TREM group) | Self-reported history of interpersonal trauma | Group attachment style, perceived social support, difficulty regulating emotions during times of distress, psychological distress related to depression, anxiety, and somatization, PTSD symptoms/Relationship Scale Questionnaire, Social Group Attachment Scale, Social Provisions Scale, Difficulties in Emotional Regulation Scale, Brief Symptom Inventory-18, PTSD Symptom Scale, Addiction Severity Index, Life Stressor Checklist-Revised |
| Matthijssen (2019) [30]/Netherlands | Test if Visual Schema Displacement Therapy is capable of reducing the emotionality and vividness of negative memories | RCT/pre and post intervention | Healthy participants (N = 105; n = 30 in study 1, n = 75 in study 2) | Not directly measured | Emotional disturbances and vividness of traumatic memories/Self-report Subjective Units of Disturbance and vividness of the most disturbing part of the memory |
| Nijdam (2012) [33]/Netherlands | Compare efficacy and response pattern of TF-CBT, brief eclectic psychotherapy for PTSD, with EMDR | RCT/Baseline, weekly at treatment sessions, post-intervention | Individuals 18-65 years with PTSD diagnosis by DSM-IV (N = 70) | Not directly measured | PTSD symptoms, verbal memory, information processing speed, executive functioning/Impact of Event Scale-Revised, Structured Interview for PTSD, California Verbal Learning Test, Rivermead Behavioral Memory Test, Trail Making Test, Stroop Color Word Test |
| Nijdam (2018) [31]/Netherlands | Examine longitudinal changes in neurocognitive functioning before and after trauma-focused psychotherapy | RCT/Assessment before and 17 weeks after start of treatment | Individuals suffering from PTSD (N = 88) | Not directly measured | PTSD symptoms, depressive symptoms, neuropsychological scores/Structured Clinical Interview for DSM-IV, Impact of Event Scale-Revised, California Verbal Learning Test, Paragraph Recall Subtest of the Rivermead Behavioral Memory Test, Trail Making Test, Stroop Color Word Test |
| Nixon (2016) [24]/Australia | Examine the effectiveness of cognitive processing therapy compared with active treatment as usual | RCT/Immediately post-intervention, 3 months, 6 months, and 12 months | Individuals with acute stress disorder that had experienced sexual assault or rape in the past month (N = 47) | Not directly measured | Acute stress disorder and PTSD symptoms/Clinician-Administered PTSD Scale, PTSD Checklist, Posttraumatic Cognitions Inventory, MINI International Neuropsychiatric Interview, Beck Depression Inventory-II, Credibility and Expectancy Questionnaire |
| Noroozi (2018) [32]/Iran | Determine the effectiveness of trauma-based cognitive-behavioral therapy in the treatment of depressed divorced women | Pre/post-test control group/3-month follow up | Females with a history of traumatic event regarding social justice (N = 133) | Not directly measured | Depression symptoms/Beck Depression Inventory |

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| *i*° author (yr) [ref]/country | Purpose | Research design/Data points | Sample | Measurement of Trauma | Main outcomes/Measures |
|-------------------------------|---------|----------------------------|--------|-----------------------|------------------------|
| Paivio (2010) [23]/Canada     | Evaluate and compare emotion-focused therapy for trauma with imaginal confrontation and emotion-focused therapy for trauma with empathic exploration | RCT/Pre-intervention, mid-intervention, post-intervention and follow up | Individuals that experienced emotional, physical, or sexual childhood abuse (N = 45; 53% female) | Childhood Trauma Questionnaire | PTSD symptoms, interpersonal difficulties, anxiety, depression, self-esteem, resolution and discomfort/Impact of Event Scale, State Trait Anxiety Inventory, Beck Depression Inventory-II, Target Complaints (Discomfort) Scale, Rosenberg Self-Esteem Scale, Inventory of Interpersonal Problems, Resolution Scale |
| Sacks (2008) [19]/United States | Evaluate the effectiveness of the three components of the Dual Assessment and Recovery Track program as compared with that of the basic outpatient treatment program | RCT/Baseline, 12 months | Individuals with substance abuse and co-occurring disorders (N = 240) | Trauma History Questionnaire | Substance use, crime, employment, psychological health, trauma, housing, depression, psychological symptoms, community and interpersonal violence, and exposure to trauma/Global Appraisal of Individual Needs (GAIN-Q and GAIN-I), Beck Depression Inventory-II, Brief Symptom Inventory, Trauma History Questionnaire |
| Sikkema (2017)[31]/South Africa | Evaluate feasibility and potential efficacy of the intervention “Improving AIDS Care after Trauma,” a coping intervention for HIV-infected women | RCT/Baseline, 3 months, and 6 months | Females with a diagnosis of HIV, met antiretroviral therapy (ART) initiation criteria and had a history of sexual abuse (N = 64) | Self-reported history of sexual abuse | PTSD symptoms, coping (avoidant, spiritual), adhererence motivation, HIV care management/PTSD CheckList, Life Windows Information-Motivation-Behavioral Skills ART Adherence Questionnaire, HIV Care Engagement survey |
| Vitrul (2009) [20]/Chile       | Examine the effectiveness of a three-month structured outpatient intervention for women with severe depression and childhood trauma | RCT/Baseline, 3 months, 6 months | Females that experience traumatic childhood trauma and have severe depression (N = 87) | Self-reported traumatic experience before age 15; separation from a parent or caregiver, alcohol or drug abuse by family member, physical injury related to punishment, and forced sexual contact | Depressive symptoms, symptoms of PTSD/Hamilton Depression Scale, Composite International Diagnostic Interview-10, Lambert’s Outcome Questionnaire-45.2, Post-traumatic Stress Treatment Outcome scale |
| Nixon (2016) [24]/Australia   | Examine the effectiveness of cognitive processing therapy compared with active treatment as usual | RCT/Immediately post-intervention, 3 months, 6 months, and 12 months | Individuals with acute stress disorder that had experienced sexual assault or rape in the past month (N = 47) | Not directly measured | Acute stress disorder and PTSD symptoms/ Clinician-Administered PTSD Scale, PTSD Checklist, Posttraumatic Cognitions Inventory, MINI International Neuropsychiatric Interview, Beck Depression Inventory-II, Credibility and Expectancy Questionnaire |
| Noroozi (2018)[32]/Iran        | Determine the effectiveness of trauma-based cognitive-behavioral therapy in the treatment of depressed divorced women | Pre/post-test control group/3-month follow up | Females with a history of traumatic event regarding social justice (N = 133) | Not directly measured | Depression symptoms/Beck Depression Inventory |
| Paivio (2010) [23]/Canada      | Evaluate and compare emotion-focused therapy for trauma with imaginal confrontation and emotion-focused therapy for trauma with empathic exploration | RCT/Pre-intervention, mid-intervention, post-intervention and follow up | Individuals that experienced emotional, physical, or sexual childhood abuse (N = 45; 53% female) | Childhood Trauma Questionnaire | PTSD symptoms, interpersonal difficulties, anxiety, depression, self-esteem, resolution and discomfort/Impact of Event Scale, State Trait Anxiety Inventory, Beck Depression Inventory-II, Target Complaints (Discomfort) Scale, Rosenberg Self-Esteem Scale, Inventory of Interpersonal Problems, Resolution Scale |

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relevant information to adequately score its methodological rigor. Most RCTs clearly described randomization, group equivalence at baseline, rates and reasons for attrition, study outcomes, and analysis. Blinding of outcomes assessors to treatment assignment was used and described in several RCTs [17,20,21,24,27,35], whereas blinding of those delivering treatment was discussed clearly in only one study [25]. The majority of the quasi-experimental studies

### Table 1. (Continued)

| 1st author (yr) [ref]/country | Purpose | Research design/Data points | Sample | Measurement of Trauma | Main outcomes/Measures |
|--------------------------------|---------|-----------------------------|--------|-----------------------|------------------------|
| Sacks (2008) [19]/United States | Evaluate the effectiveness of the three components of the Dual Assessment and Recovery Track program as compared with that of the basic outpatient treatment program | RCT/Baseline, 12 months | Individuals with substance abuse and co-occurring disorders (N = 240) | Trauma History Questionnaire | Substance use, crime, employment, psychological health, trauma, housing, depression, psychological symptoms, community and interpersonal violence, and exposure to trauma/Global Appraisal of Individual Needs (GAIN-Q and GAIN-I), Beck Depression Inventory-II, Brief Symptom Inventory, Trauma History Questionnaire |
| Sikkema (2017) [34]/South Africa | Evaluate feasibility and potential efficacy of the intervention 'Improving AIDS Care after Trauma,' a coping intervention for HIV-infected women | RCT/Baseline, 3 months, and 6 months | Females with a diagnosis of HIV, met antiretroviral therapy (ART) initiation criteria and had a history of sexual abuse (N = 64) | Self-reported history of sexual abuse | PTSD symptoms, coping (avoidant, spiritual), adherence motivation, HIV care management/PTSD Checklist, Life Windows Information-Motivation-Behavioral Skills ART Adherence Questionnaire, HIV Care Engagement survey |
| Vitriol (2009) [20]/Chile | Examine the effectiveness of a three-month structured outpatient intervention for women with severe depression and childhood trauma | RCT/Baseline, 3 months, 6 months | Females that experience traumatic childhood trauma and have severe depression (N = 87) | Self-reported traumatic experience before age 15; separation from a parent or caregiver, alcohol or drug abuse by family member, physical injury related to punishment, and forced sexual contact | Depressive symptoms, symptoms of PTSD/Hamilton Depression Scale, Composite International Diagnostic Interview-10, Lambert’s Outcome Questionnaire-45.2, Post-traumatic Stress Treatment Outcome scale |
| Wieferink (2017) [48]/Netherlands | Analyze whether there is a difference in decrease of days of substance use, craving and psychiatric symptoms during subjective units of disturbance treatment between patients with higher or lower levels of PTSD symptoms | Retrospective study/ Baseline, 3 months, 6 months | All participants followed regular substance use disorder treatment (N = 297, 72% male) | Not measured | PTSD symptoms, cravings, depression, anxiety and stress/ Self-Report Inventory for PTSD, Substance Use Inventory, Obsessive Compulsive Drinking Scale, Depression, Anxiety and Stress Scales-21 |

ART: Antiretroviral Therapy.  
ATREM: Attachment-informed adaptation Trauma Recovery and Empowerment Model.  
DSM-IV: Diagnostic and Statistical Manual of Mental Disorders 4th edition.  
EMDR: Eye Movement Desensitization and Reprocessing.  
HIV: Human Immunodeficiency Viruses.  
ICD: International Statistical Classification of Diseases and Related Health Problems.  
IPV: Intimate Partner Violence.  
PTSD: Post-Traumatic Stress Disorder.  
RCT: Randomized Controlled Trial.  
TANF: Temporary Assistance for Needy Families.  
TF-CBT: Trauma-Focused Cognitive Behavioral therapy.  
TREM: Trauma Recovery and Empowerment Model.
were of high quality (i.e., 7 or higher), except two, which scored 2 of 9 [37] and 6 of 9 [39], respectively. Six of twelve quasi-experimental studies [36,41–44,47] had a comparison group to strengthen internal validity of causal inferences by comparing intervention and control groups. Some of these studies, however, noted differences in baseline assessments between groups [36,43,44]. Finally, one retrospective study [48] scored 11 of 11 and hence was rated as high quality.

**Characteristics of trauma-informed interventions**

**Type of intervention.** Table 5 details the trauma informed intervention characteristics included in this review. The two most frequently used interventions were eye movement desensitization and reprocessing (EMDR) [28,30,31,33,36,38]—a multi-phase intervention using bilateral stimulation, such as left-to-right eyes movements or hand tapping, to desensitize individuals to a traumatic memory or image—and trauma-focused cognitive behavioral therapy or cognitive behavioral therapy (CBT) [26,27,32,46,48]—a psychological approach to introduce emotional regulation and coping strategies (e.g., deep muscle relaxation, yoga, thought discovery and breathing techniques) to deal with negative feelings and behaviors surrounding a trauma of interest [32,48]. The implementation of CBT varied on the trauma of interest. Other studies implemented interventions using general trauma focused therapy [22,43], emotion focused therapy [23,25], stress reduction programs [17], cognitive processing therapy [24], brief electric psychotherapy [31], present focused group therapy [26], compassion focused therapy [44], prolonged exposure [45], stress inoculation training [45], psychodynamic therapy [45], and visual schema displacement therapy [30]. A number of studies included more than one of these therapies [13,26,30,31,33,36,45].

**Setting, scope, and delivery of intervention.** Twenty of the interventions were identified to occur in an outpatient clinic/setting [19–21,24,25,27–29,31–34,36,39,40,42,43,46–48]. Four of the studies took place in a research lab or office [23,26,41,45], one study occurred in the community [17], and one study implemented therapy in three locations, two of which were outpatient and one of which was a residential treatment center [47]. Lastly, one study occurred in internally displaced people’s camps within a metropolitan area in Haiti [37]. The remaining studies did not identify a specific setting [22,35,38,44].

The interventions ranged in length and time, but most often occurred weekly. The longest intervention was done by Lundqvist and colleagues [43], which lasted a total length of 2-years and included 46 sessions. Several other studies included 20 sessions or more [18,22,23,25,26]. The interventions were most commonly delivered by medical professionals, including but not limited to: psychologists or psychiatrists, therapists, social workers, mental health clinicians and physicians [16,17,20–29,33,36,38,39,41,44–47]. The articles frequently noted that the interventionists were masters-level-prepared or higher in their profession [21,23,25–27,33,40,47]. In addition to standard education and licensure, many of the professionals implementing the interventions were required to obtain further training in the therapy of interest [23–25,27–30,33,36,38–40,46,47]. Two studies were identified to be delivered by lay persons [34,37].

Fidelity was addressed in 16 of the included articles [16,19,21,23,24,26–30,33–35,45–47]. The manner in which fidelity was addressed varied by study. Videotaping or audiotaping therapy sessions [21,23,24,28–30,33,35] were most common, followed by deploying regular supervision of the therapy sessions [21,23,27,29,33,46], using a training manual or intervention protocols [19,21,33,46], or having individuals unaffiliated with the study or blind to the intervention rate sessions [21,26,28,35]. Additionally, three articles utilized fidelity checks/checklists to ensure components of the intervention were addressed [16,30,47] or had patients and/
Table 2. Study quality ratings for randomized control trials.

| Items                                                                 | Boosh-ehri [18] | Bowland [35] | Bryant [21] | Classen [26] | Dalton [23] | Doering [28] | Ford [27] | Gawande [29] | Ginzburg [22] | Kelly [17] | Matthijssen [30] | Nijdam [33] | Nijdam [31] | Nixon [24] | Noroozi [32] | Paivio [25] | Sacks [19] | Sikkema [34] | Vitriol [20] |
|----------------------------------------------------------------------|-----------------|--------------|-------------|--------------|-------------|--------------|-----------|--------------|--------------|-----------|-----------------|------------|-------------|-----------|-------------|-----------|-----------|-------------|----------|
| 1. Was true randomization used?                                       | 1               | 1            | 1           | 1            | ?           | 1            | 1         | 1            | 1            | ?         | 1               | 1          | 1           | 1         | 1           | 1         | 1         | 1           | 1        |
| 2. Was allocation to treatment groups concealed?                     | 1               | ?            | 1           | 1            | ?           | ?            | ?         | 1            | ?            | ?         | 0               | 0          | 0           | 0         | ?           | ?         | ?         | 1           | ?        |
| 3. Were treatment groups similar at the baseline?                    | 1               | 1            | 1           | 1            | 1           | 1            | 1         | 1            | 0            | 1         | 1               | 1          | 1           | 1         | 1           | 0         | 1         | 1           | 1        |
| 4. Were those delivering treatment blind to treatment assignment?     | 0               | 0            | 0           | 0            | ?           | ?            | ?         | 0            | 0            | ?         | 0               | 0          | 0           | 0         | 1           | ?         | 0         | 0           | 0        |
| 5. Were outcomes assessors blind to treatment assignment?            | ?               | 1            | 1           | ?            | ?           | ?            | 1         | 0            | ?            | ?         | 1               | 0          | 1           | 0         | ?           | ?         | ?         | 1           | ?        |
| 6. Were treatment groups treated identically other than the intervention of interest? | 1               | 1            | 1           | 1            | 1           | 1            | 1         | 1            | 1            | 1         | 1               | 1          | 1           | 1         | 1           | 0         | 1         | 1           | 1        |
| 7. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed? | 1               | 1            | 1           | 0            | 1           | 1            | 0         | 1            | 1            | 1         | 1               | 1          | 1           | 1         | 1           | ?         | 1         | 1           | 1        |
| 8. Were participants analyzed in the groups to which they were randomized? | 1               | 1            | 1           | 1            | 1           | 1            | 1         | 1            | 1            | 1         | 1               | 1          | 1           | 1         | 1           | 1         | 1         | 1           | 1        |
| 9. Were outcomes measured in the same way for treatment groups?      | 1               | 1            | 1           | 1            | 1           | 1            | 1         | 1            | 1            | 1         | 1               | 1          | 1           | 1         | 1           | 1         | 1         | 1           | 1        |
| 10. Were outcomes measured in a reliable way?                         | 1               | 1            | 1           | 1            | 1           | 1            | 1         | 1            | ?            | 1         | 1               | 1          | 1           | 1         | 1           | 1         | 1         | 1           | ?        |
| 11. Was appropriate statistical analysis used?                        | 1               | 1            | 1           | 1            | 1           | 1            | 1         | 1            | 1            | 1         | 1               | 1          | 1           | 1         | 1           | ?         | 1         | 1           | 1        |
| Items | Booshbehri [18] | Bowland [35] | Bryant [21] | Classen [26] | Dalton [23] | Doering [28] | Ford [27] | Gawande [29] | Ginzburg | Kelly [17] | Matthijssen [30] | Nijdam [33] | Nijdam [31] | Nioo [24] | Noroozi [32] | Paivio | Sacks [19] | Sikkema [34] | Vitriol [20] |
|-------|----------------|-------------|------------|-------------|-------------|-------------|-----------|-------------|----------|-----------|----------------|-------------|-------------|----------|-------------|--------|-----------|-------------|------------|
| 12. Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial? | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Total Score | 10 | 10 | 11 | 9 | 8 | 9 | 8 | 10 | 8 | 10 | 7 | 9 | 9 | 10 | 4 | 8 | 8 | 10 | 9 |

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or therapists rate therapy sessions [26,34,45]. Finally, one study had quality assurance worksheets completed after each session that were later reviewed by the study coordinator [34].

### Effects of trauma-informed interventions

Trauma-informed interventions were tested to improve several psychological outcomes, such as post-traumatic stress disorder (PTSD), depression, and anxiety. The most frequently assessed psychological outcome was PTSD, which was examined in 23 out of the 32 studies [17,20–27,31,33,35–39,41,42,44–48]. Among the studies that assessed PTSD as an outcome, 11 found significant reductions in PTSD symptoms and severity following the trauma-informed intervention [17,20,21,24,26,28,34,42,45–47], however, one of these studies, which utilized outpatient psychoeducation, did not find significant differences in reduction between the intervention and control group [20]. Trauma-informed interventions that were associated with a significant reduction in PTSD were a mindfulness-based stress reduction program [16], two therapies using the Trauma Recovery and Empowerment Model (TREM) [47], CBT [26,46], EMDR [28], general trauma-focused therapy [42], psychodynamic therapy [45], stress

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**Table 3. Study quality ratings for quasi-experimental studies.**

| Quasi-experimental study | Beaumont [44] | D’Andrea [45] | Decker [40] | Decker [39] | de Jongh [36] | de Roos [38] | Duton [41] | James [37] | Lundqvist [42] | Lundqvist [43] | Mac-Intosh [46] | Masin-Moyer [47] |
|--------------------------|--------------|--------------|------------|------------|-------------|-------------|------------|------------|---------------|---------------|----------------|----------------|
| 1. Is it clear in the study what is the ‘cause’ and what is the ‘effect’ (i.e., there is no confusion about which variable comes first)? | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 2. Were the participants included in any comparisons similar? | 0 | 1 | 1 | 0 | 0 | 1 | 1 | ? | 1 | 0 | 1 | 1 |
| 3. Were the participants included in any comparisons receiving similar treatment/ care, other than the exposure or intervention of interest? | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 4. Was there a control group? | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| 5. Were there multiple measurements of the outcome both pre and post the intervention/exposure? | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 6. Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed? | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| 7. Were the outcomes of participants included in any comparisons measured in the same way? | 1 | 1 | 1 | 1 | 1 | 1 | 1 | ? | 1 | 1 | 1 | 1 |
| 8. Were outcomes measured in a reliable way? | 1 | 1 | ? | 1 | ? | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| 9. Was appropriate statistical analysis used? | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |
| Total Score | 8 | 7 | 7 | 6 | 7 | 8 | 8 | 2 | 8 | 8 | 8 | 9 |

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inoculation therapy [45], present-focused therapy [26], and cognitive processing therapy [24]. In addition, an intervention designed to reduce stress and improve HIV care engagement improved PTSD symptoms; however, this intervention was not intended to treat PTSD [34].

Other commonly assessed psychological symptoms, including depression and anxiety, were examined in 16 [17–21,24–26,29,31, 32,35,40,44,47,48] and 10 [21,24,25,28,29,35,36,44,47,48] studies, respectively. Among these, trauma-informed interventions were associated with decreased or improved depressive symptoms in 9 studies [17,18,20,21,24,32,35,47,48] and decreased or improved anxiety in 5 studies [21,28,35,47,48]. For example, Vitriol and colleagues found that outpatient psychoeducation resulted in improved depressive symptoms in women with severe depression and childhood trauma [20]. Similarly, Kelly and colleagues found that female survivors of interpersonal violence experienced a significantly greater reduction of depressive symptoms in the intervention group (mindfulness-based stress reduction) compared to the control group [16,17]. Other therapies that resulted in improved depressive symptoms were TREM [47], prolonged exposure therapy [21], CBT [32, 46], psychoeducational cognitive restructuring [35], and financial empowerment education [18]. Cognitive processing therapy similarly resulted in large reductions in depression symptoms, however this reduction was also observed in the control group [24]. The same studies showed that TREM [47], prolonged exposure therapy [21], CBT [48], and psychoeducational cognitive restructuring [35] were associated with improved anxiety. Lastly, in a separate study than the one highlighted above, EMDR was associated with improved anxiety [28].

A select number of the studies found associations between trauma-informed interventions and other psychological outcomes such as attachment anxiety, attachment avoidance, psychiatric symptoms or dental distress. For example, the trauma-informed mindfulness-based reduction program implemented by Kelly and colleagues was associated with a greater decrease in anxious attachment, measured by the Relationship Structures Questionnaire, compared to the waitlist group [17]. Similarly, Masin-Moyer and colleagues found that TREM and an attachment-informed TREM (ATREM) were associated with significant reductions in group attachment anxiety, group attachment avoidance, and psychological distress in women

Table 4. Study quality ratings for cohort study.

| Cohort study | Items | Wieferink [48] |
|--------------|-------|---------------|
| 1. Were the two groups similar and recruited from the same population? | 1 |
| 2. Were the exposures measured similarly to assign people to both exposed and unexposed groups? | 1 |
| 3. Was the exposure measured in a valid and reliable way? | 1 |
| 4. Were confounding factors identified? | 1 |
| 5. Were strategies to deal with confounding factors stated? | 1 |
| 6. Were the participants free of the outcome at the start of the study (or at the moment of exposure)? | 1 |
| 7. Were the outcomes measured in a valid and reliable way? | 1 |
| 8. Was the follow up time reported and sufficient to be long enough for outcomes to occur? | 1 |
| 9. Was follow up complete, and if not, were the reasons to loss to follow up described and explored? | 1 |
| 10. Were strategies to address incomplete follow up utilized? | 1 |
| 11. Was appropriate statistical analysis used? | 1 |
| Total Score | 11 |

* 1 = yes; 0 = no; ? = unclear.

https://doi.org/10.1371/journal.pone.0252747.t004
| Study Code | Intervention | Intervention Description | Setting | Interventionists | Fidelity | Main Findings |
|------------|--------------|--------------------------|---------|-----------------|----------|--------------|
| Booshehri (2018) | Cognitive behavioral therapy (CFT) and trauma-focused cognitive behavioral therapy (TF-CBT) combined with CFT | Location not specified Cognitive behavioral therapist Not addressed | TF-CBT combined with CFT had more effective than TF-CBT alone in reducing off-setting (p = .03). TF-CBT and CFT are not statistically significant for depression and avoidance; however, revealed a downward trend in the combined TF-CBT + CFT groups. |
| Bowland (2012) | Financial empowerment group classes | Financial empowerment group classes 2 trained financial services organization facilitators | Not addressed | Companions in the two groups had lower scores on traumatic severity, depression, and somatic symptoms. Trauma scores fell from mean 19.25 ± 11.68. Depressive symptoms decreased by 80% compared to 73% in control. Anxiety decreased by 62% compared to 1.0 increase in control. Somatic symptoms decreased by 2% compared to increase of 0.08% in control. |
| Bryant (2012) | Prolonged exposure and cognitive restructuring | Weekly sessions: Prolonged Exposure consisted of participant engagement in exposure to trauma, homework, and strategies to manage stress. Cognitive restructuring consisted of Praesent-back and homework to restructure thoughts surrounding trauma. | Not reported | Not specified | Independent-evaluator randomly selected videotape of group sessions | At follow up, patients on prolonged exposure treatment were less likely to meet PTSD criteria than those who underwent cognitive restructuring (7% vs. 63%; odds ratio [OR] = 2.10, 95% confidence interval [CI] = 1.12-3.94) and to achieve full remission (47% vs. 13%. OR = 2.78, 95% CI = 1.44-6.83). |
| Classen (2011) | Trauma-focused group therapy (TF-GT) and present-focused group therapy (PF-GT) | 24-week sessions (each lasting 1.5 hours). TF-GT involved active exploration of traumatic events to minimize the trauma’s impact on current experience and functioning. TF-GT focused on examining current functioning, eliminating the fear and the maladaptive behaviors and expectations to help restructure views of self and others. | Research lab | Psychologists, psychiatrists and master level clinicians with prior experience in working with trauma survivors and group therapy Brief-post session survey completed at end of every session: One randomly selected session for each group rated on the post-session questionnaire by 2 raters who were blind to conditions | Training manual weekly supervision of session and audios of 45 random sessions rated by psychologists not involved in intervention | At follow up, patients on prolonged exposure treatment were less likely to meet PTSD criteria than those who underwent cognitive restructuring (7% vs. 63%; odds ratio [OR] = 2.10, 95% confidence interval [CI] = 1.12-3.94) and to achieve full remission (47% vs. 13%. OR = 2.78, 95% CI = 1.44-6.83). |
| Dalton (2013) | Emotion-focused therapy (EFT) | EFT sessions (22 couple and 2 individual sessions) helped clients symbolically and work through their emotional responses to traumatic events through a focus on creating safe interpersonal connections. Sessions lasted 1.25 hours | Research office | Five therapists, four of whom were masters level mental health therapists and one of whom was the primary investigator. Therapists had at least 4 years of experience in treating childhood abuse and received five months of weekly training in EFT | Brief post session survey completed at end of every session: One randomly selected session for each group rated on the post-session questionnaire by 2 raters who were blind to conditions | At follow up, patients on prolonged exposure treatment were less likely to meet PTSD criteria than those who underwent cognitive restructuring (7% vs. 63%; odds ratio [OR] = 2.10, 95% confidence interval [CI] = 1.12-3.94) and to achieve full remission (47% vs. 13%. OR = 2.78, 95% CI = 1.44-6.83). |
| D’Andrea (2012) | Trauma-focused therapy | Trauma-focused therapy included prolonged exposure (PE), stress inoculation training (SIT) and psychodynamic therapy (PDT) over 12 weekly sessions. Therapy focused on re-creating the patient’s memories of the traumatic events by discussing feelings, perceptions, connections, etc. surrounding the event | Lib setting | 22 trauma-oriented therapists who were recruited through prison administration’s approval or from the clients. | The group EFT displayed a significant reduction in relationship distress (p < .05). A statistically significant proportion of participants who participated in EFT displayed clinically significant improvement on the DDS from pre-test to post-test (p < .001). However, no participant in the control group exhibited significantly different changes on the DDS. |
| Donker (2017) | Trauma informed partner violence assessment with Addressing Reproductive Coercion in Health Settings (ARCHES) | ARCHES assessment included a universal assessment of the recognition of abuse. Intervention involved harm reduction counseling and referrals to violence resources. A provider facilitated discussion of intimate partner violence. Reproductive coercion was addressed with a safety card including suggestions for harm and reduction of family violence related help-seeking | Family planning health centers | Physician/Provider who received a day-long training from national experts | The group received violence-related training and felt more confident in their provider’s concern for the client’s ability to respond appropriately to violence. Treatment increased knowledge of violence-related resources. Close to 70% of women reported receiving harm reduction elements of the intervention on their exit survey and reported that clinic-based interpersonal violence counseling was helpful in improving relationship violence history. |
| Decker (2017) | Integrating Fetal Alcohol Syndrome (FAS) Prevention into HIV care (IFASP) | Brief, semi-structured dialogue that was reinforced with a safety card. Dialogue centered around the target population. They underwent training specific to sex workers, violence-related research and practice and ethics in research. | Mobile vans in radicant vehicles in community setting | Field research team selected based on experience with FAS prevention/education (p < .01); and frequency of sex trade under the influence of drugs or alcohol (p < .01). Women’s safety behavior increased (p < .001). Participants improved knowledge and use of verbal violence support (p < .01) and use of fallback partner violence support (p < .01). Change in rape myths, depression and PTSD did not reach statistical significance. |

(Continued)
| Study | Year | Intervention | Setting | Information Description | Therapy Beakdown |
|-------|------|-------------|---------|-------------------------|------------------|
| de Jongh (2011) | 2011 | TF-CBT | Patient's office | 125 therapists accredited in CBT or EMDR. Patients were assigned to therapist based on their anxiety or depression. | TF-CBT and EMDR. Therapy was based on the use of exposure exercises with and without eye movements. |
| James (2013) | 2013 | Soman | Soulaje Lespri | 12 group seminars (2 hour-drop in seminars, 3 times a week) were conducted over 8 weeks in mental health centers and community centers in camps. | Group therapy based on exposure techniques. |
| Ford (2018) | 2018 | CBT and MBSR | Connecticut University of Hartford | 8 sessions of manualized internet-supported CBT for problem solving. Treatment included 2-hour weekly sessions and a weekly workbook. | CBT and MBSR. Treatment included exposure to traumatic memories and guided imagery. |
| Lundqvist (2006) | 2006 | TF-GT | Trauma-focused therapy | 22 sessions during 5 months, twice a week to help patients with PTSD. | TF-GT. Treatment included exposure exercises with and without eye movements. |
| Dutton (2016) | 2016 | Imagery | Trauma Affect Regulation: Guide (TARGET) | 3 weekly sessions. Sessions lasted 1.5 hours. EMDR treatment consisted of reprocessing of memories using the application of eye movements to tax working memory. A series of 25-30 horizontal movements were repeated until the subjective distress reached zero. | Imagery and EMDR. Treatment included exposure to traumatic memories with eye movements. |
| Gawande (2019) | 2019 | Mindfulness | Mindfulness Training for Primary Care (MTPC) | 13 trained providers including 12 licensed mental health professionals trained survivors. MTPC incorporates elements from mindfulness-based stress reduction (MBSR) and mindfulness-based stress reduction (MBSR) Lasting 30-45 minutes a day. | Mindfulness. Treatment included training in mindfulness and stress reduction techniques. |
| Ginzburg (2009) | 2009 | TF-GT | Present focused group therapy (PFGT) focused on the link between traumatic memory and current distress. | 24 weekly sessions (sessions lasted 1.5 hours) were conducted to help patients with PTSD. | TF-GT. Treatment included exposure exercises with and without eye movements. |
| Moun (2008) | 2008 | Soman | Soman | 5-week seminars (2 hours each seminar) were conducted to help patients with PTSD. | Soman. Treatment included group therapy and individual therapy. |
| James (2013) | 2013 | Soman | Soulaje Lespri | 12 group seminars (2 hour-drop in seminars, 3 times a week) were conducted over 8 weeks in mental health centers and community centers in camps. | Group therapy based on exposure techniques. |
| Ford (2018) | 2018 | CBT and MBSR | Connecticut University of Hartford | 8 sessions of manualized internet-supported CBT for problem solving. Treatment included 2-hour weekly sessions and a weekly workbook. | CBT and MBSR. Treatment included exposure to traumatic memories and guided imagery. |
| Lundqvist (2006) | 2006 | TF-GT | Trauma-focused therapy | 22 sessions during 5 months, twice a week to help patients with PTSD. | TF-GT. Treatment included exposure exercises with and without eye movements. |
| Dutton (2016) | 2016 | Imagery | Trauma Affect Regulation: Guide (TARGET) | 3 weekly sessions. Sessions lasted 1.5 hours. EMDR treatment consisted of reprocessing of memories using the application of eye movements to tax working memory. A series of 25-30 horizontal movements were repeated until the subjective distress reached zero. | Imagery and EMDR. Treatment included exposure to traumatic memories with eye movements. |
| Gawande (2019) | 2019 | Mindfulness | Mindfulness Training for Primary Care (MTPC) | 13 trained providers including 12 licensed mental health professionals trained survivors. MTPC incorporates elements from mindfulness-based stress reduction (MBSR) and mindfulness-based stress reduction (MBSR) Lasting 30-45 minutes a day. | Mindfulness. Treatment included training in mindfulness and stress reduction techniques. |
| Ginzburg (2009) | 2009 | TF-GT | Present focused group therapy (PFGT) focused on the link between traumatic memory and current distress. | 24 weekly sessions (sessions lasted 1.5 hours) were conducted to help patients with PTSD. | TF-GT. Treatment included exposure exercises with and without eye movements. |
| Moun (2008) | 2008 | Soman | Soman | 5-week seminars (2 hours each seminar) were conducted to help patients with PTSD. | Soman. Treatment included group therapy and individual therapy. |
Table 5. (Continued)

| L. St author [yr] and Intervention | Intervention Description                                                                 | Setting          | Interventionists                                                                 | Fidelity                                | Main Findings                                                                 |
|-----------------------------------|------------------------------------------------------------------------------------------|------------------|----------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------|
| Girimbang (2009) [25]/TFGT       | Present focused group therapy (TFGT) focused on the link between symptomatology and the immediate distress. Trauma focused group therapy (TFGT) emphasized the link between symptomatology and the past environment. Patients were guided through retrieval and reinterpretation of traumatic memories to work through and reconstruct painful memories in TFGT and in PFGT, to identify and modify current maladaptive behaviors and coping strategies. Both groups were allocated to 8-weekly sections (sessions lasted 1.5 hours).                                                   | Three universities in California                                                                 | Licensed clinical psychologists                                      | Not adulterated                                                                 | Both shame and guilt significant treatment effects were found for TFGT and PFGT compared with waitlist at 12 months (p < 0.01 and p = 0.03, respectively). Shame and guilt were not significantly related to treatment when TFGT compared with PFGT. |
| James (2015) [26]/Sipoh Loupi Mean (SLM, “Bodel for the Spirit” in Haitian Creole) | Drop in program within the internally displaced people. 12 group sessions (2 hour-deep in content, 3 times a week). Seminars addressed earthquake safety, common somatic and emotional responses to trauma, basic information and self-soothing techniques, coping skills, spirituality. | internally displaced people camps in Port-au-Prince metropolitan area |                           | Not adulterated                                                                 | In the 1st study, lower trauma scores achieved after SLM (p = .017). In the 2nd study, where survivors offered more frequently and in a more private space there was a reduction in PTSD symptoms post trauma attendance (p < .001). In 3rd study, there was a reduction of PTSD symptoms post trauma treatment (p < .001). |
| Kelly (2018) [27]/2016-17/TI-MBSR Group | The 8-week mindfulness course consisted of movement exercises, didactic lecture, and group discussion. Seminar in Port-au-Prince, lasted 2 to 2.5 hours. Participants were also asked to practice mindfulness 30-45 minutes a day with provided CD. | licensed clinical social workers | Licensed mindfulness was completed part-time participation of choice | Ensured fidelity using a checklist to document each intervention component as it was delivered during the session (100% adherence) | TI-MBSR group reported significantly greater reductions in posttraumatic stress than the waitlist control group (p = .004, d = .86). TI-MBSR group reported significantly greater decreases in antidepressant use than the waitlist control group (p = .003, d = .85). |
| Landry-Kyne (2006) [28]/Trauma- focused therapy | 40 group therapy sessions with a phase-divided structure. Phase 1 was 22 sessions over 5 months, twice a week, to help women discuss their childhood sexual abuse narratives and discuss relationships in family of origin. Phase 2 had 15 weekly sessions in 6 months, to work with separation and get used to autonomy. The group therapy model for the short-term group was limited to 20 weekly sessions and focused on four topics. | 2 female group leaders for all group sessions in all 10 groups together |                                        | Not adulterated                                                                 | Not group differences in psychological and PTSD symptoms and some of coherence. Significant reductions for the study group in total symptom score and in 82% of 17 clinical anxiety (p < .05); reductions for the short-term group in 10% 9 subscales (p < .05), and no differences for the waitlist group. A PTSD reduction for the study group, from 87% to 85% (p = .01) but not for the waiting list group. An increase in sense of coherence for both groups (10-point and 7-point, respectively, p < .05). |
| Landry-Kyne (2009) [29]/Trauma- focused therapy | 2-year long trauma-focused group therapy. 46 sessions total, 20 sessions in week 1, 22 sessions in week 5 of months, 20 sessions in week 6 of months, and 2 sessions in week 7 of months. Each session included six topics. | Licensed group leader was all group members in all 10 groups together | Licensed group leader was all group members in all 10 groups together | Not adulterated                                                                 | Level of social interaction significantly improved, with no evident improvements in total score and adequacy of social integration. The effect size was 55 and 64, respectively. Social adjustment was significantly improved particularly in subscales of work/industry and homework. Effect sizes were: 55 and 56, respectively. No significant changes in family climate except for the expressed emotion subscale perceived criticism in relation to the partner that showed a reduction. |
| Macintosh (2018) [30]/Skills Training in Affective and Interpersonal Regulation (STAIR) treatment | STAIR, consisted of 18 weekly group sessions. First focus on the impact of trauma on emotions and relationships. Identifying difficult feelings and emotions. Learning to identify emotions and increase capacity to express positive emotions. The remaining sessions included identification of trauma-generated interpersonal "schemas" or expectations that impact current relationships, more positive schemas related to effective living in the present, skills training in effective assertiveness, increasing flexibility regarding interpersonal interactions, and enhancing empathy for self and others. | Center based treatment by the first author of the course on an intensive day-long training seminar | Clinical director of the author provided weekly supervision and adherence checks over the course of the groups. Standardized materials were developed by the originator of the STAIR model and given to all therapists. | Not adulterated                                                                 | There was significant reduction in Inventory of Interpersonal Problems scores from pre to post treatment, suggesting lower levels of relationship dysfunction (p < .001). There was significant reduction in the mean levels of trauma symptoms reported by participants from pre to post treatment (p = .004). |
| Mann-Meyer (2019) [31]/Trauma Recovery and Empowerment Model (TREM) versus Attachment- informed adaptation TREM (ATREM) | TREM included 16 weekly sessions. Sessions lasted 1.5 hours. TREM had the same 16 topics as TREM but also had 3 open weeks to add new attachment information involving imagery, art, play, group meditations, transactional objects, body mapping and written and verbal feedback. Open weeks were to integrate more prosaic processing content and initiating in-the-moment exploration of relational dynamics and facilitating dynamic group connections. | Licensed group leader was all group members in all 10 groups together | First author was TREM trained and minimal all others. Each group had at least 1 licensed masters level oral or counselor. All facilitators participated in training prior to intervention implementation | A facilitator report fidelity checklist was created by the first author to ensure weekly discussion questions and activities in the TREM manual were addressed | Pre- and post intervention scores showed statistically significant reductions in individual and group attachment anxiety (p = .001), group attachment avoidance (p = .001), perceived social support (p = .001), emotional regulation capacities (p = .001), psychological distress, depression, anxiety, and PTSD symptom severity (p < .001) for ATREM and TREM. ATREM associated with statistically significant reductions in individual attachment avoidance. |
| Landry-Kyne (2009) [32]/Trauma- focused group therapy | 2-year long trauma focused group therapy. 46 sessions total, 20 sessions in week 1, 22 sessions in week 5 of months, 20 sessions in week 6 of months, and 2 sessions in week 7 of months. Each session included six topics. | Licensed group leader was all group members in all 10 groups together | Licensed group leader was all group members in all 10 groups together | Not adulterated                                                                 | Level of social interaction significantly improved, with no evident improvements in total score and adequacy of social integration. The effect size was 55 and 64, respectively. Social adjustment was significantly improved particularly in subscales of work/industry and homework. Effect sizes were: 55 and 56, respectively. No significant changes in family climate except for the expressed emotion subscale perceived criticism in relation to the partner that showed a reduction. |

(Continued)
### Table 5. (Continued)

| Study                          | Intervention Description | Setting                      | Interventionists | Fidelity | Main Findings |
|-------------------------------|--------------------------|------------------------------|------------------|----------|---------------|
| Nijdam (2012)[33]             | Brief eclectic psychotherapy (BEP) | Tertiary care facility, a residential substance use treatment, and an outpatient behavioral health facility | Clinical director & therapists | Not addressed | Significant, small- to medium-sized improvements in verbal expression, declarative speech, and social interactions.
| Matthijssen (2019)[30]       | Visual Schematic Debriefing (VSDT) | Outpatient behavioral health facility | Research assistant | A facilitator report fidelity checklist was created by the first author to ensure weekly discussion questions and activities in the VSDT manual were addressed. | No differences in vividness score between EMDR and the control condition. Small- to medium-sized improvements in EMDR emotionality scores were observed.
| MacIntosh (2018)[46]         | Skills Training in Affective and Regulatory Modalities (STAIR) | Community mental health center and inpatient hospital | First author | A facilitator report fidelity checklist was created by the first author to ensure weekly discussion questions and activities in the STAIR manual were addressed. | Pre- and postintervention data showed statistically significant improvements in Global Capacity for regulatory strategies (p < .001), psychological distress, depression, and interpersonal problems.
| TREM                          | Attachment-informed adaptation (TREM) | Victim services agency | TREM included 16 weekly sessions. Sessions lasted 1.5 hours. Therapists received a 3-day level-I training for EMDR and for brief electric psychotherapy. | Not addressed | Statistically significant reduction in PTSD symptoms and TREM associated with statistically significant improvement in the NESD mood score than EMDR (p < .001).}

**Notes:** EMDR = Eye Movement Desensitization and Reprocessing; NESD = Neuropsychological Evaluation Scale; VSDT = Visual Schematic Debriefing; STAIR = Skills Training in Affective and Regulatory Modalities; TREM = Attachment-informed adaptation.
| Nijdam (2018) | Trauma Focused Cognitive Behavior Therapy (TF-CBT) | Centre for Psychological Trauma at the Academic Medical Centre of the University of Amsterdam | “Independent assessor” | Not addressed | PTSD symptom decrease was significantly correlated with better post-treatment neurocognitive performance (p<.001). Patients with untreated depression improved more than patients with PTSD alone on interference tasks (p<.01). REB and EMDR were equally effective at the end of treatment on self-reported PTSD symptoms (mean difference 3.76; 95% CI = -6.63 to 14.03; p = .48) and on clinician rated PTSD (mean difference 2.41; 95% CI = -.2.10 to 6.92; p = .29). Both CPT and CBT were superior to control groups demonstrating large reductions in PTSD and depression symptoms following treatment, and those gains were maintained over the course of follow-ups (Cohen’s d of FEED vs. PTSD symptom reduction = 0.76; 1.43). Independent assessment of PTSD severity indicated that CPT participants reached good and stable functioning at 12 months follow up than control participants (50% vs. 31%). Although both treatments were effective, there were some indications that CPT led to better outcomes relative to usual care. |
|---|---|---|---|---|---|
| Nirmal (2018) | Cognitive Processing Therapy (CPT) | Sexual assault center | Control group implemented by female staff at sexual assault center with a minimum education of a Bachelor of Social Work. No extra study specific training. Intervention therapists received a 3-day seminar, 2) trauma-informed addictions treatment, and 3) case management. | Not addressed | TF-CBT reduced depression symptoms in divorced women compared to control group (p = .001) in the post-test and after the three months follow up. |
| Nunnally (2010) | Emotion focused therapy for trauma | Clinic setting | Licensed professional | Not addressed | A larger proportion of IC compared with EE clients were improved (88% vs. 78%) and recovered (64% vs. 52%) at post-test but the advantage for IC at follow-up was smaller (79% vs. 77% improved; 67% vs. 64% recovered and 6% vs. 13% deteriorated). |
| Sacks (2009) | Dual Assessment and Recovery Track (DART) | Outpatient substance abuse treatment program | Clinical curricula and manuals used to implement intervention | Not specified | The DART group had better outcomes on measures of psychiatric severity (p = .001) and psychological resilience (p = .001) and on one measure of housing stability (p = .04) compared to the control group (usual care). No group differences on measures of substance use, crime, and employment. |
| Schlaefke (2017) | Improving AIDS Care After Trauma (ImpACT) | Lay provider (non-specialist in mental health) | Quality assurance (QA) worksheets after each session. Weekly feedback completed after each session. QA data was reviewed by study coordinator | Not specified | There was a decrease in ImpACT arm compared to control for co-occurring symptoms and hypervigilance (p = .003). There was an increase in ART adherence. ImpACT arm reported greater increase in motivation to adhere to ART than control from baseline to 3 months (47.4% vs. 15.4%; p < .001). Decrease in avoidant coping and increase in social/spiritual coping and adherence to motivation in both arms. |
| Vitting (2009) | Outpatient psychodrama | Outpatient public health clinic | Multidisciplinary team, including psychiatrist and social worker. | Not addressed | Significant difference in the intervention group in Hamilton Depression Scale (HAMD) scores (p<.001) and Outcome Questionnaire (OQ) 45-2 scores (p<.05) at 6 months. Greater proportion of the intervention group had indicators of remission measured by OQ (45.2% vs. 14%; p < .05) and by Hamilton (22% vs. 5%, p<.05 for 6 months. No group difference in PTSD symptoms. |
Table 5. (Continued)

| 1st author (yr)[ref] | Intervention Description | Setting | Interventionists | Fidelity | Main Findings |
|----------------------|--------------------------|---------|------------------|----------|---------------|
| Wieferink (2017)[48]  | CBT and motivational interviewing | Substance use treatment facility for group and individual sessions | Not specified | Not addressed | After 3 and 6 months of substance use disorder (SUD) treatment, there was no group difference in days of substance use. After 6 months of SUD treatment, symptoms of cravings were significantly diminished in both groups (p = 0.003) with those with higher levels of PTSD improving more. For the group with higher levels of PTSD symptoms, depression, anxiety and stress symptoms improved significantly from baseline to 6 months of treatment (p<0.001). Psychiatric symptoms showed a significant improvement between baseline and 6 months of SUD treatment and revealed a significant difference (p=0.001). |

API: Action Plan Initiation.
ARCHES: Addressing Reproduction Coercion in Health Settings.
ATREM: Attachment-informed adaptation Trauma Recovery and Empowerment Model.
BEP: Brief Electric Psychotherapy.
CBT: Cognitive Behavioral therapy.
CFT: Compassion Focused Therapy.
CI: Confidence Interval.
CPT: Cognitive processing therapy.
DART: Dual Assessment and Recovery Track.
EE: Empathic Exploration.
EFT: Emotion-Focused Therapy.
EMDR: Eye Movement Desensitization and Reprocessing.
Ham-D: Hamilton Depression Scale.
HIV: Human Immunodeficiency Viruses.
IC: Imaginal Confrontation.
IRT: Antiretroviral Therapy.
LDC: Low-Dose Comparator.
MTPC: Mindfulness Training for Primary Care.
OR: Odds Ratio.
OQ-45.2: Outcome Questionnaire-45.2.
PDT: Psychodynamic Therapy.
PE: Prolonged Exposure.
PFGT: Present Focused Group Therapy.
PTSD: Post-Traumatic Stress Disorder.
QA: Quality Assurance.
SIT: Stress Inoculation Training.
STAIR: Skills Training in Affective and Interpersonal Regulation.
SUB: Substance Use Disorder.
TARGET: Trauma Affect Regulation: Guide for Education and Therapy.
TF-CBT: Trauma-Focused Cognitive Behavioral Therapy.
TFGT: Trauma-Focused Group Therapy.
TI-MBSR: Trauma-Informed Model of Mindfulness-Based Stress Reduction.
TREM: Trauma Recovery and Empowerment Model.
VSDT: Visual Schema Displacement Therapy.
with a history of interpersonal trauma [47]. Additionally, individuals in an outpatient substance abuse treatment program, consisting of psychoeducational seminars and trauma-informed addiction treatment, experienced significantly better outcomes of psychiatric severity, measured by the Global Appraisal of Individual Needs scale, compared to a control treatment group [19]. Doering and colleagues found that EMDR, compared to the control group, was associated with significantly greater improvement in dental stress, anxiety and fear in patients with dental-phobia [28].

There was a series of interpersonal, emotional and behavioral outcomes assessed in the included studies. For example, adult females that were sexually abused in childhood experienced a significant improvement in social interaction and social adjustment after receiving trauma focused group therapy [43]. Similarly, Dalton and colleagues found that couples that received emotion focused therapy experienced a significant reduction in relationship distress [23] and McIntosh and colleagues found that individuals that received CBT reported lower interpersonal problems post-treatment [46]. Trauma-based interventions were also associated with emotional outcomes. Visual schema displacement therapy and EMDR both were superior to the control treatment in reducing emotional disturbance and vividness of negative memories [30]. In a separate study, CBT was found to reduce levels of emotional dysregulation in individuals that experienced childhood sexual abuse [46]. Lastly, trauma-informed interventions were associated with behavioral outcomes, including HIV risk reduction [26], decreased days of alcohol use [27], and improvements in avoidance of client condom negotiations, frequency of sex trade under influence of drugs or alcohol, and use of intimate partner violence support [40]. Interventions that were associated with these behavioral outcomes included trauma focused and present focused group therapy [26], CBT [27], and a trauma-informed support, validation, and safety-promotion dialogue intervention [40].

**Publication bias**

We analyzed three sets of outcome variables for publication bias: PTSD, depression, and anxiety. Based on Begg and Mazumdar test, there was no evidence of publication bias for PTSD ($z = 1.55, p = 0.121$) and anxiety ($z = 0.29, p = 0.769$). However, there was some evidence of publication bias for depression ($z = 5.19, p < .001$). The statistically significant publication bias for depression appears to be mainly due to large effect sizes in Nixon [24] and Bowland [35].

**Discussion**

According to our database search, this is the first systematic review to critically appraise trauma-informed interventions using a comprehensive definition of trauma. In particular, our definition encompassed both physical and psychological experiences resulting from various circumstances including chronic adversity. Overall, there was inconsistent evidence to suggest trauma informed interventions in addressing psychological outcomes. We found that trauma-informed interventions were effective in improving PTSD [17,20,21,24,26,28,34,42,45–47] and anxiety [21,28,35,47,48] in less than half of the studies where these outcomes were included. We also found that depression was improved in less than about two thirds of the studies where the outcome was included [17,18,20,21,24,32,35,47,48]. Although limited in the number of published studies included this review, available evidence consistently supported trauma-informed interventions in addressing interpersonal [23,43,46], emotional [30,46], and behavioral outcomes [26,27,40].

Effective trauma informed intervention models used in the studies varied, encompassing CBT, EMDR, or other cognitively oriented approaches such as mindfulness exercises [16,24,26,28,32,35,45,46,48]. In particular, CBT was noted as an effective trauma informed
intervention strategy which successfully led to improvements in a wide range of outcomes such as depression [32,48], anxiety [48], emotional dysregulation [46], interpersonal problems [23,46], and risky behaviors (e.g., days of alcohol use) [27]. While the majority of the studies included in the review were focused on interpersonal trauma such as child abuse, sexual assault, or domestic violence [16–18,20–22,24–26,35,40–43,45,46], growing evidence demonstrates perceived discrimination and racism as significant psychological trauma and as underlying factors in inflammatory-based chronic diseases such as cardiovascular disease or diabetes [4]. Future trauma informed interventions should consider a wide-spectrum of trauma types, such as racism and discrimination, by which racial/ethnic minorities are disproportionately affected from [49].

While the majority of the trauma informed interventions were delivered by specialized medical professionals trained in the therapy [16,17,20–29,33,36,38–41,44–47], several of the articles lacked full descriptions of interventionist training and fidelity monitoring [20,22,25,36,38–41,44]. Two studies were identified to be delivered by lay persons [34,37]. There is sufficient evidence to suggest that lay persons, upon training, can successfully cover a wide scope of work and produce the full impact of community-based intervention approaches [50]. Given such, there is a strong need for trauma informed intervention studies to clearly elaborate the contents and processes of lay person training such as competency evaluation and supervision to optimize the use of this approach.

There are methodological issues to be taken into consideration when interpreting the findings in this review. While twenty-three of 32 studies were of high quality [17,18,20,21,24,26,28,29,31,33–36,38,40–48], some studies lacked methodological rigor, which might have led to false negative results (no effects of trauma informed interventions). For example, about one-third (31%) had a sample size less than 50 [17,23–25,27,28,35,38,43,45]. In addition, half of the quasi-experimental studies [37–40,45,46] did not have a comparison group or when they had one, group differences were noted in baseline assessments [36,43,44]. In several studies, therapists took on both traditional treatment and research responsibilities (e.g., delivery of the intervention) [20,25,29,32,33,36,40,46,47], yet blinding of those delivering treatment was discussed clearly in only one study [25]. This dual role is likely to have led to the disclosure of group allocation, hence, threatening the internal validity of the results. Future studies should address these issues by calculating proper sample size a priori, using a comparison group, and concealing group assignments.

**Review limitations**

Several limitations of this review should be noted. First, by using narrowly defined search terms, it is possible that we did not extract all relevant articles in the existing literature. However, to avoid this, we conducted a systematic electronic search using a comprehensive list of MeSH terms, as well as similar keywords, with consultation from an experienced health science librarian. Additionally, we hand searched our reference collections. Second, the trauma informed interventions included in this review were implemented to predominantly address trauma related to sexual or physical abuse among women. Thus, our findings may not be applicable to trauma related to other types of incidence such as chronic adversity (e.g., racism or discrimination). Likewise, there were insufficient studies addressing a wider range of trauma impacts such as emotion regulation, dissociation, revictimization, non-suicidal self-injury or suicidal attempts, or post-traumatic growth. Future research is warranted to address these broader impacts of trauma. We included only articles written in English; therefore, we limited the generalizability of the findings concerning studies published in non-English languages. Finally, we used arbitrary cutoff scores to categorize studies as low, medium, and high...
quality (quality ratings of 0-4, 5-8, and 9+ for RCTs and 0-3, 4-6, 7+ for quasi-experimental studies, respectively). Using this approach, each quality-rating item was equally weighted. However, certain factors (e.g., randomization method) may contribute to the study quality more so than others.

Conclusions
Our review of 33 articles shows that there is inconsistent evidence to support trauma informed interventions as an effective intervention approach for psychological outcomes (e.g., PTSD, depression, and anxiety). With growing evidence in health disparities, adopting trauma informed approaches is a growing trend. Our findings suggest the need for more rigorous and continued evaluations of the trauma informed intervention approach and for a wide range of trauma types and populations.

Supporting information
S1 Checklist.
(DOCX)

S1 Appendix. Search strategies.
(DOCX)

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