Evidence Integration Review of Multimodal Interventions for PTSD, Social Reintegration, and Economic Stability in Veterans

Military veterans and service members face significant challenges transitioning to civilian life, including physical, psychological, and social difficulties. Approximately 20% of veterans returning from Iraq and Afghanistan are diagnosed with PTSD, while over 30% experience comorbid conditions such as depression, further complicating reintegration efforts (Schnurr et al., 2022; Acierno et al., 2021). Chronic health conditions are also widespread, with 45% of veterans reporting at least one service-related disability limiting daily activities (Damschroder et al., 2020). Furthermore, 60% of transitioning veterans encounter issues with employment, reestablishing familial connections, or forming meaningful social networks (Bond et al., 2022).

The problem is that military veterans and service members face interconnected challenges, including PTSD, social reintegration struggles, and economic instability. Fragmented interventions often fail to address these multifaceted needs comprehensively, leaving critical gaps in support for long-term reintegration into civilian life.

Intervention

Multimodal interventions are essential for addressing these interconnected challenges. Physical activity programs can alleviate chronic conditions while reducing stress; mindfulness-based interventions reduce symptoms of PTSD and depression; and social support initiatives foster connections, economic stability, and successful reintegration (Davis et al., 2018; Kearney et al., 2021). Despite their promise, evidence supporting these interventions remains fragmented, with inconsistencies in methodologies, target populations, and measured outcomes. This disjointed evidence base complicates implementing strategies tailored to veterans' diverse needs.

Efficacy of the Intervention

Individual studies demonstrate the efficacy of tailored interventions, including improvements in PTSD symptoms, depression, and reintegration outcomes. However, variability in study designs, inclusion criteria, and measurement tools limits the generalizability of findings. Furthermore, the underrepresentation of female veterans, racial minorities, and individuals with complex comorbidities constrains the applicability of existing research. A comprehensive synthesis is needed to evaluate the effectiveness of multimodal interventions and their ability to address veterans' challenges holistically.

Justification

This Evidence Integration Review (EIR) synthesizes findings from randomized controlled trials (RCTs), cross-sectional studies, and qualitative analyses to bridge these gaps. By incorporating quantitative and qualitative evidence, the review contextualizes intervention outcomes and veterans' lived experiences, providing a nuanced understanding of their effectiveness. Unlike traditional systematic reviews or meta-analyses, this EIR emphasizes a holistic approach, offering actionable recommendations for clinicians, researchers, and policymakers to develop inclusive and sustainable strategies that enhance veterans' physical, psychological, and social well-being.

Figure1_overlapofchallenges.png

Methods

This Evidence Integration Review (EIR) synthesized findings from 41 studies, including randomized controlled trials, cross-sectional studies, and qualitative analyses, to evaluate the effectiveness of multimodal interventions targeting physical, psychological, and social outcomes in military veterans. Quantitative methods adhered to PRISMA guidelines to ensure systematic

and transparent data collection, synthesis, and reporting (Sohrabi et al., 2021). Julius.ai software facilitated the filtering and extraction of quantitative data, enhancing efficiency and accuracy. Qualitative analyses were conducted using ATLAS.ti software, which supported the identification of recurring themes, including barriers to engagement, psychological benefits, and social reintegration. Searches were conducted in PsycINFO, Medline, CINAHL, and Web of Science using Boolean operators and targeted keywords. Inclusion criteria focused on U.S.-based studies published in English from January 2014 to November 2024, evaluating exercise, mindfulness, or social support interventions. Studies with a high risk of bias or those focused on non-military populations or pharmacological treatments were excluded. A PRISMA flowchart, detailed search strategies, and information about excluded studies are available in the supplementary materials. By integrating quantitative outcomes with qualitative insights, this review provides a holistic understanding of intervention effectiveness and veterans' lived experiences.

Results

Article Selection

This Evidence Integration Review applied a rigorous process to ensure the inclusion of high-quality studies. An initial search identified 5,982 studies across multiple databases. After removing 72 duplicates, 5,910 studies underwent title and abstract screening, resulting in the exclusion of 5,756 studies that did not meet the inclusion criteria. Subsequently, 154 full-text articles were assessed for eligibility, leading to the exclusion of 118 studies for reasons such as small sample sizes (n = 37), pilot designs (n = 20), non-veteran-specific populations (n = 11), lack of randomization (n = 26), insufficient follow-up durations (n = 14), and unreported standardized outcomes (n = 5). Despite these exclusions, two small-sample studies were retained

due to their unique insights into specific subpopulations of veterans. Ultimately, 41 studies were included in the final analysis. The study selection process adhered to PRISMA guidelines and is summarized in a flow diagram (Figure 2).

Figure2_prismaflowchart.png

Characteristics of Included Studies

The 41 studies reviewed exclusively focused on U.S. military veterans and were published between 2014 and 2024. Study designs included randomized controlled trials (RCTs), cross-sectional studies, and qualitative analyses. Sample sizes ranged from 21 to 916 participants, totaling 7,364 individuals. The studies predominantly involved male veterans (81.8%), with four studies specifically targeting female veterans. Participant ages ranged from 28.1 to 57.1 years, capturing both younger veterans transitioning to civilian life and older veterans with chronic conditions.

Interventions varied across psychological, physical, and social domains. Psychological interventions included mindfulness-based therapies, trauma-focused approaches, and cognitive-behavioral strategies addressing PTSD, depression, and anxiety. Physical interventions featured exercise regimens, yoga, and mobility programs, while social interventions encompassed peer-led support groups, employment readiness programs, and community-based initiatives. Most studies were conducted in Veterans Affairs Medical Centers (VAMCs), while others employed remote or community-based settings, enhancing accessibility for rural or underserved populations. Follow-up durations ranged from immediate post-intervention assessments to 24 months. Validated instruments such as the PTSD Checklist for DSM-5 (PCL-5), Beck Depression Inventory-II (BDI-II), and Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) were used to measure outcomes.

Comprehensiveness of Reporting

The included studies adhered to high methodological standards, frequently aligning with the guidelines of CONSORT (Consolidated Standards of Reporting Trials). Essential study elements were consistently detailed, including recruitment strategies, randomization procedures, intervention protocols, and statistical analyses. Many studies described intervention fidelity, with reports of facilitator training, adherence monitoring, and fidelity rates often exceeding 90%. However, only a subset of studies systematically reported adverse events or unintended outcomes, limiting the ability to evaluate intervention safety comprehensively.

Validated instruments were routinely used to assess primary and secondary outcomes, and most studies provided effect sizes, confidence intervals, and p-values to ensure robust statistical reporting. Adjustments for baseline differences and potential confounders enhanced the validity of the findings. Attrition rates and dropout reasons were often reported, though some studies lacked detailed explanations. Variability in follow-up durations presented a challenge in systematically comparing long-term outcomes across studies.

Limitations in Reporting

Despite generally high reporting standards, certain limitations were evident. Not all studies consistently documented adverse events or unintended consequences, reducing the ability to assess intervention safety thoroughly. Variability in follow-up durations hindered direct comparisons of long-term efficacy. Additionally, the underrepresentation of diverse populations, such as female veterans and racial or ethnic minorities, highlighted the need for more inclusive research designs. Expanding demographic representation in future studies is critical to ensuring interventions are equitable and broadly applicable to the veteran population.

Table1_detailedsummary.png

Themes

The analysis identified recurring themes across the studies included in this Evidence Integration Review, shedding light on the impacts, challenges, and outcomes of interventions targeting physical, psychological, and social well-being among military veterans and service members. These themes provide a comprehensive understanding of the multifaceted effects of these interventions and the contextual factors influencing their success. The key themes emerging from the review include psychological benefits, social support and connection, barriers to engagement, improvements in physical activity, employment, reintegration, and technology's role. These themes underscore the complex interplay between individual and structural factors in achieving meaningful improvements in veterans' quality of life.

Table2_evidenceintegrationmatrix.png

Psychological Benefits

Quantitative findings revealed significant reductions in PTSD symptoms with mindfulness interventions (e.g., Kearney et al., 2021; effect size d=0.8) and exposure therapies (e.g., Castillo et al., 2016; Clinician-Administered PTSD Scale [CAPS] improvement of 24 points, p<0.001) demonstrating the most promise. Acierno et al. (2021) reported substantial reductions in grief (Inventory of Complicated Grief [ICG-R]: ~14 points), depression (Beck Depression Inventory-II [BDI-II]: ~6 points), and PTSD symptoms (PTSD Checklist for DSM-5 [PCL-5]: ~13 points) over six months, highlighting the efficacy of grief-focused therapies. Similarly, Seppala et al. (2014) found that breathing-based meditation significantly reduced PTSD symptoms and improved emotional resilience. Stephenson et al. (2017) further identified mindfulness facets, specifically Non-Reactivity and Acting with Awareness, as significant

predictors of PTSD reduction (hierarchical regression, $p<0.05$). Dahm et al. (2015) emphasized the role of self-compassion in reducing PTSD symptoms ($f2=0.25$) and functional disability ($f2=0.41$), suggesting its integration with mindfulness-based therapies.

However, qualitative insights highlighted challenges in sustaining engagement, particularly in trauma-focused therapies. High dropout rates were often linked to stigma and emotional distress. Goldstein et al. (2018) noted logistical challenges and reluctance among rural veterans to seek care, while Castillo et al. (2016) emphasized the importance of culturally sensitive approaches to address stigma. Participants consistently reported a need for personalized interventions that consider individual trauma histories and social circumstances. Saban et al. (2022) highlighted additional barriers, such as high attrition rates in mindfulness-based stress reduction (MBSR) programs, alongside significant reductions in perceived stress ($p<0.05$) and loneliness ($meanchange=-4.7, p<0.05$) for those who completed interventions.

Social Support and Connection

Social support programs significantly improved reintegration scores, with structured employment interventions such as the NCCP program (Bond et al., 2022) increasing monthly earnings by $703 and the percentage of months employed by 20% ($p<0.01$). Davis et al. (2018) reported a 20% improvement in reintegration scores through peer mentorship programs, emphasizing the role of social connection in promoting psychological stability and economic well-being. Group-based interventions, such as those evaluated by Sautter et al. (2016), fostered camaraderie and reduced isolation, improving mental health outcomes. Barr & Kintzle (2019) found that mindfulness-based group settings increased mental health service utilization (MHSU) by 27% ($p<0.05$) among veterans with PTSD, further highlighting the role of structured social connections in facilitating access to care.

Qualitative feedback underscored the emotional benefits of peer-led and family-inclusive programs. Veterans frequently reported feeling less isolated and more connected to their communities through these initiatives (Reger et al., 2021). Bond et al. (2022) highlighted how social mentoring enhanced resilience and self-efficacy, particularly for veterans transitioning to civilian roles. Colgan et al. (2017) emphasized the importance of active coping skills and shared experiences within mindfulness-based group settings, which veterans reported as critical in fostering trust and reducing emotional distress.

Barriers to Engagement

Despite their efficacy, interventions often faced significant barriers to engagement, with dropout rates ranging from 24% (Castillo et al., 2016) to 40% (Bond et al., 2022). Qualitative feedback identified logistical challenges such as scheduling conflicts, transportation difficulties, and financial constraints as key obstacles, disproportionately affecting rural and underserved veterans (Reinhardt et al., 2020). Goldstein et al. (2018) observed that stigma surrounding mental health care further inhibited participation, particularly among male veterans and those with severe PTSD. Saban et al. (2022) reported a 33% attrition rate in mindfulness-based stress reduction (MBSR) programs, citing accessibility challenges as a significant factor in dropout, especially among diverse veteran populations.

Program designs that required frequent in-person attendance often posed additional challenges for veterans balancing work and family commitments. Veterans emphasized the need for flexible, hybrid models that combine in-person and virtual sessions to enhance accessibility (Agarwal et al., 2021). Barr & Kintzle (2019) further highlighted self-stigma as a significant barrier to mental health service utilization ($\beta=-0.34, p<0.001$), particularly for veterans with PTSD, emphasizing the importance of stigma-reduction strategies.

Physical Activity Improvements

Physical activity interventions demonstrated measurable benefits, including increased mobility, reduced chronic pain, and enhanced mental health. For example, gamification strategies increased daily step counts during the intervention phase (Agarwal et al., 2021; +1224 steps with financial incentives, $p=0.005$), though engagement often declined after the intervention concluded. Damschroder et al. (2020) found that veterans with high baseline physical activity experienced moderate increases in weekly active minutes, suggesting that adaptive programs tailored to individual fitness levels may optimize outcomes. Roseen et al. (2023) reported that yoga interventions significantly improved satisfaction and perceptions of global improvement among participants (global improvement: 39% in the yoga group vs. 19% in the control group, $p=0.01$), even though no significant differences were observed in primary outcomes such as pain or disability.

Qualitative feedback emphasized veterans' appreciation for gamification strategies, which enhanced motivation and adherence during interventions (Agarwal et al., 2021). Participants in the yoga interventions reported that the tailored and group-based nature of the programs provided a sense of community and support (Roseen et al., 2023). However, veterans highlighted difficulty maintaining engagement after program completion, underscoring the need for ongoing support and personalized feedback to sustain physical activity. Veterans also suggested integrating social components into physical activity programs to foster accountability and peer support.

Gender-Specific Insights

Quantitative findings highlighted the effectiveness of gender-specific interventions, particularly for female veterans with histories of military sexual trauma (MST). Castillo et al.

(2016) reported significant PTSD reductions in women participating in MST-focused group therapies (CAPS improvement, $d=1.72$). Lehavot et al. (2023) found that online, coach-assisted self-management interventions tailored for women veterans led to significant improvements in PTSD symptoms (PCL-5 improvement, mean reduction = 12 points, $p<0.001$). Saban et al. (2022) added that mindfulness-based stress reduction (MBSR) interventions significantly reduced loneliness ($meanchange=-4.7$, $p<0.5$) and diurnal salivary cortisol levels ($p=0.03$) among diverse female veteran populations, suggesting the physiological and emotional benefits of tailored interventions.

Qualitative insights highlighted the importance of creating safe, gender-specific environments where women could share experiences and receive targeted support. Castillo et al. (2016) noted that women-only groups fostered trust and safety, which were critical for addressing trauma-related symptoms. Saban et al. (2022) echoed this, emphasizing that such spaces facilitated open discussions about unique stressors like MST and military culture. Veterans consistently emphasized the need for inclusive, culturally sensitive approaches to enhance engagement and retention among diverse populations.

Employment and Reintegration

Quantitative findings emphasized the efficacy of employment-focused interventions in improving veterans' reintegration into civilian life. Bond et al. (2022) reported that participants in structured employment programs earned $703 more per month and were employed for 56.5% of months compared to 42.8% in the control group ($p<0.01$). Similarly, Davis et al. (2018) found that supported employment programs led to higher job retention rates and greater satisfaction with civilian work environments. Breneman et al. (2023) further demonstrated that combined mindfulness and acupuncture interventions improved mental health functioning (VR-36 MCS

scores, $p<0.05$) and reduced fatigue (PROMIS-Fatigue scores, $p<0.05$), which supported reintegration goals by addressing psychological and physical barriers to employment. Employment-focused programs also enhance financial well-being and reduce financial distress (Bond et al., 2022).

Qualitative feedback further emphasized the importance of structured employment programs in providing veterans with purpose and stability during reintegration. Peer coaching and mentorship, as described by Bond et al. (2022), enhanced veterans' confidence in navigating civilian work environments. Breneman et al. (2023) highlighted the value of integrative health interventions, which veterans described as helping them build resilience and sustain engagement with vocational goals—however, logistical barriers, such as limited access to job training resources, restricted participation. Veterans emphasized the need for continued support, such as follow-up career coaching and mental health resources, to sustain employment gains and promote long-term success.

Role of Technology

Studies such as Agarwal et al. (2021) and Damschroder et al. (2020) highlighted the potential of technology in enhancing intervention accessibility and engagement. Virtual platforms, telehealth services, and wearable activity trackers addressed logistical barriers and increased participation rates. Saban et al. (2022) further emphasized the value of online adaptations for mindfulness-based stress reduction (MBSR) programs, which were recommended to mitigate high attrition rates and improve accessibility, particularly for rural and underserved veterans. However, challenges such as technological literacy and inconsistent user engagement limited their efficacy.

Veterans suggested that technology-enabled interventions could be more effective if designed with user-friendliness and adaptability. Saban et al. (2022) also noted that personalized support and feedback during online interventions enhanced user satisfaction and outcomes. Providing regular feedback and incorporating veterans' input into developing these tools would further strengthen their alignment with user needs and preferences.

Table3_studytothememapping.png

Discussion

This Evidence Integration Review synthesized findings from 41 studies, comprising RCTs, cross-sectional surveys, and qualitative analyses, to evaluate interventions targeting physical, psychological, and social outcomes for military veterans and service members. The review highlighted key themes, including psychological benefits, social support and connection, barriers to engagement, physical activity improvements, employment and reintegration, and the role of technology. These findings offer a comprehensive understanding of intervention efficacy while addressing the multifaceted challenges experienced by veterans.

The Integration Matrix used in this review bridged quantitative outcomes, such as PTSD symptom reductions and dropout rates, with qualitative insights, including barriers to engagement and participant experiences. This mixed-methods approach emphasized the value of integrating veterans' lived experiences into intervention assessments. For instance, mindfulness interventions demonstrated statistically significant reductions in PTSD symptoms (Kearney et al., 2021, d = 0.8), while qualitative data contextualized these findings by highlighting stigma and logistical barriers that impact engagement. This underscores the need for multimodal strategies that address measurable outcomes alongside the complexities of veterans' reintegration journeys.

Main Findings and Implications

Interventions targeting psychological well-being, such as Mindfulness-Based Cognitive Therapy (MBCT) and Behavioral Activation for Grief (Acierno et al., 2021), yielded significant improvements in PTSD, depression, and anxiety symptoms. However, challenges such as comorbid mental health conditions and persistent symptoms highlight the necessity for sustained psychological care. Social support emerged as a critical determinant of intervention success, with peer-led and family-inclusive programs fostering connection and facilitating care-seeking behaviors (Sautter et al., 2016). Despite these promising results, geographical disparities and logistical barriers persist, suggesting the need for hybrid models combining virtual and in-person components to enhance accessibility.

Physical activity interventions, including gamification strategies and yoga programs, demonstrated benefits in mobility, chronic pain reduction, and energy levels (Damschroder et al., 2020; Roseen et al., 2023). These findings indicate that personalized fitness plans incorporating mindfulness and social support may enhance adherence and outcomes. Employment-focused initiatives significantly improved economic stability and life satisfaction, but the sustainability of these benefits requires continued vocational support and integrated mental health care (Bond et al., 2022; Breneman et al., 2023).

Strengths and Limitations

The inclusion of diverse methodologies, from RCTs to qualitative analyses, provided a nuanced understanding of interventions and their outcomes. The use of PRISMA guidelines and advanced tools such as ATLAS.ti and Julius AI enhanced the rigor of this review. However, limitations included high attrition rates in certain studies, underrepresentation of female veterans

and minorities, and variability in intervention designs and follow-up durations. These gaps underscore the importance of prioritizing inclusive research designs and long-term evaluations.

Future Directions

The findings from this review provide a foundation for developing a holistic framework for veteran reintegration that addresses psychological, physical, and social dimensions. Future interventions should aim to integrate multimodal strategies, leveraging technological advancements such as telehealth and wearable devices to enhance accessibility and personalization. Stigma-reduction initiatives are essential to increase participation among veterans hesitant to seek care. Moreover, targeted efforts to include diverse populations, such as female veterans and racial minorities, are critical to ensuring equity in intervention outcomes.

Longitudinal studies are necessary to assess the sustainability of intervention benefits over time. As noted by Liese and Monley (2023), hybrid models combining brief, multimodal interventions with ongoing support can mitigate logistical barriers while maintaining efficacy. This approach aligns with the need to construct a flexible and inclusive framework that addresses the interconnected challenges of reintegration into civilian life.

The insights from this review offer actionable guidance for policymakers, clinicians, and researchers. By addressing current gaps in the literature and leveraging evidence-based practices, future research and interventions can enhance veterans' quality of life and promote sustainable reintegration.

Table4_practicalimplications.png

Note. **PTSD** = Post-Traumatic Stress Disorder; **CAPS-5** = Clinician-Administered PTSD Scale for DSM-5; **PCL-5** = PTSD Checklist for DSM-5; **BDI-II** = Beck Depression Inventory-II. This table summarizes multimodal interventions evaluated in RCTs and other studies for veterans,

highlighting their targeted domains and key benefits. Outcomes are based on quantitative and qualitative findings in this Evidence Integration Review. Specific recommendations may vary based on individual patient needs and local resources.

Conclusions

This Evidence Integration Review synthesized findings from 41 studies, evaluating multimodal interventions designed to improve PTSD, depression, anxiety, physical resilience, social connections, and reintegration outcomes for military veterans. Results demonstrated that mindfulness practices, physical activity programs, and social support initiatives significantly reduced PTSD and depressive symptoms, alleviated anxiety, and enhanced social and physical resilience. These findings underscore the importance of accessible and culturally sensitive interventions tailored to veterans' unique needs.

Despite these promising outcomes, challenges such as inconsistent adherence and underrepresentation of female veterans and racial minorities highlight gaps in current research. Addressing these issues requires the development of inclusive, sustainable approaches and comprehensive evaluation strategies. This review provides critical insights into constructing evidence-based, multimodal frameworks to support veterans' reintegration into civilian life effectively.

Funding and Conflicts of Interest

This review was part of the author’s doctoral research and did not receive external funding. The author declares no conflicts of interest related to this review.

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