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Acceptance and commitment therapy for co-occurring gambling disorder and posttraumatic stress disorder in veterans: a narrative review

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ABSTRACT

Background: PTSD and gambling disorder (GD) are frequently comorbid. Gambling may provide escape-based coping for the emotions experienced by PTSD sufferers. Military personnel may be at increased risk of PTSD and/or GD. Acceptance and Commitment Therapy (ACT) has been found to improve both PTSD and GD outcomes, yet research into the potential effectiveness of ACT for PTSD and/GD in veterans is scarce.

Objective: This review aimed to systematically assess and describe the evidence relating to the use of ACT and acceptance-based therapy for military populations with PTSD and/or GD.

Method: Six databases were searched. Selection criteria included studies that featured the armed forces/military, delivered ACT/acceptance-based therapy, and aimed to improve PTSD and/or GD outcomes. A narrative synthesis approach was adopted.

Results: From 1,117 results, 39 studies were fully screened and 14 met inclusion criteria. All studies originated from the USA and 9 were associated with United States Department of Veterans Affairs. Therapy use within each study produced an improvement in PTSD and/or GD, yet only one study examined GD and no studies considered comorbid PTSD/GD. The broad range of study designs made it difficult to compare the findings or make generalisations from the collective results. It is unclear which method of ACT delivery is superior (app-based, telehealth, face-to-face, groups, one-to-one, manualised, or unstructured), or what the true effect size is of ACT for PTSD and/or GD.

Conclusions: These preliminary findings are promising, yet more research is needed on the delivery format and content of ACT sessions, and whether findings generalise beyond USA-recruited military samples. The cost-effectiveness of remote-based ACT also warrants investigation.

Terapia de aceptación y compromiso para la comorbilidad del juego patológico y el trastorno de estrés postraumático en veteranos: una revisión narrativa

Antecedentes: el TEPT y el juego patológico (JP) son frecuentemente comórbidos. El juego puede proporcionar un afrontamiento basado en el escape para las emociones experimentadas por los pacientes con TEPT. El personal militar puede tener un mayor riesgo de TEPT y/o JP. Se ha encontrado que la Terapia de Aceptación y Compromiso (TAC) mejora los resultados tanto del TEPT como del JP, sin embargo, la investigación sobre la efectividad potencial de la TAC para el TEPT y/JP en veteranos es escasa.

Objetivo: Esta revisión tuvo como objetivo evaluar y describir sistemáticamente la evidencia relacionada con el uso de TAC y la terapia basada en la aceptación para poblaciones militares con TEPT y/o JP.

Método: Se realizaron búsquedas en seis bases de datos. Los criterios de selección consideraron estudios que incluyeron a las fuerzas armadas/militares, administraron TAC/terapia basada en la aceptación y tenían como objetivo mejorar los resultados del TEPT y/o JP. Se adoptó un enfoque de síntesis narrativa.

Resultados: De 1.117 resultados, 39 estudios fueron evaluados completamente y 14 cumplieron con los criterios de inclusión. Todos los estudios se originaron en los EE. UU. y 9 se asociaron con el Departamento de Asuntos de Veteranos de los Estados Unidos. El uso de la terapia dentro de cada estudio produjo una mejora en el TEPT y/o el JP; sin embargo, solo un estudio examinó el JP y ningún estudio consideró el TEPT/JP comórbido. La amplia gama de diseños de estudio dificultó comparar los hallazgos o hacer generalizaciones a partir de los resultados colectivos. No está claro qué método de entrega de TAC es superior (basado en aplicaciones, telesalud, cara a cara, grupos, uno a uno, manualizado o no estructurado), o cuál es el verdadero tamaño del efecto de TAC para TEPT y/o JP.

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Gambling disorder; PTSD; military; acceptance; therapy; ACT

PALABRAS CLAVE

ludopatía; TEPT; militar; aceptación; terapia; TAC

关键词

赌博障碍; PTSD; 军人; 接受; 治疗; ACT

HIGHLIGHTS

- Among veterans, psychological interventions such as Acceptance and Commitment Therapy (ACT) may be effective for Post-Traumatic Stress Disorder (PTSD) and/or Gambling Disorder (GD).
- There is a paucity of evidence on ACT approaches for treating PTSD and GD in veterans.
- Further work is needed on context-specific delivery (in-person vs. group), method of ACT intervention (manualised vs unstructured, digital therapeutics) with non-US samples.

Conclusiones: Estos hallazgos preliminares son prometedores, pero se necesita más investigación sobre el formato de entrega y el contenido de las sesiones de TAC, y si los hallazgos se generalizan más allá de las muestras militares reclutadas en EE. UU. La rentabilidad de TAC a distancia también merece una investigación.

退伍军人并发赌博障碍和创伤后应激障碍的接受和承诺疗法：叙述性综述

背景: PTSD 和赌博障碍 (GD) 经常并存。赌博可以为 PTSD 患者所经历的情绪提供基于逃避的应对。军事人员患 PTSD 和/或 GD 的风险可能增加。已发现接受和承诺疗法 (ACT) 可以改善 PTSD 和 GD 结果, 但关于 ACT 对退伍军人中 PTSD 和/或 GD 潜在有效性的研究很少。

目的: 本综述旨在系统地评估和描述与使用 ACT 和基于接受的疗法治疗 PTSD 和/或 GD 军人患者相关的证据。

方法: 检索六个数据库。选择标准包括以武装部队/军队为特色、提供基于 ACT/接受的治疗、旨在改善 PTSD 和/或 GD 结果的研究。采用了叙事综合方法。

结果: 从 1,117 项结果中, 39 项研究经过全面筛选, 14 项符合纳入标准。所有研究均来自美国, 其中 9 项与美国退伍军人事务部有关。每项研究中的治疗使用都改善了 PTSD 和/或 GD, 但只有一项研究考查了 GD, 没有研究考虑 PTSD/GD 共病。广泛不同的研究设计使得难以比较或概括研究结果。目前尚不清楚哪种 ACT 实施方法更好 (基于应用程序、远程医疗、面对面、小组、一对一、手动或非结构化), 或者 ACT 对 PTSD 和/或 GD 的真实效应量是多少。

结论: 这些初步发现很有前景, 但还需要对 ACT 疗程的实施形式和内容, 以及研究结果是否可以推广到美国招募的军人样本之外进行更多研究。远程 ACT 的成本效益也值得研究。

1. Introduction

Gambling disorder (GD) involves persistent and reoccurring gambling behaviour resulting in clinical levels of past-year distress and significant functional impairment (American Psychiatric Association, 2013; Bowden-Jones et al., 2022; Wardle et al., 2019). GD is frequently comorbid with post-traumatic stress disorder (PTSD) (Dowling et al., 2015; Etuk et al., 2020; Moore & Grubbs, 2021). While GD and PTSD may share a common aetiology or arise in response to similar environmental antecedents, it is possible to conceive of gambling to avoid or escape the psychological symptoms associated with traumatic experience (Blaszczynski & Nower, 2002; Buchanan et al., 2020; Etuk et al., 2020). Indeed, the DSM-5 diagnostic criteria specify that disordered gambling likely occurs during distress and a key symptom of PTSD is psychological distress (American Psychiatric Association, 2013). In effect, disordered gambling may function as a form of experiential avoidance in coping with PTSD symptoms such as emotional dysregulation (Dighton et al., 2022; Hayes et al., 2012).

Moore and Grubbs (2021) reviewed 74 studies relating to gambling and comorbid PTSD, 19 of which reported that PTSD symptom severity was linked to GD and not simply a PTSD diagnosis. A population particularly susceptible to developing GD, due in part to their increased risk of trauma-related PTSD, are military personnel (Etuk et al., 2020; Sharman et al., 2019). Disordered gambling in the military is under-researched compared with other mental health difficulties (Etuk et al., 2020), despite the likelihood of developing GD being higher among the military compared to the general population (van der Maas & Nower, 2021). Estimates of

the prevalence of sub-threshold GD or 'problem gambling' suggest military status may be a significant risk factor (Garvey Wilson et al., 2021). Roberts et al. (2020) found UK veterans were eight times more likely to meet problematic gambling criteria compared to an age/gender-matched general population sample. Likewise, Dighton et al. (2022) found veteran status predicted an increased risk of problem gambling together with the use of gambling as an escape- or avoidance-based coping mechanism (see also, Dighton et al., 2018). A recent survey of 3511 Australian military veterans assessed for GD five years post-military service found that 4.6% had experienced problematic gambling, with a further 8.8% classified as 'at risk' (Metcalf et al., 2022). Military-related trauma, such as operational or post-deployment trauma, may account for the relationship between military affiliation and GD (Cowlshaw et al., 2020; Whiting et al., 2016) with the risk of developing GD as a veteran remaining high after military service ends (Metcalf et al., 2022).

Notwithstanding the impact of trauma and the increased risk of PTSD, veterans are also likely to report greater barriers to help-seeking (Murphy et al., 2016). The most commonly cited reasons for non-help seeking include perceived stigma and the practical accessibility of support (Hom et al., 2017; Kantor et al., 2017; Possemato et al., 2018). The increased availability of opportunities to gamble nowadays, the stigma associated with disordered gambling, and the tendency for veterans to use gambling to cope with the consequences of trauma may combine and prompt lower levels of help-seeking (Paterson et al., 2021). Mental health difficulties related to PTSD and GD may thus go undetected among veterans.

If military populations are to have their complex mental health needs fully supported, it is essential to use evidence-based interventions that target PTSD and/or GD. Acceptance and commitment therapy (ACT) may be beneficial in managing the symptoms and sequela of PTSD and GD among the military (Shipherd et al., 2016; Shirk et al., 2022). ACT is a third-wave behaviour therapy that aims to enhance one's ability to connect with and mindfully accept all psychological and emotional experiences. The emphasis within ACT is that suffering arises in large part due to repeated attempts to avoid uncomfortable sensations and experiences; instead, ACT promotes the avoiding of avoidance itself (Thompson et al., 2021). To do this, ACT promotes 'psychological flexibility' through a series of structured components and experiential exercises (Daar & Dixon, 2015; Gloster et al., 2020; Hayes et al., 2012) such as reflecting on values, being in the present moment, acceptance versus change, and commitment to act in alignment with one's values and goals. ACT does not encourage clients to 'think' their way out of a difficult experience or episode of emotional dysregulation. Rather, clients are encouraged to accept troubling experiences and to change how they relate to such experiences/emotions.

The use of acceptance strategies over avoidant-based coping within PTSD treatment has utility given that avoidance is often a main driver of PTSD. ACT has produced positive outcomes for military populations suffering PTSD, outperforming psychoeducation and cognitive behavioural therapy (CBT) in reducing PTSD symptom scores for 1524 active duty, previously deployed US soldiers (Shipherd et al., 2016). Similarly, ACT has led to a reduction in problematic gambling for treatment-seeking US military veterans (Shirk et al., 2022), with emotional dysregulation scores also seeing improvement. Due to its utility, ACT has been endorsed as a supportive, transdiagnostic therapy by the US Veterans Affairs Administration (VA; Thompson et al., 2021) and its empirical status is growing (Gloster et al., 2020). Despite the co-occurrence of PTSD and gambling and the relative effectiveness of ACT on separate PTSD and GD outcomes, little is currently known about its usefulness in military populations.

The aim of the present study was to systematically search and review the literature on the use of ACT and acceptance-based therapies to treat PTSD and/or problematic gambling/GD in veterans.

2. Methods

This review was registered with PROSPERO (CRD42022327668) and followed PRISMA guidelines (Moher et al., 2009).

2.1. Search strategy

In April 2022, six databases were searched, including CINAHL, Embase, Medline, PsychInfo, PTSDPubs and Scopus. Databases were searched with no upper date limit using the following MESH headings and terms: (military OR armed forces OR veterans) AND (acceptance and commitment OR acceptance-based OR commit* OR accept* OR refram* OR present moment) AND (gambl* OR PTSD OR post-traumatic stress OR post-traumatic stress OR post traumatic stress). Previous systematic reviews related to similar topics were searched and the reference lists of articles within the final review also screened.

2.2. Inclusion and exclusion criteria

Studies were included if they met the following criteria: featured military or armed forces populations (including serving military personnel, veterans, and reservists), were focused on ACT or included an ACT-based component (e.g. reframing, psychological flexibility, acceptance), had a goal of reducing disordered or problematic gambling and/or PTSD symptoms/scores and were peer-reviewed empirical articles written in English.

Studies were excluded if they did not isolate military populations (i.e. it was not possible to determine any effect on the military specifically where the general population had been used as a comparison group) and if it was not possible to ascertain that ACT or ACT-based interventions had impacted gambling and/PTSD specifically (e.g. where outcomes were unreported or generalised to, say, 'improved mental health'). There were no restrictions concerning date range or study design.

2.3. Screening

Titles and abstracts were screened from all identified sources, followed by an in-depth review of a selection of articles to ensure study suitability (Figure 1). Ten per cent of titles, abstracts and full papers were screened/reviewed by a second member of the research team for quality cross-checking.

2.4. Extraction and quality

Bespoke data extraction sheets were created and piloted. Data was extracted relating to the study objectives, participants, country of origin, design, results or findings, salient discussion points, generalisability, limitations, funding, and ethics. Quality was assessed by referring each article to an appropriate Joanna Briggs Institute (JBI) critical appraisal tool, relative to its study design (JBI, 2022).

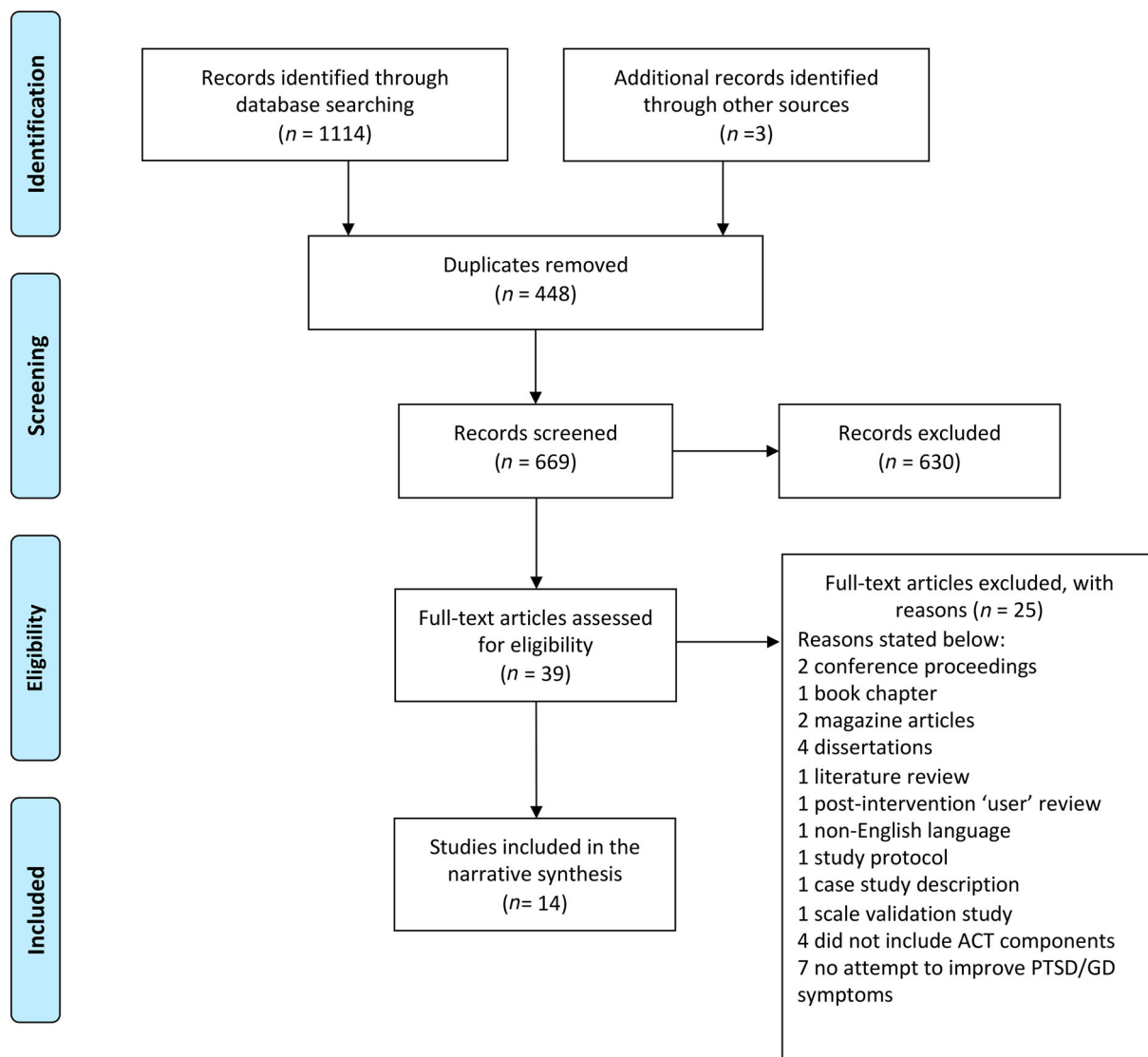


Figure 1. Flow chart of article screening process.

2.5. Data synthesis

It was anticipated that any quantitative studies identified would lack sufficient homogeneity to conduct a meta-analysis. Furthermore, as qualitative articles could be captured within the review, it was considered more appropriate to synthesise all findings via a narrative synthesis. A collective consideration and comparison of multiple studies could be summarised descriptively. One study contained qualitative data from a mixed-methods design (Reyes et al., 2020b) and thus there was no need to transform any findings in an integrated, aggregated manner.

3. Results

A search of the literature identified 1117 results. The number of duplicates removed was 448, leaving 669 titles and abstracts to be screened. A full review was conducted on 39 papers and 14 studies were selected for review inclusion (Table 1).

3.1. Study demographics and characteristics

All studies originated from the USA, with nine recruiting participants via the VA, two recruited active members of the military (Blevins et al., 2011; Shipherd et al., 2016) – with Blevins et al. focusing on guardsmen – while a further three studies featured veteran college students (Reyes et al., 2020a, 2020b, 2022).

The collective number of participants across the review was 2440, yet the participant pools varied from a single participant to $n = 1542$. Nine studies featured participant pools $n < 50$ whereas three studies had three or less. Males represented 86.20% of all participants, with 52.71% being married/cohabiting, 57.82% identifying as white and 18.28% being of black ethnicity. Of those studies that reported mean age, the overall age was $M = 34.21$ ($SD = 7.31$). Military service was predominantly with the army during the Iraq/Afghanistan era. Only Ramirez et al. (2021) reported length of service; $M = 15.0$ ($SD = 7.87$) (Table 1).

Table 1. Study characteristics.

First Author, Country, Setting	N	Age (Range, M (SD))	Gender (M/F)	Military Status	PTSD/GD diagnosis	Design, Context, Intervention, Control/ Comparison, Duration	Time Point	ACT Elements	Reported Outcomes
Shirk et al. (2022), US, VA, mental health outpatient care	3	46–57	3/0	100% army, veterans. Persian Gulf and Vietnam era(s)	Not reported	Case series/feasibility study, group setting, manualised treatment, 9 weekly sessions, homework, duration 3 months.	Pre-test, post-test	Adapted MBRP	Reduced gambling behaviour (instances), cravings (impulsivity), emotional dysregulation Instances reduced from 21x – 3x per month across participants. Collectively impulsivity decreased from $M = 50.7$ to $M = 44.3$ and emotional dysregulation reduced from $M = 56.3$ to $M = 40.0$
Reyes et al. (2022), US, technology based	23	$M 31.22$ (5.53)	0/23	Veterans, Iraq/ Afghanistan era	PTSD – DSM-5/ PCL-5	Quasi experiment, app-based delivery, daily/ weekly activity engagement prompts, duration 1 month.	Pre-test, during, post-test	Mindfulness, ACT	Global PTSD scores, experiential avoidance, mindfulness PTSD – T1 to T2 $M-11.61$ ($SD 12.71$) and T3 $M-27.78$ ($SD 14.22$), $p < .001$. Experiential avoidance significantly improved at T3 $M-7.71$ ($SD 6.97$), $p < .001$ Mindfulness and PTSD symptoms were negatively significantly correlated ($r = -.632$)
Ramirez et al. (2021), US, trauma focused outpatient care	311	$M 37.6$ (8.06)	193/118	Active duty	PTSD – DSM-5/ PCL-5	Quasi experiment, group setting with 2 (60-90 min) one-to-one sessions, homework, duration 6 weeks.	Pre-test, during (weekly)	Exposure therapy combined with ACT	Global PTSD scores; PDS-5 and PCL-5, experiential avoidance. PTSD – PDS-5: $M = -20.47$ ($SD 16.13$), $p < .000$, $d = 1.33$. PCL-5: $M = -18.12$ ($SD 15.49$), $d = 1.19$. 25.4%–28.3% (were below the PTSD clinical cut-off) Avoidance significantly reduced ($M = -6.86$, $SD 9.30$, $d = 0.88$)
Smith et al. (2021), US, technology based	1	Late 20s	1/0	Veteran	PTSD – DSM-5/ PCL-5	Single case study; individual ‘telehealth’ video conferencing setting, manualised treatment, 19 60-minute sessions, duration 5 months.	Pre-test, during, post-test, 1 month follow up	ACT	Global PTSD, experiential avoidance. PTSD reduced by 79%. Avoidance reduced (unreported)
Reyes et al. (2020a), US, VA, technology-based	23	$M 31.22$ (5.53)	0/23	Veterans, Iraq/ Afghanistan era	PTSD – DSM-5/ PCL-5	Feasibility study, app-based delivery, daily/ weekly activity engagement prompts, duration 4 weeks.	Pre-test, during and post-test; 4 weeks	Mindfulness, ACT	Global PTSD scores and app usability. PTSD reduced (-12.39 , $p < .001$). App usability score – ‘excellent’ $M 85.11$ ($SD 19.44$)
Reyes et al. (2020b), US, technology-based	9	$M 31.44$ (not reported)	3/6	Veterans	Not reported	Feasibility study, mixed methods, daily/weekly activity app engagement prompts, in-person interviews conducted at the intention conclusion, duration 2 weeks.	Pre-test, during and post-test	Mindfulness, ACT	Global PTSD scores and app satisfaction. PTSD – decreased significantly ($F = 5.08$, $p = .027$). App satisfaction scores – ‘good’ ($M 72.75$) Qualitative themes elicited: instituting a sense of progression; integrating a sense of rhythm; inculcating a sense of contribution
Kelly et al. (2020), US, VA, post-service reintegration programme	1	50s	1/0	Veteran, Gulf era	PTSD – DSM-5/ PCL-5 and SCID-5	Single case study, manualised treatment, 12 50-minute sessions, homework, duration 12 weeks.	Pre-test, during, post-test, 3 months follow up	Social support focused ACT (ACT-SS)	Global PTSD scores and negative thoughts PTSD – mean reduced 12.5%

(Continued)

Table 1. Continued.

First Author, Country, Setting	N	Age (Range, M (SD))	Gender (M/F)	Military Status	PTSD/GD diagnosis	Design, Context, Intervention, Control/ Comparison, Duration	Time Point	ACT Elements	Reported Outcomes
Dindo et al. (2020), US, VA, polytrauma clinical care	42		42/0	Veterans	PTSD – DSM-IV/ SCID-I	Pilot and follow-up RCT (ACT versus TAU), development and evaluation study, manualised treatment, homework, group-based, duration 3 months. TAU = psychoeducation	Pre-test, post-test, pilot measured at 2 weeks and 3 months, RCT measured at 3 months	ACT	Cluster of negative thoughts reduced but unreported Global PTSD scores, psychological flexibility PTSD and psychological flexibility saw non-signification reduction
Gobin et al. (2019), US, VA, multi-site clinical study	117	M 35.75 (8.1)	94/23	Veterans, Iraq/ Afghanistan era	PTSD – DSM-IV/ PCL-M	Secondary data study related to RTC by Lang et al. (2017) (see below). Data scrutinised for gender differences in intervention outcome.	Pre-test, post-test, 6, 9, 12 months follow up	Mindfulness, ACT	Global PTSD scores Gender difference over time ($F(2,109.15) = 412, p < .05$). Women had significant result ($F(1,19.47) = 11.88, p < .01$) PTSD – greater effect with ACT versus PCT ($d = 1.20$)
Wharton et al. (2019), US, VA, PTSD clinical care	21	M 54.5 (all >50)	21/0	Veterans, Vietnam era	PTSD – DSM-IV/ PCL-M	Pilot, quasi experiment, group therapy versus individual therapy, 12 weekly 60-minute sessions (individual therapy) or 90-minute session (group therapy), manualised ACT, duration 12 weeks.	Pre-test, post-test, 3 months follow up	ACT	Global PTSD scores, experiential avoidance, hyperarousal PTSD – group therapy ($t(9) = 2.67, p < .05, g = 0.69$). Individual therapy ($t(7) = 2.42, p < .05, g = 1.24$) Avoidance – group therapy ($t(8) = 2.92, p < .05, g = 0.851$), individual therapy ($t(7) = 3.40, p < .05, g = 1.04$) Hyperarousal – individual therapy ($t(7) = 2.58, p < .05, g = 1.184$)
Meyer et al. (2018), US, VA	43	M 45.26 (6.6)	38/5	Veterans	PTSD – DSM-5/ PCL-5 and CAPS-5	Pilot, quasi experiment, 12 weekly sessions, manualised treatment, one-to-one setting, homework, duration 3 months.	Pre-test, post-test, 3 months follow up	ACT	Global PTSD, experiential avoidance PTSD – reduced ($M -12.76, d = 0.96$) at intervention end and at 3-month follow-up ($M -12.34, d = 0.88$) Experiential avoidance reduced ($M -6.8, d = 0.62$).
Lang et al. (2017), US, VA, multi-site clinical study	160	M 34 (8)	128/332	Veterans, Iraq/ Afghanistan era	PTSD – DSM-IV/ PCL-M	RCT of ACT versus PCT (person-centred treatment), manualised treatment, 12 60-minute one-to-one sessions, homework, duration 12 weeks.	Pre-test, post-test, 6, 9, 12 months follow up	ACT	Global PTSD scores. PTSD – reduced overall ($d = 0.78$) but no between condition differences
Shipherd et al. (2016), US, VA, mandatory post-deployment assessment/re-assessment	1524	M 28.65 (6.72)	1372/ 152	Activity duty	PTSD – DSM-IV/ PCL-C NR	RCT comparing 4 conditions (TAU; PIT (psychoeducation)); 'PIT + change' (PIT + CBT); 'PIT + acceptance' (PIT + ACT), workshop/group face-to-face setting, 1 single session 50-60 min for 'change' or 'acceptance' or 20-30 min for PIT, duration 1 session.	Pre-test, post-test, 1 month follow up	Acceptance-based	Global PTSD scores PTSD – 'reset' condition outperformed TAU ($p = .047, d = 0.09$) and PIT ($p = .021, d = 0.14$). No significant difference between 'reset' and 'control'
Blevins et al. (2011), US, military-base Guardsmen training	144	M 30 (9.70), control M 32.4 (8.70)	134/10	Guardsmen, Iraq/ Afghanistan era	PTSD – DSM-IV/ PCL	Quasi experiment, control versus ACT, workshop/ group setting; 1 single two-hour session, duration 2-hours.	Pre-test, post-test, intervention group 2 months follow up, control group 4 months follow up	Acceptance-based	Global PTSD scores PTSD – reduced over time ($M -4.561$ (CI $-8.05, -1.07$), $p < .05$) but no significant between-group difference

Note: US, United States; VA, Veteran Affairs Administration; M (SD), mean (standard deviation); OR, odds ratio; CI, confidence interval; RCT, randomised control trial; TAU, treatment as usual; ACT, acceptance and commitment therapy; ACT-SS, acceptance and commitment therapy for social support; PIT, psychoeducation; PCT, patient centred treatment; MBRP, mindfulness-based relapse prevention; DSM, Diagnostic and Statistical Manual; PTSD, post traumatic stress disorder; GD, gambling disorder; PCL, Patient Checklist; PCL-M Patient Checklist Military; PCL-C, Patient Checklist Civilian; PDS, post traumatic diagnostic scale; PSSI, post traumatic stress disorder symptom scale; SCID, I/5 – structured clinical interview for Axis I disorders/DSM; CAPS-5, clinically administered PTSD scale for DSM-5.

3.2. PTSD/GD diagnosis

Only Shirk et al. (2022) included an unreferenced assessment of gambling behaviour (frequency, craving and self-efficacy). Frequency and self-efficacy were assessed via a 7-point Likert scale. Craving intensity was scored by a 5-point Likert scale and the number of cravings was recorded via a 'free text' number.

The likelihood of having PTSD was featured within all 14 studies but some detail of PTSD screening procedures/tools were absent. Where PTSD assessment was discussed, most studies referred to the DSM-IV or DSM-5 and screened PTSD with a version of the PCL (Weathers et al., 2013). Ramirez and colleagues (2021) included the PDS-5 and PSSI-5 diagnostic and symptom severity scales and CAPS-5 was used by Meyer et al. (2018). Two studies described using versions of the SCID (1 & 5) interview to diagnose PTSD and the MINI interview was utilised by Lang et al. (2017). There was, therefore, considerable variation across the studies in the assessment of PTSD.

3.3. Study design/objective(s)

As shown in Table 1, Kelly et al. (2020), Shirk et al. (2022) and Smith et al. (2021) reported case studies of groups of three veterans (Shirk et al.) or studies based on $n = 1$. Smith et al. explored the utility of telehealth via video conferencing with assessment measures obtained one- and three-months post-intervention.

Five studies were described as pilot/feasibility studies (Table 1). Reyes et al. examined the acceptability and utility of an app-based intervention to reduce PTSD symptoms across three articles. Wharton et al. (2019) assessed the effectiveness of in-person, group-based therapy and individual-based therapy to reduce PTSD, with a different cohort recruited for each condition. Meyer et al. (2018) assessed the effectiveness of in-person, individual ACT-based sessions to reduce PTSD. Dindo et al. (2020) conducted a randomised control trial (RCT) to compare the effectiveness of an ACT-based workshop with a 'treatment as usual' (TAU) condition for improving PTSD (and other comorbidities).

Two additional studies adopted an RCT design (Table 1). Lang and colleagues (2017) compared the outcome of an ACT-based approach with a 'person-centred therapy' (PCT) condition to reduce emotional distress (note that PTSD was captured under the term 'emotional distress', together with depression, suicidal behaviour and anger). In contrast, Shipherd et al. (2016) compared four separate conditions (treatment as usual (TAU), psychoeducation, 'change'-based therapy and 'acceptance-based' therapy) to establish which was the most effective to reduce cognitive intrusions and PTSD symptoms.

Of those studies labelled quasi-experiments, Blevins and colleagues (2011) and Ramirez et al. (2021) adopted pre-post-test designs but had other differences. Blevins and colleagues included a control condition (TAU), to ascertain whether ACT-based training would out-perform TAU in the context of PTSD symptomology and post-deployment adjustment. Yet, no randomisation was included. In contrast, Ramirez and colleagues utilised a single-arm, pre-post-test, approach when administering their 'blended' therapeutic approach (exposure therapy and ACT) to reduce PTSD.

One of the three studies by Reyes et al. was labelled as a quasi-experiment, yet all three had similar designs (Table 1). All three interventions had a similar duration period (two to four weeks), and outcomes were measured across three-time points. The Reyes et al. (2020b) study adopted a mixed-methods approach to assess the utility and acceptability of an app-based intervention. Quantitative data was collected via the app and qualitative data was collected at the intervention conclusion through in-person, semi-structured interviews. All interviews were analysed with descriptive content analysis.

Gobin and colleagues (2019) conducted secondary data analysis on existing data, related to a wider-scale RCT (Lang et al., 2017), and examined gender differences observed in the effectiveness of ACT versus PCT.

3.4. ACT components/administration

Most interventions were described as being based on ACT specifically, whereas some were 'acceptance-based' or centred around core components of ACT like 'thought reframing' (Blevins et al., 2011; Shipherd et al., 2016; Shirk et al., 2022). Eight studies utilised a manualised version of therapy (see Table 1). Lang et al. (2017) compared manualised versions of ACT with PCT. Although Ramirez et al., did not describe referring to an ACT manual, the authors used a fully structured approach to administering ACT. Both Kelly et al., and Shirk et al., described therapy administration as manualised but was adapted for the purposes of the study. In all three Reyes et al., studies (2020a, 2020b, 2022) therapy was administered in a self-directed, randomised, manner. Apart from the app-based studies, all interventions were delivered via a range of healthcare professionals (e.g. social workers, psychologists) or ACT-trained facilitators.

ACT was delivered by Reyes et al. via a series of audio recordings and videos. Four studies administered ACT via individual therapy sessions whereas three studies utilised a workshop group setting (see Table 1). While Ramirez and colleagues (2021) mainly administered their intervention to cohorts of eight to 11 veterans, the authors included two individual

sessions in their programme. Wharton and colleagues (2019) purposely included individual therapy and a separate group-based setting, because their study aimed to compare the effectiveness of group versus individual ACT sessions.

All interventions also included a variety of 'engagement' exercises, including homework, journaling, or reflective notetaking, yet not all exercises were the same across every study. For instance, participants in the Meyer et al., and Ramirez et al., interventions were permitted to record their sessions to assist with engagement activities and for future therapeutic use.

There was great variability over intervention duration. The Blevins et al. (2011) study was based on therapy being delivered via a two-hour, single-session workshop and Dindo and colleagues (2020) developed/evaluated a one-day ACT workshop. The app-based interventions ranged from two to four weeks and Ramirez et al.'s (2021) intervention was a six-week programme. The most common intervention length was 12 weeks (3 months) with Gobin et al. (2019), Lang et al. (2017), and Meyer et al. (2018) collectively referring to the same manual for intervention administration guidance. The longest intervention was 19 weeks/five months (Smith et al., 2021).

Regarding whether therapy was successful, assessment measures were generally collected pre-and post-intervention, with some studies collecting outcome data at a later, follow-up time point. However, there was great variation across the studies regarding the frequency of outcome assessment and the length of follow-up (where one was included). For example, Ramirez and colleagues (2021) assessed outcomes weekly over the duration of a six-week intervention, whereas Lang et al. (2017) measured outcomes at five-time points over a year where the intervention ceased at month three.

3.5. GD/PTSD outcomes

Only the Shirk et al. (2022) study aimed to consider whether acceptance-based therapy had a positive impact on GD. Shirk and colleagues reported that mean scores of gambling instances, craving frequency and craving intensity had decreased at follow-up. Yet, the degree to which outcome scores changed differed between the three participants, with one participant reporting an increase in craving intensity at follow-up. Overall, mean impulsivity and emotional dysregulation scores reduced across the intervention.

All other studies examined PTSD outcome scores. Collectively, all studies found intervention engagement led to a reduction in PTSD scores. Where ACT, or acceptance-based treatment, was compared with an alternative treatment, two studies found

ACT outperformed other treatments (e.g. cognitive approaches, psychoeducation or TAU; Dindo et al., 2020; Shipherd et al., 2016). Yet, two studies found no difference between the ACT condition and the comparison condition (TAU versus acceptance; Blevins et al., 2011) or person-centred therapy (PCT) versus ACT (Lang et al., 2017). However, concerning Lang and colleagues' study, when Gobin and colleagues (2019) conducted secondary analysis on the data they found gender differences: ACT did significantly out-perform PCT in reducing PTSD outcomes for females only ($d = 1.20$). Finally, Wharton and colleagues (2019) examined whether individual ACT or group-based ACT sessions reduced PTSD. There were significant reductions in PTSD scores and PTSD symptom cluster indicators ($p < .05$, $g = 0.69-1.18$) but differences between intervention contexts were not compared.

Whether ACT or acceptance-based therapy would positively impact PTSD cluster symptoms (or select symptoms) was featured in six studies. Kelly et al. (2020) and Wharton and colleagues (2019) considered all PTSD symptom clusters. Wharton et al., found both group and individual therapy settings correlated with a reduction in avoidance scores, whereas therapy in a one-to-one context seemed to improve hyperarousal as well as avoidance. In contrast, Kelly and colleagues (2020) noted ACT improved negative thoughts only; no impact was noted for intrusion or avoidance cluster symptoms. Six studies specifically focused on the PTSD cluster symptom of experiential avoidance (Meyer et al., 2018; Ramirez et al., 2021; Reyes et al., 2020a, 2020b, 2022; Smith et al., 2021). Of these studies, all except Reyes et al. (2020a) reported an improvement in experiential avoidance scores.

Across the studies, the reporting of outcomes varied. The most frequently reported outcome was a reduction in mean scores. Eight studies described statistical significance, five reported 95% confidence intervals, and seven articles included effect sizes (either Cohen's d or Hedges' g). The effect size of acceptance-based therapy on PTSD, or clusters of symptoms, ranged from $d = 0.09-1.33$, $g = 1.184$. Concerning the PTSD symptom cluster of experiential avoidance, the positive effect of acceptance-based therapy was $d = 0.62-0.88$. Reyes and colleagues (2020b) and Smith et al. did not provide data relating to their avoidance-specific findings. Shirk et al. (2022) included emotional dysregulation in their GD study and found a 4.3 mean reduction in scores. The three app-based studies included a measure of acceptability or useability, regarding the utility of an app-based intervention. The utility/satisfaction-based indicators suggest users rated app-based therapy from $M = 72.75-85.11$, with 85.58 equating to 'excellent' (Reyes et al., 2020a).

3.6. Research quality/robustness

All studies were reported in the convention associated with specific study designs. Nine studies described recruitment akin to convenience sampling, while the remainder did not describe the recruitment method employed. Two of the three RCTs included randomisation methods but Dindo et al. (2020) did not. Many authors acknowledged the limitation of not including a control group, despite several experiments having multiple conditions. Where participants were situated in different conditions, three studies statistically compared the demographic data of each condition (Blevins et al., 2011; Dindo et al., 2020; Shipherd et al., 2016).

Drop-outs or non-completers were mainly explained or acknowledged, with two studies statistically comparing the demographics of completers and non-completers (Lang et al., 2017; Meyer et al., 2018). Power analysis was reported in three studies (Dindo et al., 2020; Meyer et al., 2018; Ramirez et al., 2021) with several authors commenting that their smaller sample sizes likely led to the analysis being underpowered. Two studies evaluated the cost-benefit of interventions (Dindo et al., 2020; Reyes et al., 2022). Funding sources and ethics approval/consent were largely underreported; indeed, only eight studies described participants as having provided informed consent (Blevins et al., 2011; Dindo et al., 2020; Lang et al., 2017; Reyes et al., 2020a, 2020b, 2022; Shipherd et al., 2016).

Table 2 describes the JBI (2022) quality criteria scores for all articles. Each study was scored against the list of criteria associated with its corresponding study design and additional items assessing the presence of ethical approval and informed consent were included. Scores were rated 3 (Yes), 2 (Unclear), 1 (No), and 0 (Not applicable) for the presence/absence of each feature. As Table 2 shows, scores ranged between 25 (Smith et al., 2021) to 46 (Gobin et al., 2019; Lang et al., 2017).

4. Discussion

This review set out to assess the ACT evidence base, relating to military populations, in the context of both stand-alone and co-occurring PTSD and GD. We found 14 studies that met inclusion criteria, which is a relatively small pool of published articles and indicates this area remains relatively under-investigated. Only one article (a case study) was GD-specific, and no study directly addressed co-occurring GD and PTSD. Although extant military-specific literature exists, most publications relate to predictors or correlates of PTSD/GD rather than treatment interventions or symptom management (Moore & Grubbs, 2021; Sharman et al., 2019). Moreover, the publications that focus on PTSD and/or GD interventions

do not include ACT or acceptance-based approaches (Etuk et al., 2020; Levy & Tracy, 2018). A salient finding of this review is that both GD and comorbid GD and PTSD are largely under-studied, which is concerning as the relationship between GD and PTSD among military populations is robust (Dighton et al., 2022).

All 14 studies collectively found that therapy reduced GD or PTSD scores, with a score reduction indicating a PTSD symptom improvement. Only Blevins et al. (2011) saw no difference between ACT and the comparison control condition. Across the remaining 13 studies, ACT outperformed all other forms of therapy where an alternative condition was included. If no control condition was included, ACT positively impacted PTSD scores, often beyond the intervention conclusion. ACT positively impacted some but not all PTSD cluster symptoms, where symptom level assessments were made. Shirk et al. (2022) reported GD score changes solely at a symptom level rather than providing global GD scores. Emotional dysregulation saw a reduced mean score from 56.3–40.0 out of a maximum 90, which is promising if emotional dysregulation is a key component of disordered gambling. The PTSD and GD findings collectively have merit as they offer preliminary evidence to support the usefulness of ACT to improve GD and PTSD at both a global and symptom level. Reported intervention effect sizes did vary substantially ($d = 0.09$ – 1.33 , $g = 1.184$), making it difficult to draw impact size inferences from the studies.

4.1. Context of ACT delivery

The context in which ACT was delivered (i.e. technology, group, and one-to-one) was not directly compared by any study. It would be useful therefore to understand whether remote-delivered therapy performs as well as or out-performs ACT administered in-person. Moreover, group therapy could offer cost-saving benefits and could reach more people who spend limited time at a single location, such as military personnel attending a military base for mandatory training or a local VA centre for veterans' healthcare support (Blevins et al., 2011). Similarly, technology has the additional benefit of reaching those more resistant to help-seeking, such as veterans (Augner et al., 2022; Hom et al., 2017).

ACT interventions delivered via digital/electronic/internet-based methods (eHealth or iTherapy) have produced positive results. For instance, Thompson et al.'s (2021) review of internet-based ACT (iACT) literature, to address poor mental health in an undefined population, found mental health assessment measures improved via digital ACT and were maintained at follow-up. Reger et al. (2022) also noted some positive results in the context of 'PTSD

Table 2. Matrix of quality criteria scores for all articles based on JBI critical appraisal tools.

Article	Shirk et al. (2022)	Reyes et al. (2022)	Ramirez et al. (2021)	Smith et al. (2021)	Reyes et al. (2020a)	Reyes et al. (2020b)	Kelly et al. (2020)	Dindo et al. (2020)	Gobin et al. (2019)	Wharton et al. (2019)	Meyer et al. (2018)	Lang et al. (2017)	Shipherd et al. (2016)	Blevins et al. (2011)
Criteria														
Demographics described	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Participants history described	3	3	3	1	3	3	3	1	3	3	1	3	1	3
Clinical condition described	3	3	3	3	3	0	3	3	3	3	3	3	3	3
Randomisation of participants described	0	0	0	0	0	0	0	1	3	0	0	3	1	0
Randomisation of others described	0	0	0	0	0	0	0	1	1	0	0	1	1	0
Randomisation was 'blind'	0	0	0	0	0	0	0	1	1	0	0	1	1	0
Groups similar at baseline	3	0	0	0	0	0	3	2	3	2	0	3	2	2
Interventions administered similarly across groups	0	0	0	0	0	0	0	3	3	3	0	3	3	3
Interventions described adequately	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Control group included	0	0	0	0	0	0	0	3	3	0	0	3	3	3
Pre and post-tests described	3	3	3	3	3	3	3	3	3	3	3	3	3	3
All groups tested identically across timepoints	0	0	0	0	0	0	0	3	3	3	0	3	3	1
Follow up completed	1	1	1	3	1	1	3	3	3	3	3	3	3	3
Outcomes measured reliably	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Appropriate statistical tests used	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Adverse events described	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Ethics approval obtained	2	3	2	2	2	2	2	3	2	2	3	2	2	3
Informed consent described	1	3	1	1	3	3	1	3	3	2	3	3	3	3
Score	31	28	25	25	27	24	30	42	46	36	28	46	41	39

Note: Scoring: 3 = Yes, 2 = Unclear, 1 = No, 0 = Not applicable.

Coach' use, a mobile application support for mental health in veterans. Of the 20.4% that had used one of the 22 VA mental health apps, 7.5% of PTSD patients had engaged with the PTSD coach app. Furthermore, another app, Mindfulness Coach, was used by 6.5% of VA users to support poor mental health, which has merit within this study's findings as ACT is a 'mindfulness-based' approach.

It could be inferred that if veterans found mindfulness apps acceptable and useful, they may have a similar response to an ACT-based app, or an ACT intervention delivered via a mobile application. Reyes et al. (2022) noted the main cause of app non-engagement was a lack of app awareness rather than iACT being ineffective. Relatedly, a recent UK randomised trial concerning CBT rather than ACT, it did find that online therapy was as effective as face-to-face therapy in improving PTSD outcomes in a general population sample (Bisson et al., 2022). The continued use of technology to support those with addictive disorders does however require further careful consideration; indeed, it is possible that some users may find engagement with support services delivered virtually to be triggering if some or all of their problematic addictive behaviours such as gambling were also conducted virtually. Addressing this challenge warrants further empirical and clinical attention.

One point of contextual difference noted between the ACT interventions in this review was that the app-based studies delivered therapy via unstructured, random methods while many of the face-to-face studies delivered manualised, guided versions of ACT. Presumably, manualised ACT did not align with app-based therapy, yet no explanation was provided as to why random therapy was embedded in the app context. Despite the three app-based studies (Reyes et al., 2020a, 2020b, 2022) producing reduced PTSD scores, and strong app usability/acceptability scores, qualitative data (2020b) found that veteran users would have preferred guided therapy. This aligns with Thompson et al. (2021) who found eighteen studies indicating that guided therapy was particularly effective. Arguably, it would be particularly useful to deliver a manualised, guided form of ACT when supporting a military population, as many are likely more familiar with following a structured, guided programme than self-delivered.

4.2. Limitations

There are several limitations of the present review. The variation between study designs made it difficult to compare findings. Although sample sizes were appropriate, many were too small to make generalisations. Furthermore, no longitudinal, follow-up data were collected. There were limited RCTs, and very little evidence of control groups used. It would be useful to

conduct further RCT research on the differences between context delivery of ACT. Only one study employed a mixed-methods design, highlighting a research gap in understanding the lived experience of veterans with co-occurring PTSD and GD. Future research may also ask veterans if using technology to support GD may be triggering for their gambling, and if so, what other ACT delivery methods may be appropriate. Consensus-building with a range of stakeholders should inform future ACT interventions. All research and participants originated from the US and further work is needed to understand the international differences, if any, in veterans' coping with PTSD and GD (Randles & Finnegan, 2022).

4.3. Conclusions

The use of ACT, whether in-person or remote-based may offer benefits for veterans suffering from PTSD and/or GD. However, there is a paucity of current evidence on this topic and a great deal further research is warranted. Although iACT and other remote delivery forms of therapy may increase engagement with hard-to-reach populations like military veterans with co-occurring PTSD and GD, the potential triggering effects of these approaches for individuals with GD should be fully considered. Overall, we identified a limited evidence base, particularly from non-US samples, with many gaps in the literature on ACT-based intervention for veterans with co-occurring PTSD and GD.

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