Acceptance and commitment therapy (ACT) among U.S. Veterans: A Systematic Review

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The second and third author are both U.S. Military Veterans, having served in the U.S. Navy and U.S. Army National Guard, respectively.

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Highlights

* Systematic review of the current evidence for ACT among U.S. Veterans.
* 34 unique studies with 4,324 participants were included, but only 8 of those being RCTs.
* ACT shows promise in treating common disorders in the Veteran population including PTSD, substance use, and chronic pain when compared to other effective treatments.

* Future RCTs should consider methodology that aims to improve the risk of performance bias and detection bias.
* Recommendations are provided to improve the evidence base of ACT for Veterans.

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Abstract

Veterans of the United States military represent a large sample of the population and a distinctive culture. Veterans have a high prevalence rate of a variety of psychological disorders and disabilities. Research on treatments that meet the needs of this culturally unique group is essential. Acceptance and Commitment Therapy (ACT) may meet this need with its unified treatment approach and its focus on functioning rather than diagnosis. In this study we examine the current state of the literature of ACT for U.S. Veterans. A systematic review of 249 papers found 34 unique relevant studies involving 21 single arm studies, eight randomized clinical trials, two non-randomized controlled trials, and three case studies that met inclusion criteria. Overall, results suggest ACT is a promising intervention for Veterans across multiple conditions (e.g., anxiety disorders, depression, chronic pain) as well as intervention delivery (in-person and telehealth) and type (group and individual therapy). Limitations highlighted include recruitment methods of studies included, lack of active control conditions, and the limited number of randomized trials. Future researchers should continue to examine which presentations respond to ACT and seek to understand what types of adaptations may be necessary to increase the effectiveness of ACT for U.S. Veterans.

*Keywords*: ACT; Acceptance and commitment therapy; Veterans; Systematic Review

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In 2020, there were approximately 19.4 million living Veterans in the United States which represents approximately 6% of the U.S. population (U.S. Department of Veteran Affairs, 2022). The majority of U.S. Veterans are White (80.1%) men (89.6%) aged 65 years or older (46.0%; U.S. Department of Veteran Affairs, 2022). U.S Veterans include those of all generations (e.g., Operation Enduring Freedom (OEF) Operation Iraqi Freedom (OIF), Operation New Dawn (OND), Persian Gulf War, Vietnam War, World War II, and Korean War eras).

As a result of military service, Veterans experience unique challenges when re-integrating into civilian life post deployment. For example, 30% of Veterans who received care through Veterans Health Administration (VHA) in 2020 had a confirmed mental health diagnosis with an additional 37% noting a mental health condition in their health records (Greenberg & Hoff, 2021). The most common mental health conditions among Veterans include posttraumatic stress disorder (PTSD), depressive disorders, and substance use disorders. Among OEF/OIF/OND Veterans, PTSD, depression and alcohol misuse was reported by 23.2%, 16.4%, and 5.3% respectively (National Academies of Sciences, Engineering, and Medicine, 2017). A recent study that matched civilians and Veterans on age and gender found that Veterans were more likely to have diagnoses of anxiety, depression, psychosis, personality and stress disorders while being less likely to have a drug disorder (Williamson et al., 2023). Across service eras, approximately 1.1 million veterans meet criteria for substance use disorders (Sprong et al., 2022). There are also high rates of Veterans having multiple mental health conditions. A recent study found that 36.8% of U.S. Veterans with comorbid alcohol use disorder and PTSD were also diagnosed with major depressive disorder (Norman et al., 2018). In addition to mental health conditions, a third of Veterans report suffering from physical conditions (e.g., chronic pain) and injuries (e.g., traumatic brain injuries) which can lead to long standing difficulties impacting their impairment (Vogt et al., 2020). Other challenges include experiencing difficulty in finding suitable employment, financial stressors, and difficulty in maintaining social relationships often resulting in social isolation. Further, suicidal ideation and attempt in adulthood occurs more frequently among Veterans than civilians (Hoffmire et al., 2021). This is likely due to risk factors including combat exposure, moral injury, severe traumatic brain injury, and history of sexual harassment or assault.

These factors contribute to the need for Veterans to have timely access to healthcare. In 2018, approximately 1.7 million Veterans received treatment from a Veteran’s Affairs (VA) mental health specialty program (US Department of Veteran Affairs, 2021). Mental health services offered through the VA primarily include individual and group therapy, as well as medication management. Health care providers have an opportunity to improve quality of life for Veterans through appropriate treatment. However, there are challenges for Veterans when seeking mental health treatment including barriers to care (e.g., stigma, limited access in rural areas, concerns about insurance or quality of care). Interestingly, healthcare for Veterans has increasingly been outsourced to local civilian providers by the military medical system since the 1990s (Meyer, 2015). Common therapy approaches utilized among Veterans include cognitive behavioral therapy (CBT), prolonged exposure (PE) therapy, and person-centered therapy (PCT). These therapeutic approaches use similar techniques (e.g., exposure) but have varying key principles. For example, CBT focuses on identifying negative thought patterns and challenges them to increase positive behaviors while PE aims to reduce fear and distress responses through systematic exposure practice, and PCT prioritizes an empathetic, non-judgmental and reflective relationship between the client and therapist.

Although there are a wide variety of therapeutic approaches that work well for the disorders most common in Veterans, there is benefit to a transdiagnostic approach to treatment. For example, training in and utilization of a transdiagnostic form of therapy could reduce the time and resources needed to apply specific therapies for specific symptoms or presentations, it allows a core set of strategies to be applied across a range of health conditions, and can be effective in treating co-occurring disorders. Acceptance and Commitment Therapy (ACT) is one possible treatment that provides a flexible skillset that can effectively address a wide variety of presenting concerns in this population. ACT is a behavioral therapy that seeks to enhance psychological flexibility and quality of life while targeting six separate but interconnected processes of change (Hayes et al., 2006). Psychological flexibility is the ability to remain in contact with internal experiences (e.g., thoughts, emotions), allow these to be present when useful, viewing thoughts and emotions for what they are, being aware of personal values, orienting behavior towards these values, and engaging in a wide variety of functional behaviors in pursuit of valued living (Hayes et al., 2006; Twohig & Levin, 2017). The inverse of psychological flexibility is psychological inflexibility. Psychological inflexibility has been shown to account for increased PTSD symptom severity (Meyer et al., 2013), heightened severity of suicidal ideation (DeBeer et al., 2017), and poorer relationship functioning and heightened aggression (Reddy et al., 2011) in Veterans. A recent meta-analysis examined approximately 20 meta-analyses containing 133 separate studies across a variety of presenting problems found ACT to be efficacious (Gloster, et al., 2020). Gloster et al. (2020) report small to medium effect sizes for ACT studies on specific treatment targets such as depression and anxiety along with small effect sizes in studies examining the transdiagnostic efficacy of ACT. In addition, single meta-analyses examining less common treatment targets such as eating disorders, stress, and physical conditions found similar small to medium effect sizes (Gloster et al., 2020).

Although the consistency of effect sizes across a wide variety of presenting problems indicates that ACT is an efficacious transdiagnostic treatment for civilian populations, it is unclear how ACT is currently being implemented among Veterans given they experience unique challenges. In our opinion, the efficacy of ACT across a wide variety of presenting concerns, the ability to address complex and co-occurring presentations, the flexibility in intervention dose and modality, and processes of change may resonate well with Veterans. ACT provides an opportunity to apply a therapeutic approach that targets psychological processes instead of symptoms and can be adapted and personalized to meet the diverse needs of Veterans. Therefore, making ACT a potentially potent and adaptable treatment for this population. Examining the extant literature will help to identify research gaps and shed light upon the disorders treated using ACT in this population and the effectiveness of these studies in this population which may provide future guidance for clinicians and researchers working with this population.

The primary purpose of this review was to provide a comprehensive overview of ACT for veterans by comprehensively identifying all relevant studies, summarizing, and synthesizing findings, and then evaluating the methodological quality of the included studies to ultimately provide recommendations and inform future research. Through a systematic approach, we aim to better understand the extent of research on this topic including the types of studies being conducted, sample characteristics, the format and dose of ACT interventions being implemented, the types of control conditions used, the outcomes being assessed, the methodological quality of the studies, and key findings from the included studies.

**Method**

This review was conducted according to Preferred Reporting Items for Systematic Reviews and Meta Analyses guidelines (PRISMA2020; Page et al., 2021).

**Search Strategy**

To comprehensively identify all relevant studies, electronic databases of PsycINFO and PubMed were searched in October 2018, May 2022, and January 2024. Filters were applied to the results including (1) journal publications, (2) written in English, and (3) adult populations (i.e., 18 years or older). No lower limit to year of publication was imposed. The following search terms were used:

1. ((“Acceptance and Commitment Therapy” OR ACT) AND (“military veterans” OR military personnel,”))

2. ((“Acceptance and Commitment Therapy” OR ACT) AND (“Veteran” OR “Service Members”))

3. ((“Acceptance and Commitment Therapy” OR “Psychological Flexibility”) AND (Military OR Veteran)

Reference lists of relevant reviews and the Association for Contextual Behavioral Science (https://contextualscience.org/) website were hand-searched.

**Study Eligibility and Selection**

Studies were included if it (1) sampled U.S. Veterans and (2) delivered an ACT-based intervention. Studies were excluded if inclusion was not met or (1) participants were in concurrent psychotherapy at the time of the study, (2) did not present quantitative results, and (3) was not published in English.

Study selection occurred in three stages. Stage 1 involved screening title and abstract of all manuscripts returned from database searches. Manuscripts that clearly did not meet inclusion criteria and duplicates were removed. Records that were included in the original search in October 2018 were removed from the updated search results. In Stage 2, remaining studies had their full text retrieved and reviewed for eligibility. Ineligible studies were removed. In Stage 3, the reference section of relevant review articles and studies listed on the Association of Contextual Behavioral Science website (https://contextualscience.org) were reviewed to identify any studies that may have been missed in the initial searches. Two independent reviewers (*initials removed for masking*) conducted stages 2 and 3. Discrepancies between reviewers on inclusion were resolved through discussion.

**Data Collection Process**

To adequately summarize the study characteristics, two independent coders (*initials removed for masking*) began by extracting data from the included studies. The scope of the data extracted included study design, intervention type and dose, control condition type, sample size, sample characteristics, outcome measures, and outcome results from each study as to best address the study aims. Sample characteristics including sex, age, and race were coded as proportions (sex, race) or means (age) for each study. Outcome information was extracted and place in a table (see Appendix A) by two independent coders. Findings of significance (or non-significant findings), as well as statistics (i.e., effect sizes and mean differences) were recorded when available. Discrepancies between coders were resolved through discussion. To assess methodological quality, a risk of bias assessment was conducted for each randomized controlled trial. Authors used the original version of the Cochrane Risk-of-Bias Tool (RoB) for RCTs (Higgins et al., 2011) to assess risk of bias. The ROB measures seven domains of each study: “random sequence generation,” “allocation concealment,” “blinding of participants and personnel,” “blinding of outcome assessment,” “incomplete outcome data,” “selective reporting,” and “other bias.” Judgements were expressed as “Low risk,” “High risk,” or “Unclear.” For nonrandomized studies, the RoBANS 2 was used (Seo et al., 2023). This risk of bias assessment inquires in domains of comparability of the target group, target group selection, confounders, measurement of intervention, blinding of assessors, outcome assessment, incomplete outcome data, and selective outcome reporting that are measured as “Low risk”, “High risk”, and “Unclear.” Inter-rater reliability was assessed for all coded variables. All variables coded were continuous and yielded an average intra-class correlation coefficient (p) of 1.00.

**Results**

**Initial Search**

Our search strategy yielded a total of 249 records with 248 records from databases searches and 1 record from the ACBS website search in May 2022. (see Figure 1). A total of 77 records were excluded as duplicates. After the initial screening of title and abstract, 120 records were excluded because they did not meet the inclusion criteria. Of the 52 remaining records selected for a full-text review, an additional 40 records were excluded for ineligibility.

**Updated Search**

Our updated PsycINFO search strategy yielded a total of 64 records in January 2024. A total of 19 records were excluded as being already being included in the current review. A total of 47 records were screened by title and abstract for which 33 records were excluded because they did not meet the inclusion criteria. The remaining records (n =14) selected for a full-text review were all included in the final sample.

The final sample included a total of 42 manuscripts with 34 unique studies and 8 supplemental studies linked. A total of 16 manuscripts were identified from the October 2018 search, 11 unique and 1 supplemental from the May 2022 search, and 7 manuscripts with 7 supplemental studies from the January 2024 search. One manuscript (Wharton et al., 2019) included two studies and are analyzed as separate samples in this review.

**Sample and Study Characteristics**

Of the 34 unique studies included, studies were published between 2011 and 2023. The sample of studies involved a total of 4,324 participants who completed the program, with 3,833 in an ACT condition and 495 in a control or comparison condition. All of the included studies sampled U.S. Veterans, with the exception of one which sampled active-duty service members (Ramirez et al., 2021). Majority of Veterans who consented to participate were White males (see Table 1). There were three studies involving Veterans from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF; Blevins et al., 2011, Casselman & Pemberton, 2015, Donahue et al., 2017), four studies involving Veterans from OIF/OEF/OND (Operation New Dawn; Barnes et al., 2021, Dindo et al., 2020, Dindo et al., 2021, Lang et al., 2017), four studies with a Veteran from the Vietnam War (Barnes et al., 2021, Donahue et al., 2017, Wharton et al., 2019 a,b), and one study involving Veterans from the Gulf War (Kelly et al., 2020). Other studies either did not report on service or provided service branches included in the sample. Casselman & Pemberton (2015) and Kelly (2015) indicated that their complete sample had PTSD diagnoses. Other psychological conditions reported were anxiety-related disorders (n = 10), major depressive disorder (n = 16), adjustment disorder (n = 2), insomnia (n = 1) and substance use disorder (n = 5).

The study designs included RCTs (n = 8, 23.5%), nonrandomized controlled trials (n = 2, 5.9%), single arm studies (n = 21, 61.8%), and case studies (n = 3, 8.8%). Samples sizes varied across included studies (see Table 1). A total of 15 studies had sample sizes of 50 or more (Afari et al., 2019; Barnes et al., 2021; Blevins et al., 2011; Cosio, 2016; Cuneo et al., 2018; Dindo et al., 2018; Glover et al., 2016; Haun et al., 2020; Herbert et al., 2017; Karlin et al., 2013; Lang et al., 2017; Martin et al., 2023; Ramirez et al., 2021; Walser et al., 2013; Walser et al., 2015).

***Intervention and Control Characteristics***

A total of 16 studies (47.1%) provided ACT in an individual format with two studies using a mobile app. Of the 16 studies (47.1%) providing ACT in a group format, five (14.7%) of those involved a 1-day workshop. Two studies used a combined approach where participants attended a group meeting or workshop, as well as individual sessions (Karlin et al., 2013; Ramirez et al., 2021). As for intervention dose, ACT was most commonly provided in 1-hour sessions (n =13) or 1.5 hours (n = 8). The number of sessions for these studies ranged between 8 and 12 sessions. Three studies did not report the dose of intervention exposure (Reyes, Bhatta, et al., 2020; Reyes, Muthukumar, et al., 2020; Walser et al., 2013). Seventeen studies tailored the ACT intervention for either PTSD (n = 4), chronic pain (n = 4), depression (n = 2), eating behaviors (n = 2), suicide prevention (n = 1), geriatric informed (n = 1), insomnia, (n = 1), smoking cessation (n =1), and anger (n = 1).

For the studies with a control condition (n =10), four were usual care or treat-as-usual (Barnes et al., 2021; Dindo et al., 2018; 2020; Vowles et al., 2020), one was a waitlist condition (Blevins et al., 2011), and five used comparison conditions of cognitive behavioral therapy (Cosio et al., 2016; Martin et al., 2023), behavioral weight loss training (Afari et al., 2019), person centered therapy (Lang et al., 2017), and in-person acceptance and commitment therapy (Herbert et al., 2017).

**Included Study Results by Outcome**

Assessment characteristics, including a list of outcomes, measures, assessment time points, and study findings are listed in Appendix A. The most consistently used measure was the PTSD Checklist (PCL) which was implemented to measure PTSD symptoms (n = 14, 41.2%). Depression was commonly measured either used the Beck Depression Inventory-II (n = 5, 14.7%) or the Patient Health Questionnaire-9 (n = 8, 23.5%) Geriatric Depression Scale (n = 2, 5.9%). A version of the AAQ was used in 73.5% of the included studies. Quality of life was most commonly measured by the WHOQOL-BREF (n = 5; 18.5%). Five studies (18.5%) used a version of the Short-Form Health Survey (SF) to measure health functioning or health-related quality of life. Study findings are reported by study outcomes below.

***Functioning and Quality of Life***

Multiple single arm trials demonstrated an improvement in functioning for veterans after participating in group-based ACT with varying length of sessions (i.e., 12 sessions, Meyer et al., 2018; 8 sessions, Cuneo et al., 2018; 4 sessions, Glover et al., 2016; 1-day workshop, Huddleston et al., 2018) as well as individual ACT (Barnes et al., 2021). When ACT is compared to a control condition, the findings are mixed. For example, Lang and colleagues (2017) found improvements in functioning in both ACT and PCT conditions; however, the groups did not significantly differ. On the other hand, when comparing in-person ACT to video conferencing ACT, veterans in the in-person condition showed improvement in functioning and disability (Herbert et al., 2017). Further, when an ACT workshop is compared to TAU, veterans in the ACT workshop showed a significant decrease in disability at 3-month follow up (Dindo et al., 2020). Several studies demonstrated an improvement in quality of life for veterans at post treatment (Glover et al., 2016; Walser et al., 2013), at 1-month follow up (Smith et al., 2021), and 3-month follow up (Kelly et al., 2020; Meyer et al., 2018). In a study examining a 3-day ACT workshop with 12-16 individual sessions, veterans also showed a significant improvement in quality of life (Karlin et al., 2013). When in-person ACT is compared to video conferencing ACT, veterans who attended sessions in-person demonstrated improvement in health-related quality of life (Herbert et al., 2017). Interestingly, Wharton and colleges (2019b) found only the physical domain of quality of life to be significant after 12 sessions of individual ACT. Regarding global life satisfaction, veterans who attended 14 sessions of group-based ACT showed significant improvement at post-treatment (Haun et al., 2020).

In a sample of active-duty service members, there was a significant improvement in functioning after receiving ACT in a mixed format of individual and group sessions (Ramirez et al., 2021).

***Psychosocial Symptom Measures***

**Distress, Depression, and Anxiety.** Distress improved for veterans in several studies. More specifically, a case study of one male veteran demonstrated a decrease in distress after 19 individual ACT sessions (Smith et al., 2021). Further, multiple single arm studies showed improvements in distress after participating in group-based ACT conditions with vary lengths (1-day workshop, Dindo et al., 2021; 10 sessions, Cosio & Shafer, 2015; 8 sessions, Cuneo et al., 2018). When ACT is compared to a control condition, the findings show that improvements are made within conditions, but there are no significant differences between the groups. For example, veterans participating in individual sessions of ACT or TAU (Barnes et al., 2021), ACT or PCT (Lang et al., 2017) and for veterans participating in group-based sessions of ACT or CBT (Cosio, 2016).

Across various study designs, veterans consistently experienced improvements in depressive symptoms when in the ACT condition. This improvement was demonstrated in three case studies: a case study of one female veteran after 24 sessions (Hiraoka et al., 2016), for one male veteran after 12 sessions (Kelly et al., 2020), and for one male after 19 sessions of ACT (Smith et al., 2021). In the single arm studies, veterans participating in individual sessions showed a significant decrease at post treatment (Walser et al., 2013) and 3-month follow up following 12 ACT sessions (Meyer et al., 2018). Similarly, this improvement was found for group-based ACT (Goetz & Hirschhorn, 2022; Haun et al., 2020; Jacobs et al., 2018), group-based focused ACT (Glover et al., 2016) and one-day workshop (Huddleston et al., 2018). One study involved both individual and group sessions of ACT. Veterans attended a 3-day workshop and 12-16 individual sessions and also showed a decrease in depressive symptoms (Karlin et al., 2013). When ACT is compared to a control condition, the ACT condition showed significantly more improvement. For example, veterans experienced a significant decrease in depressive symptoms after attending an ACT-based workshop (i.e., Life Guard) as compared to a waitlist control condition at 2-month follow up (Blevins et al., 2011). This is consistent to findings comparing an ACT workshop to TAU at 3-month follow up (Dindo et al., 2020). Similarly, veterans who attended 8 sessions of in person, individual ACT showed a significant reduction in depressive symptom severity when compared to the video conferencing comparison condition (Herbert et al., 2017).

Symptoms of anxiety are consistently improved after engaging in an ACT condition. In a single arm study, veteran’s anxiety statistically decreased after 14 sessions of group ACT (Haun et al., 2020) or after a 1-day workshop (Huddleston et al., 2018). When ACT is compared to control conditions, it also demonstrated significant improvements in anxiety. For example, when compared to TAU, veterans who attended an ACT workshop showed significant improvements in anxiety at 3-month follow up (Dindo et al., 2020).

In a sample of active-duty service members, there was a significant improvement in anxiety and depression after receiving ACT in a mixed format of individual and group sessions (Ramirez et al., 2021).

**PTSD Symptom Severity.** Findings from the included studies illustrate a decrease in PTSD symptom severity for veterans who participated in 12 sessions of individual ACT at post treatment and at 3-month follow up (Kelly et al., 2020; Wharton et al., 2019b). Similarly, individual sessions of ACT showed significant decreases in PTSD symptoms at post, 1-, and 3-month follow up (Kelly et al., 2015). In one study, a veteran no longer met criteria for PTSD after 12 sessions of individual ACT that was tailored for PTSD (Hermann et al., 2016). A case study involving 19 sessions of individual ACT found significant improvement in PTSD symptoms at post treatment for one veteran (Smith et al., 2021). Veterans also demonstrated a significant decrease in PTSD symptoms when using an ACT-based mobile app (Reyes, Bhatta, et al., 2020). In group settings, ACT showed a significant decrease in PTSD symptoms among veterans at post treatment (Wharton et al., 2019a) and at 3-month follow up (Dindo et al., 2021). The findings are mixed when ACT is compared to a control condition. For example, veterans in the ACT workshop showed a significant decrease in PTSD symptoms when compared to TAU (Dindo et al., 2020), yet when group ACT is compared to group PCT, there were no significant differences in PTSD symptoms between groups (Lang et al., 2017). However, when gender differences were examined in the Lang et al. (2017) sample, there was a significant reduction in PTSD symptoms among women, but not for men (Gobin et al., 2019).

In a sample of active-duty service members, there was a significant improvement in PTSD symptom severity after receiving ACT in a mixed format of individual and group sessions (Ramirez et al., 2021).

**Pain-Related Outcomes.** A total of seven studies assessed pain-related outcomes (Cosio & Shafer, 2015; Cosio, 2016; Dindo et al., 2018; Dindo et al., 2020; Haun et al., 2020; Herbert et al., 2017; Vowles et al., 2020). Veterans demonstrated improved pain interference after 12 sessions of individual ACT (Vowles et al., 2020), 14 sessions of group-based ACT (Haun et al., 2020), and 10-sessions of group-based ACT for chronic pain (Cosio and Shafer, 2015). Interestingly, Herbert and colleagues (2017) did not find significant reduction in pain interference but found significant reduction in pain severity and pain-related anxiety when comparing in-person ACT to video conferencing ACT conditions. Veterans who attended 12 sessions of individual ACT demonstrated a reduction in pain intensity, pain behavior and had higher prescribed doses (Vowles et al., 2020). After attending an ACT workshop, veterans were taking fewer opioids and experienced more days of pain cessation as compared to TAU at 3-month follow up (Dindo et al., 2018). However, there were no significant group differences between ACT and TAU in pain severity at 3-month follow up (Dindo et al., 2020). When group ACT was compared to group CBT, Cosio (2016) did not find significant group differences in pain severity.

**Sleep Quality.** Findings on sleep quality and insomnia were inconsistent across studies. Lang and colleagues (2017) found that veterans who participated in 12 sessions of individual ACT showed greater improvement in insomnia when compared to PCT, while Herbert and colleagues (2017) showed no significant changes in sleep quality when comparing in person ACT to video conferencing ACT. When ACT was compared to CBT, the CBT group outperformed the ACT condition in sleep efficiency but not for insomnia symptom severity, sleep hygiene behaviors and sleep disturbance (Martin et al., 2023). However, when examined from pre- to 3-month follow up, the ACT condition significantly improved in sleep hygiene behaviors and beliefs about insomnia (Martin et al., 2023). In a sample of active-duty service members, findings on insomnia were nonsignificant (Ramirez et al., 2021).

**Coping Strategies.** Some studies assessed coping strategies including illness focused coping, resiliency, ability to reintegrate post deployment, and ability to manage anger. Veterans demonstrated improved illness-focused coping after 10-sessions of group-based ACT for chronic pain (Cosio & Shafer, 2015; Cosio, 2016). However, when compared to CBT, neither group statistically differed on illness-focused coping or catastrophizing (Cosio, 2016). After participating in an ACT workshop, veterans showed significantly decreased difficulties in post deployment reintegration at 3-month follow up (Dindo et al., 2021) as well as when compared to TAU at 3-month follow up (Dindo et al., 2020). In a study implementing an ACT-based mobile app, veterans demonstrated a significant increase in resiliency and decrease in rumination after using the ACT-based mobile app (Reyes, Bhatta, et al., 2020). Group based ACT was shown to significantly improve physical aggression and veterans’ ability to manage anger (Donahue et al., 2017).

**Satisfaction.** Satisfaction outcomes assessed in these studies include relationship satisfaction (Blevins et al., 2011), parenting satisfaction (Casselman & Pemberton, 2015), and treatment satisfaction (Hermann et al., 2016; Reyes, Bhatta et al., 2020; Reyes, Muthukumar et al., 2020; Lang et al., 2017). Blevins et al. (2011) found that Life Guard (i.e., ACT-based group) participants showed statistically significant improvements in relationship satisfaction at the 2-month follow up when compared to the control condition. In a single arm trial, Casselman & Pemberton (2015) found two of three veterans showed statistically significant improvements in parenting satisfaction at post treatment of an 8 week ACT-based parenting group. Veterans who participated in the 12 sessions of individual ACT were highly satisfied with the treatment (Hermann et al., 2016). When veterans engaged with an ACT-based mobile app, there was good treatment satisfaction with one study resulting in a 72.75 SUS rating (Reyes, Bhatta, et al., 2020) and another study with 80.83 SUS rating (Reyes, Muthukumar et al., 2020). In an RCT, Lang and colleagues (2017) found moderate to high levels of satisfaction with treatment but no significant differences between ACT and PCT groups at post treatment.

***Weight-Related Outcomes***

Weight related outcomes assessed included body mass index (BMI), binge eating symptoms and behaviors, as well as weight-related quality of life and weight-related experiential avoidance. When group-based ACT was compared to a behavioral weight loss training, the behavioral weight loss group outperformed the ACT condition in improving binge eating severity symptoms at posttreatment but not at follow up (Afari et al., 2019). Within the ACT group, there were significant improvements in binge eating severity, emotional eating and external eating subscales, weight-related experiential avoidance, as well as weight-related quality of life at posttreatment, 3-, 6-month follow up (Afari et al., 2019). Similar results were indicated by Cuneo and colleagues (2018) such that binge eating severity significantly improved for the ACT condition from baseline to post. Further, BMI and subscales of somatization, depression, and global severity index significantly improved for those in the ACT condition from baseline to posttreatment (Cuneo et al., 2018).

***Substance-Related Outcomes***

Four studies assessed alcohol or substance-related outcomes (Hermann et al., 2016; Lang et al., 2017; Meyer et al., 2018; Vowles et al., 2020). In one study, three of nine participants dropped from meeting criteria for alcohol dependence to alcohol abuse diagnoses, with one veteran no longer meeting criteria for alcohol use disorder completely at post treatment of individual ACT (Hermann et al., 2016). Similarly, Meyer and colleagues (2018) found that 12 sessions of individual ACT resulted in 55.2% of the sample no longer meeting criteria for alcohol use disorder, as well as, a significant decrease in alcohol related outcomes (i.e., total drinks, heavy drinking days) at post treatment and 3-month follow up. However, there were no significant group differences between ACT and PCT on alcohol use at posttreatment or follow up (Lang et al., 2017). For opioid misuse, veterans that participants in 12 sessions of individual ACT showed a decreased at post-treatment, while the UC group remained stable throughout (Vowles et al., 2020). Further, 50% of the ACT group dropped below the cut off point for current opioid misuse measure (i.e., COMM) scores at 6-month follow up (Vowles et al., 2020).

***Process Outcomes and Mindfulness***

Given that ACT interventions aim to improve psychological processes such as psychological flexibility, there were multiple studies that assessed process-related outcomes (i.e., cognitive fusion, experiential avoidance, acceptance, mindfulness, and values-based living). One case study indicated improvements in psychological flexibility at post treatment after 24 individual sessions (Hiraoka et al., 2016). In single arm trials assessing group-based ACT, studies showed significant improvements in psychological flexibility at post treatment of 8 sessions (Casselman and Pemberton, 2015), 12 sessions (Donahue et al., 2017), and 14 sessions (Haun et al., 2020), as well as at 6-week follow up (Donahue et al., 2017) and 3-month follow up (Huddleston et al., 2018). Similarly, veterans who attended a one-day ACT workshop showed significant increase in psychological flexibility at 3-month follow up (Dindo et al., 2021). In contrast, two studies did not find an improvement in psychological flexibility (Glover et al., 2016; Wharton et al., 2019b). Further, the findings are mixed when ACT is compared to a control condition. For example, when ACT is compared to TAU, veterans experienced significant improvements in psychological flexibility (Barnes et al., 2021; Dindo et al., 2020), as well as a reduction in cognitive fusion around suicidal ideation (Barnes et al., 2021). Meanwhile, when individual sessions of ACT was compared to PCT, there were no significant differences between the groups for psychological flexibility (Lang et al., 2017).

Regarding changes in acceptance, veterans demonstrated significant improvements in pain acceptance after participating in 8 sessions of in-person ACT, as compared to video conferencing ACT (Herbert et al., 2017). Similarly, veterans who participated in an ACT workshop experienced statistically improved pain acceptance and valued behavior at 3-month follow up when compared to the TAU group (Dindo et al., 2018). In regard to experiential avoidance, the findings were mixed. One study found significant improvements in experiential avoidance from pre- to 3-month follow up (Martin et al., 2023) while another found no differences from pre- to posttreatment after 6 sessions of geriatric informed, group-based ACT (Goetz & Hirschhorn, 2022). Valued action (or values-based living) was also improved among veterans after individual sessions of ACT (Barnes et al., 2021; Hiraoka et al., 2016; Hermann et al., 2016), as well as after a 1-day ACT workshop (Huddleston et al., 2018). Sessions of individual ACT (Walser et al., 2013) and engagement with an ACT-based mobile app (Reyes, Bhatta, et al., 2020) both demonstrated significant decrease in experiential avoidance and an increase in dispositional mindfulness for veterans. Contrary to the previous findings on mindfulness, two studies did not find mindfulness to be statistically significant (Wharton et al., 2019 a,b). Further, assessment of desire to avoid a thought were also not statistically significant across two studies (Wharton et al., 2019a,b).

In a sample of active-duty service members, there was a significant improvement in psychological flexibility, cognitive fusion, and valued action after receiving ACT in a mixed format of individual and group sessions (Ramirez et al., 2021).

**Risk of Bias Results**

Risk of bias assessment for included randomized controlled trials were evaluated by the second author using the Cochrane risk-of-bias tool (Higgins et al., 2011). This tool assesses the following domains: random sequence generation, allocation concealment, blinding participants and personnel, blinding of outcome assessment, incomplete outcome data, and selective reporting. The second author made a judgement of low, high, or unclear risk and provided support for his justification (Figure 2). For nonrandomized studies, the first author used the RoBANS2 (Seo et al., 2023) to assess risk of bias (see Figure 3). Findings from the risk of bias assessment indicate that all of the RCTs demonstrated low risk of bias for selection bias (i.e., random sequence generation, allocation concealment), attrition bias, and reporting bias. Future research may consider improving the risk of performance biases (i.e., blinding of participants and personnel) given all but one study demonstrated high risk in this area. Lastly, there were mixed findings regarding detection bias (i.e., blinding of outcome assessment) across RCTs. The RoBANS 2 assessment of non-randomized studies aims to provide a comprehensive framework to understand the plausible risk of bias. Results showed that there is generally a low risk of bias across domains for the included 19 nonrandomized studies. However, the domain of measurement of intervention (i.e., performance bias) had 9 studies that met criteria for “high” risk. Another noteworthy domain is blinding of assessors (i.e., detection bias). There were 14 studies that met criteria for “Unclear” meaning that it was unclear whether the assessors were blinded or masked.

**Discussion**

A total of 28 studies were included in this review. Of the studies that were included, five were RCTs, two non-randomized controlled trials, 17 single arm studies, and three case studies. ACT was shown to be implemented most commonly in samples of White male veterans aged between 30 and 60 years old and diagnosed with depression. ACT appears to be adaptable while retaining its effectiveness whether it is delivery format (e.g., group vs. individual therapy) as well as the modality (e.g., telepsychotherapy vs. in-person therapy). Lastly, it appears to be beneficial even when delivered as a single session (i.e., workshop) format. Overall, these results indicate that ACT shows promise as a transdiagnostic and adaptable treatment for Veterans.

In this review, psychological symptoms, psychological processes, and behavioral outcomes were examined. Chronic pain and associated opioid use, substance use, anxiety, depression, and PTSD were among the psychological and physiological presenting concerns treated in these studies Results from studies comparing ACT to a control condition indicated that ACT is more effective than waitlist control, treatment as usual or usual care in improving outcomes. However, when compared to active comparison conditions such as CBT and PCT, ACT performed just as well. Further, participants in the ACT condition showed improvement for a variety of presenting problems, as well as other clinically relevant secondary outcomes (i.e., positive coping, catastrophizing, symptom reduction). One study (Dindo et al., 2020), showed an improvement in military to civilian reintegration, which is a particularly beneficial outcome especially for Veterans.

Improvements in variables that are consistent with the ACT framework and underlying theory are both expected and encouraging as it lends additional support to the theoretical and applied work that has been previously conducted. Seeing consistent positive improvements in these areas (e.g., increased psychological flexibility) within this population lends additional support to the conceptualized mechanisms of change within this treatment. However, improvement in outcomes that are not consistent with the framework and theoretical orientation deserves additional research consideration. For example, examining which processes are occurring that resulted in decreases in non-traditional ACT outcomes such as catastrophizing. Additionally, Bomyea and colleagues (2017) examined unusual differences in treatment outcomes among Veterans with and without TBI and did not show any statistical differences based upon the existing research data. Areas such as these could benefit from qualitative or mixed method studies to generate hypotheses to account for these unexpected treatment differences to either refine the treatment protocol or lead to improved adaptations for this population (e.g., treatment considerations for TBI + versus TBI – patients). The results from these studies show a wide range of important clinical outcomes to include improvements in presenting concerns and as important improvement in quality of life.

ACT was consistently to be found at least as beneficial for Veterans as CBT, PCT, and TAU across a wide variety of presenting problems. Across the various study types, ACT showed clinically significant improvements in depression, anxiety, PTSD symptoms, chronic pain, and substance use. Given the higher prevalence of depression, anxiety, and stress disorder among Veterans when compared to the civilians, it is particularly encouraging that ACT can be a beneficial treatment approach. Additionally, ACT was found to improve quality of life specifically through reductions in maladaptive behaviors and increases in adaptive behaviors. This collection of studies suggests that ACT generates clinically significant improvement across important domains of functioning not just in the specified presenting concern. Clinicians often aim to help their given patient(s) as a whole person which includes improving functioning across various domains of living. ACT focuses on improving the quality of life for a given individual, connecting them with personal values while improving functional coping skills both internally (e.g., acceptance) and externally (e.g., committed action). The studies included in this review suggest that ACT is helping to make positive improvements in both primary and secondary outcomes, meaning the whole person is being treated and helped. This review also indicated that ACT is beneficial among active-duty service members. It should be noted that access to mental health services varies for active members compared to Veterans. Although both Veterans and some service members (i.e., National Guard and Reserve) receive benefits through the VA, the majority of those who seek mental health services are Veterans. Meaning, active-duty members or Reservists and National Guard who are in a training status tend to seek services on their military base or through their community.

It should be noted that there are some important limitations to the existing literature for ACT among U.S. Veterans. For example, most of the studies in this review recruited their participants from VA hospitals. While this is important, there is a significant portion of the Veteran population that does not receive their health care through this system. Meaning, there could be important differences in the population of Veterans receiving care through the VA compared to Veterans who receive their care outside of the VA. The results of these studies indicate that ACT shows promise for its use in the Veteran population; however, it’s lack of generalizability outside of the VA system should be considered. Another important area of generalizability is examining the differences in treatment outcomes based upon branch of the Veteran. The experience of Veterans across their enlistment likely differs in many important ways. Meaning, service branches each have different objectives and duties which expose them to varying stressors. This may be clinically important and for research in terms of understanding whether ACT is more beneficial for a patient based upon branch of service. The studies included in this review show promise in treating common psychological and physiological complaints for this population (i.e., depression, PTSD, chronic pain, and substance use). However, there is little research to this point in this population for other major concerns such as anxiety disorders, mood disorders, severe mental illness, and one important clinical focus for this population, suicidality. Further, the results of this review are limited in evaluating the efficacy of ACT given there were only five RCTs. Other methodological concerns to note include lack of blinding participants and personnel or assessors in both RCTs and non-RCTs. Overall, there are a limited number of studies in this area and the ones that have been completed vary in their quality and size. Thus, while ACT research overall has grown, the work for service members and Veterans is lacking. To date, the research findings are promising but additional research is needed to increase the generalizability of these results to the larger Veteran population along with understanding the transdiagnostic efficacy of ACT. This leaves the door open for exciting research opportunities not only for specific presenting problems but also looking at clinically beneficial outcomes.

Given these limitations, there are some future directions that are worth highlighting. It would be useful to assess Veterans who receive their care outside of the VA system (i.e., Veterans receiving their care through community care funded by the VA or from military providers). This may provide important insights into differences between Veterans seeking care at the VA compared to those who prefer a community provider. Further evaluation of existing literature and future research examining differences based on branch a service could help to inform both research and application of ACT. To increase rigor in future research, authors should consider more randomized controlled trials with active conditions as the control (e.g., CBT).

While ACT has been rolled out in the VA for treatment of depression, it has yet to be implemented nationwide in terms of treating other disorders such as PTSD, anxiety, chronic pain, and substance use within the VA healthcare system. There are studies in this review which point to ACT being efficacious and effective for each of these problems; however, more work is needed. Further, expanding research studies may include other highly prevalent disorders such as bipolar disorder and other severe mental illnesses. Future research studies would benefit from including suicidality measures as this is a high-risk population. ACT promotes meaningful action toward personal values which may aid in the reduction of suffering. Future research may benefit from utilization of mixed methods and/or qualitative methods to help determine the why and how ACT is resulting in improvements for this population and could help inform adaptations of existing protocols for Veterans. No matter the future research that is conducted among Veterans, this review indicates that ACT shows promising efficacy and effectiveness for this population. The extant literature lends evidence towards ACT being an effective transdiagnostic treatment which could be well suited to a range of clinics where a broad set of presenting problems can occur while also potentially being an efficacious treatment for specialty clinics (e.g., PTSD treatment teams).

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**Figure 1**

*PRISMA 2020 Flow Diagram for Updated Systematic Reviews*

**October 2018 search**

**Identification of new studies from updated searches**

Records removed *before screening*:

**May 2022**

Duplicate removed (n = 73)

Records removed as included in original search

(n = 4)

**Jan 2024**

Records removed as included in original search

(n = 19)

Studies included in previous version of review (n = 16)

**May 2022**

Records identified from:

Databases (n = 248)

ACBS website (n = 1)

**Jan 2024**

Records identified from:

PsycINFO (n = 66)

**Identification**

Records screened by title and abstract

**May 2022** (n = 172)

**Jan 2024** (n = 47)

**May 2022**

Excluded: 120

Review/editorial (n = 22)

No ACT intervention (n = 48)

Non-military sample (n = 10)

Subject non-relevant (n = 40)

**Jan 2024**

Excluded: 33

Review or Book (n = 12)

No quantitative data (n = 3)

Non-military sample (n = 6)

Non peer review journal (n = 6)

No ACT intervention (n = 6)

**Screening**

**May 2022**

Reports excluded: 40

No ACT intervention (n = 20)

No quantitative results (n = 3)

Subject non-relevant (n = 15)

Sample (n =2)

Reports sought for retrieval and assessed for eligibility:

**May 2022** (n = 52)

**Jan 2024** (n = 14)

Secondary analysis linked

**May 2020** (n = 1)

**Jan 2024** (n = 7)

New studies included in review

**May 2022** (n = 11)

**Jan 2024** (n = 7)

**Included**

Studies included in review

Unique (n = 34)

Total reviewed (42)

**Figure 2**

*Assessment of the Risk of Bias of Randomized Controlled Trials*

Risk of bias domains

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | D1 | D2 | D3 | D4 | D5 | D6 |
| Afari et al., 2019 | Low | Low | Low | Unclear | Low | Low |
| Barnes et al., 2021 | Low | Low | Low | Low | Low | Low |
| Dindo et al., 2018 | Low | Low | High | Low | Low | Low |
| Dindo et al., 2020 | Low | Low | High | Unclear | Low | Low |
| Herbert et al., 2017 | Low | Low | Low | Low | Low | Low |
| Lang et al., 2017 | Low | Low | High | Unclear | Low | Low |
| Martin et al., 2023 | Low | Low | Low | Low | Low | Low |
| Vowles et al., 2020 | Low | Low | High | Unclear | Low | Low |

Domains:

D1: Random sequence generation (selection bias)

D2: Allocation concealment (selection bias)

D3: Blinding participants and personnel (performance bias)

D4: Blinding of outcome assessment (detection bias)

D5: Incomplete outcome data (attrition bias)

D6: Selective reporting (reporting bias)

Risk: Low risk, High risk; Unclear risk

**Figure 3**

*RoBANS 2 Assessment of the Risk of Bias of Nonrandomized Studies*

Risk of bias domains

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 |
| Blevins et al. (2011) | Low | Low | Low | Low | Low | Low | Unclear | Low |
| Casselman & Pemberton (2015) | Low | Low | Low | Low | Unclear | Low | Unclear | Low |
| Cosio & Shafer (2015) | Low | Low | Low | High | Unclear | Low | Low | Low |
| Cosio (2016) | Low | Low | Low | High | Unclear | Low | Low | Low |
| Cuneo et al. (2018) | Low | Low | Low | Low | Unclear | Low | Low | Low |
| Dindo et al. (2021) | Low | Low | Low | Low | Unclear | Low | Low | Low |
| Donahue et al. (2017) | Low | Low | Low | Low | High | Low | Low | Low |
| Glover et al. (2016) | Low | Low | Low | High | Unclear | Low | Unclear | Low |
| Goetz & Hirschhorn. (2022) | Low | Low | Low | High | High | Low | Unclear | Low |
| Haun et al. (2020) | Low | Low | Low | High | Unclear | Low | Unclear | Low |
| Hermann et al. (2016) | Low | Low | Low | Low | Low | Low | Low | Low |
| Huddleston et al. (2018) | Low | Low | Low | Low | Unclear | Low | Unclear | Low |
| Jacobs et al. (2018) | Low | Low | Low | High | High | Low | Low | Low |
| Karlin et al. (2013) | Low | Low | Low | High | High | Low | Low | Low |
| Kelly et al. (2015) | Low | Low | Low | Low | Low | Low | Unclear | Low |
| Meyer et al. (2018) | Low | Low | Low | Low | Low | Low | Low | Low |
| Ramirez et al. (2021) | Low | Low | Low | Low | Unclear | Low | Low | Low |
| Reyes, Muthukumar, et al. (2020) | Low | Low | Low | Low | Unclear | Low | Unclear | Low |
| Reyes, Bhatta, et al. (2020) | Low | Low | Low | Low | Unclear | Low | Unclear | Low |
| Walser et al. (2013) | Low | Low | Low | High | Unclear | Low | Low | Low |
| Walser et al. (2015) | Low | Low | Low | High | Unclear | Low | Unclear | Low |
| Wharton et al. (2019)a | Low | Low | Low | High | Unclear | Low | Unclear | Low |
| Wharton et al. (2019)b | Low | Low | Low | High | Unclear | Low | Unclear | Low |

Domains:

D1: Comparability of the target group (selection bias)

D2: Target group selection (selection bias)

D3: Confounders (selection bias)

D4: Measurement of intervention/exposure (performance bias)

D5: Blinding of assessors (detection bias)

D6: Outcome assessment (detection bias)

D7: Incomplete outcome data (attrition bias)

D8: Selective outcome reporting (reporting bias)

Risk: “Low” (Low risk), “High” (High risk); “Unclear” (Unclear risk)

**Table 1**

*Study, Sample, and Intervention Characteristics of the Included Unique Studies (n = 34)*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Author(s) | Sample | Design | Control | Intervention Design | | | | |
| Format | Intervention | Other components | Total sessions | Dose per sessiona |
| Afari et al., 2019 | N = 88; Mage = 57.3; White = 70.5%; males = 76.1% | Randomized controlled trial | BWL | Group | ACT | Tailored for stress and eating | 4 | 120 |
| Barnes et al., 2021 | N = 70; Age range = 22-73; White = 61.4%; males = 81.4% | Randomized controlled trial | TAU | Individual | ACT  (ACT for Life) | Tailored for suicide prevention; TAU | 3-6 | NR |
| Blevins et al., 2011 | N = 144; Mage = NR; White = 92.36%; males = 92.36% | Non-randomized trial | WL | Workshop | ACT (LifeGuard) | NA | 1 | 120 |
| Casselman & Pemberton, 2015 | N = 3; Mage = NR; White = NR; males = 100% | Single arm trial | NA | Group | ACT | Parenting psychoeducation | 8 | 60 |
| Cosio & Schafer, 2015 | N = 39; Mage = NR; White = 14%; males = 86% | Single arm trial | NA | Group | ACT | Tailored for chronic pain | 10 | 60 |
| Cosio, 2016 | N = 96; Mage = NR; White = 16%; males = 90% | Non-randomized trial | Group CBT | Group | ACT | NA | 10 | 60 |
| Cuneo et al. 2018 | N = 85; Mage = 57.9; White = NR; males = 86.7% | Single arm trial | NA | Group | Stress and Eating ACT (SE-ACT) | Tailored for stress and eating; psychoeducation | 8 | 90 |
| Dindo et al., 2018 | N = 88; Mage = 62.6 (10.4); White = 82.5%; males = 94% | Randomized controlled trial | TAU | Workshop | ACT | Tailored for chronic pain; TAU | 1 | 300 |
| Dindo et al., 2020 | N = 39; Mage = NR; White = NR; males = NR | Randomized controlled trial | TAU | Workshop | ACT | TAU | 1 | 300 |
| Dindo et al., 2021 | N = 28; Mage = NR; White = 28.6%; males = NR | Single arm trial | NA | Workshop | ACT | NA | 1 | 300 |
| Donahue et al., 2017 | N = 16; Mage = 54.83 (14.57); White = 81%; males = 100% | Single arm trial | NA | Group | ACT | Tailored for anger and aggression | 12 | 90 |
| Glover et al., 2016 | N = 51; Mage = 53.23 (12.81); White = 64%; males = 86.27% | Single arm trial | NA | Group | Focused ACT (FACT) | NA | 4 | 90 |
| Goetz & Hirschhorn, 2022 | N = 17; Mage = 69.71; White = 94.1%; males = 94.1% | Single arm trial | NA | Group | ACT | Geriatric informed | 6 | 60 |
| Haun et al., 2020 | N = 201; Mage = 51.9 (8.8); White = 55.5%; males = 0% | Single arm trial | NA | Group | ACT (THRIVE) | NA | 14 | 120 |
| Hiraoka et al., 2016 | N = 1; Mage = 21; White = 100%; males = 0% | Case study | NA | Individual | ACT | NA | 24 | 60 |
| Herbert et al., 2017 | N = 128; Mage = 52 (13.3); White = 47%; males = 82.2% | Randomized controlled trial | In-person ACT | Individual | ACT VTC (video teleconferencing) | Tailored for chronic pain | 8 | 60 |
| Hermann et al., 2016 | N = 9; Mage = 48.44 (15.41); White = 77.8%; males = 88.89% | Single arm trial | NA | Individual | ACT | Tailored for PTSD and SUD | 12 | 60 |
| Huddleston et al., 2018 | N = 25; Mage = 69.71; White = 24%; males = 64% | Single arm trial | NA | Workshop | ACT | Veteran centered language in protocol; Migraine edu | 1 | 180 |
| Jacobs et al., 2018 | N = 17; Mage = 68; White = 76.5%; males = 100% | Single arm trial | NA | Group | ACT | NA | 12 | 60 |
| Karlin et al., 2013 | N = 731; Mage = 51 (12.4); White = 73.5%; males = 78.7% | Single arm trial | NA | Mixed | ACT for depression (ACT-D) | NA | 3-day workshop; 12-16 individual | 90 (individual) |
| Kelly et al., 2015 | N = 19; Mage = 56; White = 84.2%; males = 100% | Single arm trial | NA | Individual | ACT for PTSD and Tobacco Addiction (ACT-PT) + NRT | Tailored for smoking cessation and PTSD | 9 | 60 |
| Kelly et al. 2020 | N = 1; Mage = NR; White = NR; males = 100% | Case study | NA | Individual | ACT for social support (ACT-SS) | Tailored for social support | 12 | 50 |
| Lang et al., 2017 | N = 160; Mage = 34.2 (8.0); White = 75%; males = 80% | Randomized controlled trial | PCT | Individual | ACT for depression | NA | 12 | 60 |
| Martin et al., 2023 | N = 149; Mage = 48; White = 44.3%; males = 0% | Randomized controlled trial | CBT-I | Individual | Acceptance and behavioral change for insomnia (ABC—I) | Tailored for insomnia | 5 | NR |
| Meyer et al., 2018 | N = 29; Mage = 45.26 (8.6); White = 31%; males = NR | Single arm trial | NA | Individual | ACT for PTSD-AUD | NA | 12 | 60 |
| Ramirez et al., 2021 | N = 311; Mage = 37.6 (8.06); White = 43.4%; males = 68.2% | Single arm trial | NA | Mixed | ACT | Tailored PTSD; Exposure | NR (group); 12 (individual) | 720 (group); 720-1,080 (individual) |
| Reyes, Muthukumar et al., 2020 | N = 9; Mage = 31.44; White = NR; males = 33.3% | Single arm trial | NA | Mobile app | ACT | NA | 14 | NR |
| Reyes, Bhatta et al., 2020 | N = 23; Mage = 31.22 (5.53); White = 56.5%; males = 60.86% | Single arm trial | NA | Mobile app | ACT | NA | 28 | NR |
| Smith et al., 2021 | N = 1; Mage = NR; White = 0%; males = 100% | Case study | NA | Individual (TVC) | ACT | NA | 19 | 60 |
| Walser et al., 2013 | N = 745; Mage = 51 (12); White = 73%; males = 78% | Single arm trial | NA | Individual | ACT for depression | Tailored for depression | 12 | NR |
| Walser et al., 2015 | N = 981; Mage = 50.5 (12.5); White = 72.2%; males = 75.5% | Single arm trial | NA | Individual | ACT for depression | Tailored for depression | 12-16 | 90 |
| Vowles et al., 2020 | N = 35; Mage = 50 (10.5); White = 51.4%; males = 86% | Randomized controlled trial | UC | Individual | ACT | Tailored for chronic pain; UC | 12 | 90 |
| Wharton et al., 2019 (a) | N = 10; Mage = NR; White = 70%; males = 100% | Single arm trial | NA | Group | ACT | Tailored for PTSD | 12 | 90 |
| Wharton et al., 2019 (b) | N = 11; Mage = 54.5; White = 45.4%; males = 100% | Single arm trial | NA | Individual | ACT | Tailored for PTSD | 12 | 60 |

*Note.* Mage = mean age; WL = waitlist; ACT = acceptance and commitment therapy; NA = not applicable; NR = not reported; CBT = cognitive behavioral therapy; CBT-I = cognitive behavioral therapy for insomnia; TAU = treatment as usual; BWL = behavioral weight loss training; VTC = video teleconferencing; SUD = substance use disorder; PTSD = posttraumatic stress disorder; UC = usual care; AUD = alcohol use disorder; TVC = telehealth video conferencing; NRT = nicotine replacement therapy; PCT = present centered therapy.

aDose is recorded in minutes.

**Appendix A**

*Assessment Characteristics for Included Studies.*

|  |  |  |  |
| --- | --- | --- | --- |
| Author(s) | Outcome (Measure) | Assessment  time points | Findings |
|
| Afari et al., 2019  *Wooldridge et al., 2019*  *Wooldridge et al., 2022* | Binge eating severity (BES), Eating habits (DEBQ), Obesity related quality of life (ORWELL-97), Weight related experiential avoidance (AAQ-W)  *Wooldridge et al., 2019*  Functional exercise capacity (6MWT), Disinhibited eating (BES), Eating habits (DEBQ), BMI  *Wooldridge et al., 2022*  Dietary intake (FFQ), Weight related experiential avoidance (AAQW-R) | Baseline, Post-Tx, 3MFU, 6MFU | Participants in the BWL group exhibited significantly greater decreases from baseline to post-treatment compared with participants in the ACT group (*p* < 0.01) and a non-significant trend for greater decreases from baseline to 3- or 6-month follow-up. Both groups demonstrated reductions in BES scores across time with significantly lower scores at 3- and 6-month follow-up compared with baseline. There were no significant interactions for DEBQ subscales, ORWELL-97, AAQ-W or weight.  There were significant reductions for DEBQ emotional eating and external eating subscales at post-treatment and follow-ups compared with baseline. The DEBQ restraint subscale was significantly increased in scores from baseline to post-treatment with no differences between scores at follow-ups and baseline. There were significant effects for ORWELL-97 and AAQ-W with significantly lower scores at post-treatment and follow-ups compared with baseline.  *Wooldridge et al., 2019*  38% of participants had increased 6MWT distance by 100 ft or more. There was an increase in 6MWT distance from the baseline to 6MFU, with a minimal to moderate effect. There were no significant effects for group or time x group interaction.  *Wooldridge et al., 2022*  AAQW-R total scores decreased significantly from baseline to post-treatment (p = 0.001), as did subscale scores for Food as Control (p < 0.001), and Weight as a Barrier to Living (p = 0.043). |
| Barnes et al., 2021 | Values importance and consistency (VLQ), Global life satisfaction (SWLS), Psychological functioning (IPF), Symptom distress and functioning (OQ-45), Social functioning (SFQ), Global physical and mental health (PROMIS-SF) | Baseline, Post-Tx, 1MFU, 6MFU | ACT for Life participants suggests potential increases in values-consistent behavior and satisfaction with life, as well as decreases in symptom distress and functional impairment and suicidal ideation intensity. ACT for Life participants’ showed decreases in psychological inflexibility and cognitive fusion with suicidal ideation. |
| Blevins et al., 2011 | Global functioning (SF-12), depression (PHQ-9), generalized anxiety disorder (GAD), posttraumatic stress disorder (PCL-C); anger (BPAQ), relationship satisfaction (DAS), substance use (AUDIT), interpersonal conflict (CTS) | Baseline, 2MFU | At 2MFU, Life Guard participants showed statistically significant decrease in depressive symptoms (mean difference = 2.609) and positive improvement in relationship satisfaction (mean difference = -2.621) when compared to control condition participants. |
| Casselman & Pemberton, 2015 | Positive parenting behavior (PARQ), parenting satisfaction (KPS), psychological flexibility (AAQ-II), posttraumatic symptoms (PCL-M) | Baseline, Post-Tx | Assessing pre/post differences utilizing RCI corrections, all participants showed statistically significant improvements in positive parenting behaviors, two had significant improvements in parenting satisfaction, and two had significant improvements in psychological flexibility. |
| Cosio & Schafer, 2015 | Pain interference and pain severity (BPI), coping strategies (CPCI), functional disability (ODI), distress (BSI-18); coping/catastrophizing (CSQ); Readiness questionnaire | Baseline, Post-Tx | At post-tx, ACT showed a statistically significant improvement in pain interference (ES = 0.26), along with significant decreases in illness-focused coping (ES = 0.38) and global distress (ES = 0.42). |
| Cosio et al., 2016 | Pain interference and pain severity (BPI), coping strategies (CPCI), functional disability (ODI), distress (BSI-18); coping/catastrophizing (CSQ); Readiness questionnaire | Baseline, Post-Tx | There were no significant differences between interventions. Both groups (CBT and ACT) showed statistically significant decreases in illness-focused coping (ES = 0.70), catastrophizing (ES = 0.55), and global distress (ES = 0.84). |
| Cuneo et al., 2018 | Binge eating severity (BES), body mass index, health functioning (SF-8), distress (BSI) | Baseline, Post-Tx | At post-tx, SE-ACT participants showed medium to large effects on the BES (ES = 0.27), BMI (ES = 0.09), SF-8 (ES = 0.22), and all subscales of the BSI (BSI-SOM ES = 0.08; BSI-DEP ES = 0.11; BSI-GSI ES = 0.10) except for the anxiety subscale. |
| Dindo et al., 2018 | Pain intensity per day (DLPM), pain acceptance (CPAQ), engagement in valued behavior (CPVI) | Baseline, 3MFU | The ACT + TAU showed more days of pain cessation, were taking fewer opioids, improved pain acceptance (mean difference = 1.42), valued behavior – success (mean difference = .13), and valued behavior – discrepancy (mean difference = -.42), at follow-up as compared to TAU. |
| Dindo et al., 2020 | Depression, anxiety, stress (DASS-21), posttraumatic symptoms (PCL-C), functioning and disability (WHODAS), pain (BPI), psychological inflexibility (AAQ-II), post deployment reintegration (M2C-Q) | Baseline, 3MFU | When compared to TAU participants, the ACT group showed significant improvement in depression, anxiety and stress (ES = 0.68), decreases in PTSD symptoms (ES = 0.33), decreases in disability (ES = 0.30), decreased difficulties in reintegration (ES = 0.47), and increased psychological flexibility (ES = 0.56). |
| Dindo et al., 2021 | Distress and functioning (OQ-45), reintegration (M2C-Q), posttraumatic symptoms (PCL-5), meaning and purpose (PROMIS), psychological flexibility (AAQ) | Baseline, 1MFU, 3MFU | Within group changes from baseline and 3MFU showed small effect size improvements on distress and functioning (ES = -0.37), PTSD symptom severity (ES = -0.28), and psychological flexibility (ES = -0.22). Medium effects were seen on meaning and purpose (ES = 0.40) and reintegration (ES = -0.45). |
| Donahue et al., 2017 | Anger (DAR), aggression (AQ), quality of life (QOLI), psychological inflexibility (AAQ-II) | Baseline, Post-Tx, 6WFU | A main effect of time was found for physical aggression (ES = 0.53 at post-tx) and for psychological flexibility (ES = 0.65 at post-tx; ES = 0.86 at 6WFU). Participants reported increased ability to manage anger (*p* < .05). |
| Glover et al., 2016 | Depression, anxiety and stress (DASS-21), health functioning (SF-12), psychological flexibility and experiential avoidance (AAQ-II), well-being and quality of life (WBI-5) | Baseline, Post-Tx | Pre to post-tx analyses revealed large effects of QOL (ES= 0.30), moderate effects for depressive symptoms (ES = 0.08), moderate effects on perceptions of mental health functioning (ES= 0.11). Small effects for perceived stress (ES = 0.03) and for physical health functioning (ES = 0.08). No significant effects were found on psychological flexibility. |
| Goetz & Hirschhorn, 2022 | Life satisfaction (SWLS), Depression severity (GDS-SF), Experiential avoidance (AAQ-II) | Baseline, Post-Tx | Treatment resulted in significant reductions in depression and increases in satisfaction with life. No significant difference found in AAQ-II scores at pre-treatment and post-treatment. |
| Haun et al., 2020 | Depression (PHQ-9), anxiety (GAD-7), psychological inflexibility (AAQ-II), global life satisfaction (SWLS), health functioning (SF-12) | Baseline, Mid-Tx, Post-Tx | Participants saw statistically significant improvement across most scales in the three assessments with the exception of the physical composite score on the SF-12 (p = 0.487). Pain interference significantly decreased across treatment (p = 0.042). |
| Hiraoka et al., 2016 | Psychological inflexibility (AAQ-II), depression (BDI-II) | Baseline, Post-Tx | Psychological flexibility (AAQ-II) dropped steadily across treatment (pre = 42; post = 16) along with improvement in depressive symptoms (BDI-II; pre = 33; post = 16). Of note, the participant made significant functional improvements in her daily life and improved her engagement in values consistent actions. |
| Herbert et al., 2017  *Herbert et al., 2018*  *Herbert et al., 2019* | Pain interference and pain severity (BPI); health-related quality of life (SF-12); pain acceptance (CPAQ), disability and functioning (MPI), depression (PHQ-9), pain-related anxiety (PASS-20), sleep quality (PSQI)  *Herbert et al. (2018)* Executive functioning (DKEFS-Inhibition subtest), Working memory (WAIS-IV Letter Number Sequencing subtest), Processing speed (WAIS-IV Symbol Search subtest), Learning and verbal memory (CVLT-II), Pain interference (BPI – interference scale), Health-related quality of life (SF-12), Disability and functioning, Depressive symptoms (PHQ-9), Pain-related anxiety (PASS)  *Herbert et al. (2019)* Pain interference (BPI-Interference scale), Pain acceptance (CPAQ), Depressive symptoms (PHQ-9), Pain-related anxiety (PASS-20), PTSD symptoms (PCL-C) | Baseline, Mid-Tx, Post-Tx, 3MFU, 6MFU | Group x Time interaction showed significant decreases in baseline, post-treatment, and 6MFU pain interference scores (ES = 0.81 & ES = 0.84, respectively) with no differences between groups. In-person ACT participants showed greater change on MPI-activity scores compared to VTC (*p* = 0.03). In-person ACT showed improvements for BPI severity (ES = .52), SF-12-MCS (ES = .37), SF-12-PCS (ES = .60),pain acceptance (ES = 1.01), depressive symptom severity (ES = .42), and pain-related anxiety (ES = .65). No significant changes were noted on sleep quality.  *Herbert et al. 2018*  The only significant interactions observed were between time and neuropsychological functioning with depression and pain-related anxiety. A significant interaction was observed between time and Inhibition (P = .04), and between time and Symbol Search with depressive symptoms (P = .03). Further, a significant interaction was observed between time and Letter-Number Sequencing (P = .04), and between time and Symbol Search with pain-related anxiety (P = .04).  *Herbert et al. 2019*  After removing the PTSD status by time, there was a significant effect of time for pain interference, pain severity, pain acceptance, and pain-related anxiety (P < 0.01). |
| Hermann et al., 2016 | Treatment satisfaction (CSQ-8), psychological inflexibility (AAQ-II) values-based living (VLQ), PTSD diagnosis and severity (CAPS-IV) PTSD symptoms (PCL-S), substance use (STLFB), health related quality of life (VR-12) | Baseline, Mid-Tx, 3MFU | 42.9% of participants completed all sessions which is on par or better than other treatments for PTSD/SUDS. Participants rated the treatment as understandable and logical, and were highly satisfied with help received. Self-reported PTSD symptoms saw modest improvement in pre-post analysis, with one participant losing a PTSD diagnosis. Three participants dropped from alcohol dependence to abuse diagnoses, with one losing an alcohol use disorder diagnosis altogether. Seven participants noted an increase in values based living. |
| Huddleston et al., 2018 | Depressive symptom severity (HRS-D), Anxiety symptom (HRS-A), Dimensions of depression and anxiety disorders (IDAS), Disability (WHODAS II), Engagement with live – pain related (CPAQ), Importance, success, and living out values (CPVI), Psychological flexibility (AAQ) | Baseline, 3MFU | At the 3MFU, 57% no longer met criteria for major depressive episode. Significant improvements in depressive symptoms (p < 0.01) and anxiety symptoms (p < 0.01). A nonsignificant trend toward improvement was observed for IDAS – Depression (p = 0.07) and IDAS Well-Being scores (p = 0.12). At 3MFU, significant improvements were found in functioning (p < 0.05) and in headache-related disability (p < 0.05). There was significant improvements in values-based engagement (p < 0.05), acceptance-based coping (p < 0.05), and psychological flexibility (p < 0.01) at 3MFU. |
| Jacobs et al., 2018 | Depressive symptoms (GDS-15), Anxiety symptoms (GAD-7), Psychological flexibility (AAQ-II) | Baseline, Post-Tx | Treatment resulted in statistically significant reductions in depressive symptoms. Although not statistically significant, there were minor decreases in anxiety scores and increase in psychological flexibility. |
| Karlin et al., 2013 | Depression severity (BDI-II), quality of life (WHOQOL-BREF), therapeutic alliance (WAI-SR) | BDI-II (pre and post each session), WHOQOL-BREF (sessions 1, 7, and final), WAI-SR (sessions 1,,3,7, 11) | Mean depressive scores decreased for both older and younger veterans from pre to post treatment (ES = 0.95; ES = 1.01 respectively). All quality of life subscales showed statistically significant improvement (p < 0.05) except for the WHOQOL-BREF physical QOL subscale. |
| Kelly et al., 2015 | Nicotine dependence (FTND), Readiness to quit smoking (CL), Satisfaction with behavioral treatment (CSQ-8), Function of smoking urges (QSU-Brief), PTSD symptoms (PCL) | Baseline, Post-Tx, 1MFU, 3MFU | Results showed 50% were abstinent at the end of treatment, 50% were abstinent at the 1MFU and 21% were abstinent at 3MFU. Participants significantly reduced the number of cigarettes per day. There was a 62%average reduction in individual-level percentage of smoking at post, a 62% average reduction at the 1MFU, and a 43% average reduction at the 3MFU. PTSD symptoms significantly decreased over time from baseline to the post-tx and remained significantly decreased at 1MFU and 3MFU. |
| Kelly et al. 2020 | Depression (BDI-II), posttraumatic symptoms (PCL-5), quality of life (Q-LES-Q-SF); client satisfaction (CSQ), therapeutic alliance (WAI) | Baseline, Sessions 1-12, 3MFU | Participant saw a decrease in PTSD symptom severity pre-post (51 to 40 respectively) with these gains being maintained at 3MFU. Decrease in depressive symptoms from a peak score of 36 (session 1) to 18 at post-tx with gains continuing at 3MFU (BDI-II = 15). QOL improved across treatment as well from 21 at baseline to 35 at post and 29 at 3MFU. Participant had high satisfaction (CSQ = 30) and alliance with therapist (WAI = 47). |
| Lang et al., 2017  *Gobin et al., 2019*  *Bomyea et al., 2017* | Depression, anxiety, distress (BSI-18 – GSI), disability (SDS), alcohol use (AUDIT), depression (PHQ-9), insomnia (ISI), posttraumatic symptoms (PCL), quality of life (WHOQOL-BREF), psychological inflexibility (AAQ-II), satisfaction (CSQ-8)  *Gobin et al. (2019)* Depression, anxiety, distress (BSI-18), Trauma related symptoms (PCL-MV), Health-related functioning (SF-12)  *Bomyea et al. (2017)* TBI screening (I-TBI), Functional impairment (SDS), Depression, anxiety and somatization symptoms (BSI-18), Health-related functioning (SF-12), Post-concussion symptoms (RPQ) | Baseline, mid-Tx, Post-Tx, 3MFU, 6MFU, 9MFU, 12MFU | Across the whole sample improvements were noted for general distress (ES = 0.74) and functioning (ES = 0.71). ACT showed a greater improvement on insomnia when compared to PCT (ES = 0.63 and 0.08 respectively). Neither treatment differed significantly on changes outside of insomnia, nor in drop-out or satisfaction ratings.  *Gobin et al., 2019*  Changes between time, group and gender were examined. There was no significant interaction for the general distress, physical health-related functioning, or mental health-related functioning. There was a significant interaction for PTSD among women, but not men. Among women, ACT led to greater decreases than PCT in PTSD symptom severity from baseline to posttreatment, whereas the treatments did not differ among men.  *Bomyea et al., 2017*  Scores improved significantly over time on the BSI-18 (d = 0.74), SDS (d = 0.60), and SFMCS-12 (d = 0.43). There were no statistically significant improvement in SFPCS-12 scores. Regardless of the TBI status, the magnitude of reductions on all outcomes over time was modest. TBI did not moderate the slope of change over time in ACT versus PCT for the BSI-18, SDS, SFPCS-12, or SFMCS-12. TBI also did not moderate posttreatment outcomes in ACT versus PCT as measured by the BSI-18, SDS, SFPCS-12, or SFMCS-12. Individuals in ACT versus PCT did not show differential improvement in RPQ-3 and RPQ-13 subscales. Data raise the possibility that PCS are associated with greater severity, but not differential change in symptoms over treatment. |
| Martin et al., 2023 | Sleep efficiency (Sleep diary and wrist actigraphy), Insomnia symptom severity (ISI), Sleep disturbance (PSQI), PTSD symptoms (PCL-5), Depressive symptoms (PHQ-9), Anxiety symptoms (GAD-7), Psychological flexibility and experiential avoidance (AAQ-II), Beliefs about insomnia (DBAS-10), Sleep hygiene behaviors (SHI) | Baseline, Post-Tx, 3MFU | At posttreatment, ABC-I was noninferior for sleep diary sleep efficiency, and objective sleep efficiency from actigraphy; ps < .002), but not for ISI or PSQI total scores. However, at 3MFU, ABC-I was noninferior to CBT-I for ISI, PSQI, sleep diary sleep efficiency, and objective sleep efficiency. There were no between-group differences in SHI scores at either time point. DBAS scores were significantly lower for the CBT-I group compared to the ABC-I group at posttreatment, but not at 3MFU. AAQ scores improved more in the ABC-I group compared to the CBT-I group at 3MFU but not at immediate posttreatment.  Within-group comparisons showed that SHI, DBAS, and AAQ improved significantly from baseline to posttreatment and from baseline to 3MFU for both ABC-I and CBT-I groups. |
| Meyer et al., 2018 | PTSD severity and diagnosis (CAPS-5), PTSD symptoms (PCL-5), substance use (SCID-5), amount and frequency of substance use (TLFB), AUD symptoms and severity (AUDIT), functional impairment (WHODAS 2.0), quality of life (WHOQOL-BREF), depression (PHQ-9), psychological inflexibility (AAQ-II), experiential avoidance (BEAQ), drug use symptoms (DAST) | Baseline, Post-Tx, 3MFU | Clinician and participant ratings of PTSD symptoms were significantly decreased at post-tx (ES = 0.79 and 0.96) with gains from treatment remaining at 3MFU (ES = 0.88). Decreases across all alcohol related outcomes were seen at post-tx and 3MFU (ES range = 0.65-1.30). QOL improved at post-tx and 3MFU (ES = 0.55, 0.56). Functional disability improved significantly at 3MFU (ES = 0.52). |
| Ramirez et al., 2021 | PTSD diagnosis (PSSI-5), PTSD symptoms (PDS-5), depression (PHQ-9), anxiety (GAD-7), insomnia (ISI), functioning (BASIS-24), psychological flexibility (AAQ-II), cognitive fusion (CFQ), valued action (VLQ) | Baseline, Post-Tx | Large effect sizes (ES > 0.8) were found for PDS-5, PCL-5, AAQ-II and CFQ. Medium effect sizes (ES = 0.05-0.79) were found for BASIS-24 and GAD-7. Small effect sizes were found for PHQ-9 and subscales of the VLQ. Effect sizes for the ISI were nonsignificant. |
| Reyes, Muthukumar et al., 2020 | Satisfaction (ISS), usability (SUS) | Baseline, Mid-Tx, Post-Tx | Satisfaction with the treatment increased from mid-tx to post-tx, though this was not statistically significant (*p* = 0.32). SUS scores increased in a similar fashion from mid to post-tx, again not statistically significant (*p* = 0.31). |
| Reyes, Bhatta et al., 2020  *Reyes et al., 2022* | Resilience (CD-RISC), PTSD symptoms (PCL-5), dispositional mindfulness (MAAS), experiential avoidance (AAQ-II), rumination (RSS), satisfaction (ISS), usability (SUS), history of exposure to trauma events (PC-PTSD-5) | Baseline, Mid-Tx, Post-Tx | Resiliency (*p* < 0.01) and mindfulness (*p*< 0.001) scores significantly increased from mid to post-tx while experiential avoidance, PTSD symptoms and rumination decreased significantly at those time points (*p* < 0.001).  *Reyes et al., 2022*  No quantitative data reported. |
| Smith et al., 2021 | Distress (K6), depression (PHQ-9), posttraumatic symptom (PCL-5), quality of life (WHOQOL-BREF) | Baseline, Session 6, Post-Tx, 1MFU | PHQ-9 scores dropped from 14 at baseline to 6 at post-tx. Distress (K-6) scores dropped from 16 at baseline to 7 at post-tx. PTSD symptom severity was 48 at baseline and dropped to 10 at post-tx. QOL improved across the four assessed domains from pre to 1MFU with improvements in scores ranging from 38% - 120% increases in scores. |
| Walser et al., 2013 | Depression (BDI-II), quality of life (WHOQOL-BERF), experiential avoidance (AAQ-II), mindfulness (FFMQ), therapeutic alliance (WAI-SR) | Baseline, Post-Tx | Mean BDI-II scores decreased from 30 at baseline to 19 at post-tx (*p* < 0.001). QOL improved across all domains (ES range: 0.40 – 0.61). AAQ-II and FFMQ scores significantly improved across treatment (*p* < 0.001). WAI-SR scores were associated with participant improvement, however when controlling for AAQ-II scores this relationship was no longer significant. |
| Walser et al., 2015 | Depression and suicidal ideation (BDI-II), mindfulness (FFMQ), experiential avoidance (AAQ-II) | Baseline, Mid-Tx, Post-Tx | Improvements in acceptance and mindfulness scores were associated with decreased depressive symptoms (b = -0.44 and -0.09 respectively). Increases in acceptance was associated with decreases in SI across treatment (*p* = 0.16). |
| Vowles et al., 2020 | Current opioid misuse (COMM), pain interference (PROMIS); opioid dose; pain intensity past 7 days | Baseline, Post-Tx, 6MFU | At 6MFU, integrated intervention (50%) vs UC (10%) reduction in misuse (ES = .73); decreased in pain interference (ES = .79) and pain intensity (ES = .79); decreased modestly in pain behavior (ES = .30), and had higher prescribed doses (ES = .83) |
| Wharton et al., 2019 (a) | Posttraumatic symptoms (PCL-M), automatic thoughts (ATQ), mindfulness (KIMS), desire to avoid a thought (WBSI) | Baseline, Post-Tx | PTSD symptom severity significant decreased from baseline to post-tx (ES = 0.69). Changes in the KIMS and WBSI from baseline to post-tx were not statistically significant. Differences on ATQ were also not statistically significant. |
| Wharton et al., 2019 (b) | Posttraumatic symptoms (PCL-M), distress (SCL-6), quality of life (WHOQOL-BREF), desire to avoid a thought (WBSI), psychological flexibility (AAQ-II), mindfulness (FFMQ) | Baseline, Post-Tx, 3MFU | Changes in PTSD symptom severity were significant from baseline to post-tx (ES = 0.71) and from baseline to 3MFU (ES = 1.24). For QOL only the physical domain was found to be statistically significant (ES = 0.80). Changes in the SCL-6 were nonsignificant. The non-reactivity subscale of the FFMQ was significant (ES = 1.34), Changes in AAQ\_II and WBSI were nonsignificant. |

*Note.* Studies in italics are supplemental studies providing additional outcome data. Tx = treatment; MFU = month follow up; WFU = week follow up; RCI = reliable change index; ES = effect size; SE-ACT = Stress and Eating Acceptance and Commitment; **Quality of life measures:** SF-12 = 12-item Short Form Survey; WHOQOL-BREF = World Health Organization Quality of Life-BREF; QOLI = Quality of Life Inventory; WBI-5 = WHO-5 Well Being Index; SWLS = Satisfaction with Life Scale; Q-LES-Q-SF = Quality of Life, Enjoyment, and Satisfaction Questionnaire-Short Form; ORWELL-97 = Obesity-related Well Being Scale; **Symptom measures:** PHQ-9 = Patient Health Questionnaire–9; GAD-7 = Generalized Anxiety Disorder – 7; PCL-C = Posttraumatic Stress Disorder Checklist - Civilian; BPAQ = Buss-Perry Aggression Questionnaire; PCL-M = Posttraumatic Stress Disorder Checklist - Military; BPI = Brief Pain Inventory-Short Form; BSI-18/ GSI = Brief Symptom Inventory–18/ Global Severity Index; CPVI = Chronic Pain Values Inventory; DASS-21 = Depression Anxiety Stress Scale-21 item; CSQ = Coping Strategies Questionnaire; GDS = Geriatric Depression Scale; CPCI = Chronic Pain Coping Inventory – Short Form; BES = Binge Eating Scale; Dutch Eating Behavior Questionnaire (DEBQ); DBAS-10 = Dysfunctional Beliefs and Attitudes about Sleep; BSI = Brief Symptom Inventory -18; OQ-45 = Outcome Questionnaire 45-items; M2C-Q = Military to Civilian Questionnaire; PROMIS = Patient Reported Outcomes Measurement Information System; SHI = Sleep Hygiene Index; FTND = The Fagerstrom Test for Nicotine Depedence; CL = Contemplation Ladder; QSU-Brief = Questionnaire for Smoking Urges – Brief; DAR = Dimensions of Anger Reactions Scale; HRS-D = Hamilton Rating Scale for Depression; HRS-A = Hamilton Rating Scale for Anxiety; IDAS = The Inventory of Depression and Anxiety Symptoms; AQ = Aggression Questionnaire; CPAQ = Chronic Pain Acceptance Questionnaire- revised; MPI = West Haven-Yale Multidimensional Pain Inventory; PASS-20 = Pain Anxiety Symptom Scale – Short Form; PSQI = Pittsburgh Sleep Quality Index; CAPS-IV = Clinician Administered PTSD Scale for DSM-IV; PCL-S = Posttraumatic Stress Disorder Checklist – self report; VR-12 = Veteran Short Form Health Survey; BDI-II = Beck Depression Inventory-II; AUD = alcohol use disorder; WAI-SR = Working Alliance Inventory-Short Revised; DAS = Dyadic Adjustment Scale; CTS = Conflict Tactics Scale; PARQ = Parental PARQ/Control: Child-Short Form; KPS = Kansas Parental Satisfaction Scale; IPF = Inventory of Psychosocial Functioning; ISI = Insomnia Severity Index; AUDIT = Alcohol Use Identification Test; SCID-5 = Structured Clinical Interview for DSM-5; DAST = Drug Abuse Screening Test; PSSI-5 = Posttraumatic Symptom Scale Interview for DSM 5; SFQ = Social Functioning Questionnaire; PDS-5 = Posttraumatic Diagnostic Scale for DSM5; BASIS-24 = Behavior and Symptom Identification Scale; SUS = System Usability Survey; ISS = Intervention Satisfaction Survey; CD-RISC = Connor-Davidson Resilience Scale; RSS = Ruminative Responses Scale; PC-PTSD-5 = Primary Care PTSD Screen for DSM-5; K6 = Kessler Psychological Distress Scale 6; DKEFS = Delis-Kaplan Executive Function System; WAIS-IV = Wechsler Adult Intelligence Scale, fourth edition; CVLT-II = California Verbal Learning Test-II; WHYMPI-25 = The West Haven–Yale Multidimensional Pain Inventory 25; PASS = Pain Anxiety Symptoms Scale-Short Form; FFQ = General Nutrition Assessment Food Frequency Questionnaire; RPQ = Rivermead Post-concussion Symptoms Questionnaire; **Process measures:** AAQ-II = Acceptance and Action Questionnaire-II; VLQ = Valued Living Questionnaire; BEAQ = Brief Experiential Avoidance Questionnaire; CFQ = Cognitive Fusion Questionnaire; AAQ-W = Acceptance and Action Questionnaire – Weight-related; **Mindfulness measures:** FFMQ = Five Facet Mindfulness Questionnaire; MAAS = Mindful Attention Awareness Scale; KIMS = Kentucky Inventory of Mindfulness Skills; **Disability measures:** ODI = Oswestry Disability Index; WHODAS 2.0 = World Health Organization (WHO) Disability Assessment Schedule 2.0; SDS = Sheehan Disability Scale; **Log measures:** DLPM = daily log of pain and pain medication; STLFB = Self-administered Timeline Followback; TLFB = Timeline Followback (past 30 days).