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Psychosocial Outcomes of Australian Male and Female Veterans Following Participation in Peer-Led Adventure-Based Therapy

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Adjunct or second-line therapies are increasingly being utilised among military populations to address treatment barriers and improve mental health outcomes. This study evaluated the psychosocial outcomes of an Australian peer-led adventure-based therapy program, Trojan's Trek, for 60 ex-service military personnel (i.e., veterans, 56.7% male). Participants completed 1 of 6 Queensland Trojan's Trek programs—a 6-day, live-in program consisting of 10–12 structured CBT-based group sessions and 11 nature-based activities—between March 2018 and March 2019. A non-controlled, within-subjects longitudinal design was utilised with assessment at pre-intervention, post-intervention, and 2-month follow-up. Changes in psychosocial outcomes were assessed using the Depression, Anxiety, and Stress Scale 21 (DASS-21), PTSD Checklist-5 (PCL-5), Positive and Negative Interactions Scale (PNI), General Self-Efficacy Scale (GSES), and the Life Satisfaction Questionnaire (LSQ). Mixed-factorial ANOVAs indicated a significant time x gender effect for anxiety (male $F[2, 28] = 31.1, p < .001$; female $F[2, 19] = 4.05, p = .025$); and stress (male $F[2, 28] = 45.3, p < .001$; female $F[2, 19] = 9.98, p < .001$). There were significant improvements between pre- and post-intervention for depression, anxiety (male only), stress, posttraumatic stress, perceived positive relationships with friends and family, perceived negative relationships with family and partners, self-efficacy, and life satisfaction. Improvements were maintained or established at 2-month follow-up for depression, anxiety (male and female), stress, posttraumatic stress, perceived negative relationships with friends, and self-efficacy. This study demonstrates utility of the Trojan's Trek program for male and female Australian veterans with mental health difficulties. However, a controlled trial is required to determine program efficacy.

Keywords: adventure-based therapy; peer-to-peer intervention; peer support veterans; mental health; posttraumatic stress disorder

A large body of evidence has shown substantial rates of mental health disorders among ex-serving military personnel (i.e., veterans) both nationally and internationally (Ikin et al., 2016; Van Hooff et al., 2018). Commonly reported disorders within this population include posttraumatic stress disorder (PTSD), depression, and anxiety (e.g., generalised anxiety disorder, social anxiety disorder, agoraphobia, and panic disorder; Van Hooff et al., 2018), and comorbidity of psychiatric disorders is high (Knowles et al., 2019). A recent report on the prevalence of mental health disorders in recently transitioned Australian Defence Force (ADF) personnel estimated that almost 75% met criteria for a lifetime mental health disorder and almost 50% met criteria for a mental health disorder in the previous 12 months, with 55.2% having at least two co-existing disorders (Van Hooff et

al., 2018). Furthermore, this report found that transitioned ADF personnel had significantly higher rates of psychological distress (33.1%) than a matched Australian community sample (12.8%). Similarly, between 2002 and 2017, suicide rates were higher among Australian ex-serving military personnel, particularly women, compared to an age-adjusted community sample (AIHW, 2019). Over this period, the age-adjusted rate of suicide for ex-serving men was 18% higher than civilian Australian men, and the age-adjusted rate of suicide for ex-serving women was 115% higher than civilian Australian women (AIHW, 2019). These statistics highlight the vulnerability for those who have left the military with a multitude of factors identified that contribute to this including a loss of purpose, community and culture, and identity (Romaniuk et al., 2019). In addition to increased suicide risk

(Kuehn, 2009; O'Toole et al., 2015), mental health difficulties have been associated with poor health behaviours such as sedentary lifestyle, eating high amounts of low nutritive value foods, cigarette smoking, and substance abuse (Mills et al., 2006; van den Berk-Clark et al., 2018; Zen et al., 2012), physical health problems (Kelsall et al., 2014; McLeay et al., 2017), and reduced quality of life (Ikin et al., 2010). As such, research into effective psychological treatments for veterans is of paramount importance.

Several first-line evidence-based treatments exist for commonly reported mental health disorders (PTSD, depression, etc.), including Cognitive Behaviour Therapy (CBT) and its variants such as trauma focused-CBT (TF-CBT) and CBT for insomnia (CBT-I), Prolonged Exposure Therapy (PET), and Eye Movement Desensitisation and Reprocessing Therapy (EMDR; Phoenix Australia, 2013). In a recent meta-analysis, findings indicated CBT is a moderately efficacious treatment for anxiety disorders compared to placebo (Carpenter et al., 2018). However, treatment uptake and adherence are low, with literature citing considerable delays in military personnel engaging in mental health treatment following deployment or service (Maguen et al., 2012; McFarlane et al., 2011) and high rates of attrition (Goetter et al., 2015). The ADF Mental Health Prevalence and Wellbeing Study found that there are two main factors preventing ADF personnel from receiving timely and adequate mental health care:

1. The fear of stigma (i.e., harbouring negative attitudes and beliefs about mental illness and treatment, and the potential consequences if mental health services are accessed), and
2. Perceived barriers to care (i.e., the organisational, procedural, or administrative aspects that preclude or reduce access to mental health treatment; McFarlane et al., 2011).

These barriers are reflected in international research of military populations (Britt et al., 2019; Browne et al., 2019; see Australian Centre for Posttraumatic Mental Health, 2010). Research suggests that military culture, beliefs, and values, which endorse masculinity, self-sufficiency, and emotional control, and condemn shirking of work responsibilities, are antithetical to help-seeking and thus may contribute to the stigmatisation of those seeking or accessing mental health care, with these beliefs often persisting into civilian life (Sharp et al., 2015). Furthermore, military personnel report fears of being judged or misunderstood by professionals outside of the military (Coleman et al., 2017). These barriers highlight the need for interventions focused on enhancing treatment engagement, adherence, and acceptability (Australian Centre for Posttraumatic Mental Health, 2010). In an effort to address such treatment barriers—particularly the perception of stigma with mental health services—and increase treatment acceptance by a military community, there has been growing interest in the effectiveness of various adjunct or second-line treatments for military popula-

tions such as peer-to-peer interventions and adventure-based therapy.

Peer-to-Peer Interventions

Peer-support, in the context of mental health treatment for current and ex-serving military personnel, includes support from individuals with a history of mental illness or shared lived experience (i.e., military service). Peers may provide emotional or practical assistance to those in earlier stages of the recovery process (Chien et al., 2019; Jain et al., 2012). Although promising, peer support for individuals with mental health problems has been shown to be understudied and variable in the literature (Bassuk et al., 2016; Campos et al., 2016; Chien et al., 2019; Chinman et al., 2014). In ex-service personnel, previous research has demonstrated peer-to-peer interventions or peer-support programs may help to support reintegration to civilian life (Drebing et al., 2018; Westwood et al., 2010), reduce stigma (Kivari et al., 2018), enhance treatment adherence or engagement (Goetter et al., 2018; Ray et al., 2017), and improve treatment outcomes (Jain et al., 2016; Travis et al., 2010). Specifically, peer-support may help to improve engagement and outcomes related to CBT (Nelson et al., 2014; Pfeiffer et al., 2020; Westwood et al., 2010). In a recent study by Pfeiffer and colleagues (2020), peer encounters in association with an online peer-support CBT program for veterans was positively associated with the number of CBT modules completed. Furthermore, results from an online peer-developed and delivered CBT-related program named “The Post War: Survive to Thrive Program,” demonstrated significant long-term improvements to psychosocial outcomes for veterans with PTSD (Romaniuk et al., 2019). More specifically, participants who completed this self-paced, 9-module program reported lower levels of depression, anxiety, stress, and posttraumatic symptoms, and higher levels of happiness, both 3 and 6 months after commencing the program, indicating maintenance of treatment gains.

Adventure-Based Therapy

Adventure-based therapy, also known as wilderness or outdoor adventure therapy, is a varied therapeutic approach that is differentiated from other psychological treatment modalities by the presence of and interaction with nature, the meaningful engagement in adventure experiences, and a group-based environment (Bowen & Neill, 2013). Adventure activities may include wilderness adventure experiences such as camping, backpacking, bushwalking, rock climbing, canoeing, kayaking, white water rafting, skiing, snowboarding, mountain climbing, abseiling, rope courses, and sailing (Bowen & Neill, 2013). Other program elements may include group discussion or group therapy, peer-support, and elements of CBT with or without facilitation by mental health professionals (Bowen & Neill, 2013).

Adventure-based therapy has been shown to be moderately effective in improving psychological, behavioural, emotional, and interpersonal outcomes in children and young adults (Bowen & Neill, 2013). Furthermore, there is

a small but growing evidence base suggesting the effectiveness of adventure-based therapy for current and ex-serving military personnel (e.g., Bennett et al., 2014a; Bennett et al., 2017; Bettmann et al., 2019; Bird, 2015; Duvall & Kaplan, 2014; Ewert, 2014; Gelkopf et al., 2013; Harper et al., 2014; Scheinfeld & Spangler, 2013; Vella et al., & 2013). These studies show considerable variability of adventure-based therapy, with the duration of programs ranging from 2 days to 12 months, and the inclusion of both residential and outpatient programs and a variety of adventurous activities (e.g., camping, water rafting), therapeutic components (e.g., peer mentoring, CBT, and inpatient PTSD therapy), and outcome measures (e.g., PTSD symptomology, leisure satisfaction, and self-confidence). Despite this variability, taken together the results demonstrate significant short-term positive outcomes associated with adventure-based therapy, including improvement in psychological health, quality of life or life satisfaction, self-confidence and self-efficacy, and overall well-being. Limited follow-up data indicates some, but not all, improvements may be maintained over time (Bennett et al., 2017; Bird, 2015; Duvall & Kaplan, 2014; Harper et al., 2014; Scheinfeld & Spangler, 2013; Vella et al., 2013); however, available data precludes any conclusions about the long-term effectiveness of adventure-based therapy, with very few studies reporting more than 1-month follow-up post-intervention (Bennett et al., 2017; Bird, 2015; Harper et al., 2014; Vella et al., 2013), and very few controlled studies.

Trojan's Trek

While promising, the majority of adventure-based therapy studies are from the United States (US) and Canada (e.g., Outward Bound for Veterans [OB4V]; Bettmann et al., 2019; Ewert, 2014; Harper et al., 2014; Scheinfeld et al., 2017; Scheinfeld & Spangler, 2013; and Warrior Adventure Quest [WAQ], see Hayden, 2010; McIlvaine, 2008), and the United Kingdom (e.g., The Battle Back Programme, see Carless et al., 2013; Peacock et al., 2019), with very little research examining the effectiveness of adventure-based therapy for Australian current and ex-serving military personnel. One exception, however, is the Trojan's Trek program.

Trojan's Trek combines adventure-based therapy and peer-to-peer intervention based on CBT principles for military and first responder personnel experiencing mental health or transition-related difficulties. To date, three small mixed-method evaluations have been conducted for the Trojan's Trek South Australian program in 2010, 2013, and 2015, with a total of 39 current or ex-serving military or emergency service personnel (Australian Centre for Posttraumatic Mental Health, 2010; Bird, 2015; Burleigh, 2015). Despite small sample sizes, results of these evaluations suggest participants may experience short-term improvements in self-reported life satisfaction (Australian Centre for Posttraumatic Mental Health, 2010; Bird, 2015; Burleigh, 2015), self-efficacy (Bird, 2015; Burleigh, 2015), and symptoms of depression, anxiety, and stress (Australian Centre for Posttraumatic Mental Health, 2010; Bird, 2015). Correspondingly, qualitative data

showed that participants believed the program benefited them through enhanced self-awareness, self-reflection, connection with others, communication, problem-solving abilities, thoughts and actions for change, and hope for the future (Australian Centre for Posttraumatic Mental Health, 2010; Bird, 2015). However, many of these improvements were not maintained or could not be assessed at 2-month follow-up. For example, in the study by Bird (2015), symptoms of depression, anxiety, and stress were reduced at follow-up compared to pre-intervention, yet improvements to self-efficacy and life satisfaction were not maintained. Similarly, the evaluation by the Australian Centre for Posttraumatic Mental Health (2010) reported that the initial perceived benefits from the Trojan's Trek program diminished for some participants at follow-up; however, firm conclusions about long-term program effectiveness cannot be drawn due to the low follow-up response rate and the fact that participants who did not respond to follow-up assessments represented a more clinically severe group at the time of initial assessment compared to follow-up responders. Given that the extant literature on the Trojan's Trek program includes small sample sizes, no control groups, and limited follow-up response rates, additional, more robust research is required to more clearly establish the short- and long-term effectiveness of this program for Australian military veterans.

The Current Study

The current study seeks to address this gap in the literature by evaluating the psychosocial outcomes of an Australian adventure-based therapy program, Trojan's Trek, for Australian ex-service personnel (veterans) across the domains of depression, anxiety, stress, PTSD symptoms, positive and negative interactions, general self-efficacy, and life satisfaction. The study aimed to determine if participation in Trojan's Trek improved psychosocial outcomes in Australian veterans upon completion of the program and at longitudinal follow-up (minimum of 2 months following treatment completion) as well as compare the outcomes of male and female participants.

Method

Design

This study utilised a non-controlled, within-subjects longitudinal design. Participants were assessed at 3 time-points:

1. Prior to starting the Trojan's Trek program (pre-intervention),
2. Upon conclusion of the Trojan's Trek program (post-intervention), and
3. A minimum of 2 months ($M = 73.7$ days, $SD = 11.7$) following the conclusion of the Trojan's Trek program (follow-up).

Given that Trojan's Trek is an existing program offered within an Ex-Service Organisation (ESO), random allocation to a control group for comparison was precluded.

Procedures

Potential participants were referred to the study by Trojan's Trek staff members during the enrolment process. Interested participants received a Participant Information Sheet and Informed Consent Form via email and in-person. Participants were informed that they could decline to participate in the study with no effect on their enrolment in the program and that they were also free to withdraw their participation at any time without penalty. Prior to any study-specific data collection, written informed consent was obtained by Trojan's Trek staff members who were trained in the informed consent process by the Gallipoli Medical Research Foundation (GMRF) study investigator, RT. Inclusion criteria were ex-serving ADF members (veterans) who took part in a Trojan's Trek program between March 2018 and March 2019. Exclusion criteria included currently serving ADF members, emergency service personnel, and repeat participants of a Trojan's Trek program. In addition, a requirement of the Trojan's Trek program is that participants meet standard health eligibility requirements, which precludes individuals currently hospitalised with a psychiatric condition. Participants received no incentives for their participation.

Ethical and Safety Procedures

Ethics approval was obtained from the Greenslopes Research and Ethics Committee (GREC; approval number 18/05). Data was stored in a password-protected database on a server that requires a unique login and password by all project team members. Hardcopy data was de-identified upon data entry to ensure participant confidentiality and all hardcopy data was stored in a locked filing cabinet.

Trojan's Trek safety protocols are maintained and regularly updated. Trained medics are present for all programs to provide immediate first aid and have access to first aid materials, portable defibrillators, and satellite phones. Evacuation plans are in place including engagement with local hospital, police, community safety stakeholders, and airstrip access. All camping and adventure equipment are audited, cleaned, and replaced if damaged after each trek. Equipment is securely stored in a humidity controlled, purpose-built storage container following each program. Prior to enrollment in the Trojan's Trek program, participants require doctor approval to ensure they are physically and emotionally suitable for the course. Participants also provide a list of medications and allergies to ensure participant safety.

Trojan's Trek Program

Trojan's Trek is a not-for-profit ESO that provides free adventure-based therapy for current and ex-serving military personnel, first responders, and other service providers (e.g., nurses and prison guards). Program costs, approximately \$2,500.00 AUD per participant, are covered by private funding partners and donations. The Trojan's Trek program is a 6-day, live-in, peer-led outdoor support ther-

apy program for participants experiencing mental health or transition-related difficulties. Veterans designed and deliver the program in consultation with mental health professionals to ensure that the program is specific to military culture. Each trek consists of a minimum of one staff member to three participants and usually consists of one medic, and five facilitators and mentors, all of whom are past program participants. Program staff are all volunteers and receive annual Trojan's Trek specific training in addition to annual police checks. Facilitators are specifically trained to deliver CBT-based group content and lead activities; however, intervention fidelity is not formally assessed. Program staff are consistent throughout the duration of each program.

The Trojan's Trek program, which first began in South Australia, has been running in Queensland since 2015. In addition to four treks in South Australia, four treks (2 male, 2 female) based in rural Queensland are held each year. Male and female programs are run separately to accommodate participant preference. Participants spend the 6-day trek immersed in nature including the use of basic camping equipment for sleeping accommodation.

The program includes 10–12 structured CBT-based group sessions, 11 nature-based skills building activities, informal gatherings and activities, and one-on-one debriefings with program peer facilitators or mentors. Sessions and activities are led by non-mental health professional peer facilitators and aim to promote cognitive and behaviour change and improve self-esteem through peer social support, group-identity development, and various skill-building activities. CBT-based group sessions run for approximately 40–60 minutes and aim to improve understanding of how thoughts and feelings influence behaviour and to develop strategies and skills to make positive changes. Adventurous and skills building activities include four-wheel driving, knot tying, target shooting, guided meditation, hiking, and team building exercises. **Table 1** provides a brief overview of core program content.

Participants receive Trojan's Trek manuals that summarise program content. A typical day includes CBT-based group sessions, journaling and debriefings, and interspersed adventure activities. Program content is delivered sequentially and scheduled based on number of participants, weather, and daily adventurous activities.

Data Collection

Data collection took place between March 2018 and August 2019. Six programs based in Millmerran, Queensland took place during this time and were included in this study: two in March 2018 ($n = 18$; 61.1% male); two in August 2018 ($n = 15$; 33.3% male); and two in March 2019 ($n = 27$; 66.7% male). Trojan's Trek staff collected pre- and post-intervention measures, and GMRF staff collected follow-up measures via phone or online survey. Collected data was stored securely to ensure participant confidentiality (see Ethical and Safety Procedures).

Table 1: Brief Overview of Trojan's Trek Program: Core Content.

Key therapeutic components and activities	Examples
<i>Brain Function/Mechanisms of thoughts influencing behaviour</i>	<ul style="list-style-type: none"> • Sensory filters • Conscious vs. subconscious brain • Recognising behaviour and thought patterns • Identifying and challenging unhelpful thoughts
<i>Motivation and skills development</i>	<ul style="list-style-type: none"> • Identifying needs and motivators • Beliefs vs. values • SMART goals
<i>Relationships and communication</i>	<ul style="list-style-type: none"> • Communication process and effective communication • Barriers to communication • Active listening • Team/relationship building
<i>Legacy making and values</i>	<ul style="list-style-type: none"> • Qualities of an effective mentor • Pathway to mentoring
<i>Common experiences</i>	<ul style="list-style-type: none"> • Suicide • Women in service* • Sexual assault*
<i>Nature-based skills building activities</i>	<ul style="list-style-type: none"> • Journaling • Silent walk • Guided meditation • Target shooting • Knot tying • Celebrity heads • Charades • Understanding 4-wheel driving • Bushwalking • Navigating by the stars • Stories and jokes

Note: * Content only provided in women's program delivery.

Measures

Depression, anxiety, and stress

Participants' symptoms of depression, anxiety, and stress were measured with the Depression Anxiety Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995). The DASS-21 is a self-report measure that comprises three 7-item subscales: depression (e.g., "I felt that I had nothing to look forward to"), anxiety (e.g., "I was aware of dryness of my mouth"), and stress (e.g., "I found it hard to wind down"). Participants rated how much each item applied to them over the past week on a scale from 0 (*Did not apply to me at all*) to 3 (*Applied to me very much, or most of the time*). Items were summed to create subscale scores, with higher scores reflecting greater symptoms of depression, anxiety, and stress. Severity ratings were also calculated by multiplying summed subscale scores by 2, and using interpretive guidelines (Lovibond & Lovibond, 1995). Previous research has demonstrated acceptable to excellent psychometric properties for the DASS-21 (Antony et al., 1998; Lovibond & Lovibond, 1995; Weiss et al., 2015).

PTSD symptoms

Presence and severity of PTSD symptoms were measured with the Posttraumatic Stress Disorder Checklist-5 (PCL-5 see Blevins et al., 2015). The PCL-5 is a 20-item self-report

measure that assesses DSM-5 symptoms of PTSD. Participants rated how much each symptom (e.g., "repeated, disturbing, and unwanted memories of the stressful experience") affected them over the past month from 0 (*Not at all*) to 4 (*Extremely*). Items were summed to create a composite score, with higher scores indicating greater PTSD severity. In addition, a provisional diagnosis of PTSD was obtained by summing items scores within a given cluster. A provisional diagnosis requires at least one symptom endorsed (rated ≥ 2) in Cluster B (items 1–5) and in Cluster C (items 6–7), and two symptoms endorsed in Cluster D (items 8–14) and in Cluster E (items 15–20). The PCL-5 has demonstrated strong psychometric properties in previous studies and is used regularly for screening and making a provisional diagnosis of PTSD, and monitoring symptom change during and after interventions (Blevins et al., 2015; Bovin et al., 2016; Wortmann et al., 2016).

Positive and negative interactions

Participants' perceptions of their relationships with friends, family, and partners were assessed with the Positive and Negative Interactions Scale (PNI; Schuster et al., 1990). The PNI is a 14-item self-report measure that was adapted from Schuster and colleagues for use in the Trojan's Trek program. It includes

six subscales: three that assess perceptions of positive or supportive interactions with friends, family, and partners, and three that assess perceptions of negative interactions with friends, family, and partners. Example items include “How often do friends make you feel cared for?” and “How often do you have an unpleasant disagreement with your partner?” Participants rated each item on a scale from 1 (*Never*) to 4 (*often*). Items on each subscale were summed, with higher scores indicating higher perceived positive or negative interactions across the domains of friends, family, and partners. Schuster and colleagues (1990) demonstrated acceptable internal consistency (Cronbach’s $\alpha > .70$) for all but two subscales: positive and negative interactions with friends.

General self-efficacy

General self-efficacy was measured with the 10-item General Self-Efficacy Scale (GSE; Schwarzer & Jerusalem, 1995). Participants rated each item (e.g., “I can always manage to solve difficult problems if I try hard enough”) on a scale from 1 (*Not at All True*) to 4 (*Exactly True*). Items were summed to form a composite score, with higher scores indicating greater general self-efficacy. Previous research has demonstrated acceptable to excellent internal consistency for the GSE (Schwarzer & Jerusalem, 1995).

Life satisfaction

Participants’ life satisfaction was measured with the Life Satisfaction Questionnaire (LSQ; Wooden et al., 2002). The LSQ is a 13-item self-report measure that was developed for the annual Household and Income Labour Dynamic in Australia survey (HILDA; Wooden et al., 2002) and was obtained for use in the Trojan’s Trek program. The LSQ assesses 13 domains around quality of life and life satisfaction (e.g., home, employment, finances). For each item (e.g., “The home in which you live”), participants rated their current level of satisfaction from 0 (*Dissatisfied*) to 10 (*Satisfied*). Items were averaged to create a composite score, with higher scores indicating greater perceived life satisfaction. The LSQ showed acceptable internal consistency in the present study (Cronbach’s $\alpha = .85$).

Demographics

Participants completed a demographic questionnaire at pre-intervention which included the following information: age, gender, ethnicity, marital status, number of children, employment status, military service information, mental health conditions, and current mental health treatment regimens. In addition, at follow-up, participants were asked to report any changes to mental health treatment regimens including initiating new treatment and ceasing or reducing past treatments.

Statistical Analyses

Prior to examining outcomes, descriptive statistics (e.g., means and standard deviations), independent samples *t*-tests, Fischer’s exact tests, and Pearson’s χ^2 tests were conducted to compare male and female groups at pre-

intervention on demographic characteristics. In addition, independent samples *t*-tests were used to examine differences on psychosocial outcome measures at pre-intervention between male and female groups as well as between participants who did and did not complete follow-up questionnaires. Data were assessed for normality, with non-normal data assessed using Mann-Whitney *U* tests. To compare treatment outcomes across each assessment time point (pre-intervention, post-intervention, and follow-up) between the male and female groups, 2 (Group: male vs female) \times 3 (Time: pre-intervention, post-intervention, and follow-up) mixed-factorial ANOVAs were used. Effect sizes were calculated using multivariate partial eta squared (η_p^2) and are considered large when greater than 0.14 (Cohen, 1988). Outcomes with significant interaction (time \times gender) main effects were rerun as simple effects ANOVAs. Significant main effects for time and gender were further explored post-hoc with paired-samples *t*-tests. To account for multiple testing, a Bonferroni correction was applied. *P*-values were considered significant when less than 0.05. The magnitude of change was determined using Cohen’s *d* effect sizes, with .2, .5, and .8 indicating a small, medium, and large effect, respectively (Cohen, 1988, 1992). Assumptions for normality and homogeneity of sphericity were assessed. The assumption of homogeneity of sphericity was upheld for all analyses except the PNI negative interactions with family subscale. The Greenhouse-Geisser correction was used to account for this violation. All analyses were conducted using SPSS v.26 (IBM Corporation). The study was sufficiently powered (95%) to detect statistically significant differences (with a medium effect size).

Results

Safety of Program

There were no injuries or medical issues on completion of the 2018 and 2019 Queensland programs.

Participant Characteristics

Participants were 60 ex-serving military personnel members (56.7% male; $M_{age} = 46.5$ years, $SD = 12.6$) who took part in a Queensland Trojan’s Trek program running in March 2018, August 2018, or March 2019. A total of six programs took place (3 female, 3 male) with male and female treks taking place simultaneously. The majority of participants reported their ethnicity as Caucasian (81.7%) and service type as the Army (61.7%). For the total sample, the average length of service was 12.1 years and the average amount of time since discharge was 15.2 years. A large proportion of the sample reported having a psychological condition (86.7%) including 61.7% with depression and 58.3% with PTSD. At pre-intervention, participants were in the “severe” range on depression, anxiety, and stress, as assessed by the DASS-21, and 47 participants (79.7%) met criteria for a provisional diagnosis of PTSD, as measured by the PCL-5 (Blevins et al., 2015). Additionally, 73.3% of participants reported receiving current psychological treatment. **Table 2** provides full details of demographic characteristics.

Table 2: Demographic Information for Participants of the March 2018 – March 2019 Trojan's Trek Programs.

Variable	All participants (n = 60)	Male (n = 34)	Female (n = 26)	p
Age (years)	46.5 ± 12.6 Range = 25–77	46.7 ± 13.3 Range = 28–74	46.3 ± 11.9 Range = 25–77	.904
Children (yes)	39 (65.0%)	23 (67.6%)	16 (61.5%)	.785
Ethnicity				.345
Caucasian	49 (81.7%)	26 (76.5%)	23 (88.5%)	
Aboriginal	1 (1.7%)	1 (2.9%)	0 (0%)	
Other	5 (8.3%)	4 (11.8%)	1 (3.8%)	
Missing	5 (8.3%)	3 (8.8%)	2 (7.7%)	
Employment Status				.340
Full-time	12 (20.0%)	5 (14.7%)	7 (26.9%)	
Part-time/Casual	11 (18.3%)	7 (20.6%)	4 (15.4%)	
Pension	10 (16.7%)	4 (11.8%)	6 (23.1%)	
Retired	12 (20.0%)	9 (26.5%)	3 (11.5%)	
Unemployed	13 (21.7%)	7 (20.6%)	6 (23.1%)	
Missing	2 (3.3%)	2 (5.9%)	0 (0%)	
Service Type				.289
Army	37 (61.7%)	24 (70.6%)	13 (50.0%)	
Navy	13 (21.7%)	5 (14.7%)	8 (30.7%)	
Air Force	8 (13.3%)	4 (11.8%)	4 (15.4%)	
Navy + Air Force	1 (1.7%)	0 (0%)	1 (3.8%)	
Missing	1 (1.7%)	1 (2.9%)	0 (0%)	
Years of Service	12.1 ± 8.67 Range = 1–43 (n = 57)	13.2 ± 9.61 Range = 3–43 (n = 32)	10.7 ± 7.24 Range = 1–27 (n = 25)	.284
Years Since Discharge	15.2 ± 12.1 Range = 1–57 (n = 58)	14.5 ± 12.2 Range = 1–46 (n = 33)	16.1 ± 12.2 Range = 1–57 (n = 25)	.623
Medical Discharge				.800
Yes	31 (51.7%)	17 (50.0%)	14 (53.8%)	
No	29 (48.3%)	17 (50.0%)	12 (46.2%)	
Deployed Overseas				<.001**
Yes	37 (61.7%)	28 (82.4%)	9 (34.6%)	
Self-reported Psychological Condition*				.037*
Yes	52 (86.7%)	32 (94.1%)	20 (76.9%)	
No	7 (11.7%)	1 (2.9%)	6 (23.1%)	
Unsure	1 (1.7%)	1 (2.9%)	0 (0%)	

(Contd.)

Variable	All participants (n = 60)	Male (n = 34)	Female (n = 26)	p
<i>Anxiety</i>				.115
Yes	26 (43.3%)	11 (32.4%)	15 (57.7%)	
No	31 (51.7%)	20 (58.8%)	11 (42.3%)	
Missing	3 (5.0%)	3 (8.8%)	0 (0%)	
<i>Depression</i>				.781
Yes	37 (61.7%)	21 (61.8%)	16 (61.5%)	
No	20 (33.3%)	10 (29.4%)	10 (38.5%)	
Missing	3 (5.0%)	3 (8.8%)	0 (0%)	
<i>PTSD</i>				.013*
Yes	35 (58.3%)	24 (70.6%)	11 (42.3%)	
No	22 (36.7%)	7 (20.6%)	15 (57.7%)	
Missing	3 (5.0%)	3 (8.8%)	0 (0%)	
<i># of Self-Reported Psychological Conditions*</i>				.012*
0	7 (11.7%)	1 (2.9%)	6 (23.1%)	
1	13 (21.7%)	9 (26.5%)	4 (15.4%)	
2	11 (18.3%)	8 (23.5%)	3 (11.5%)	
3	15 (25.0%)	10 (29.4%)	5 (19.2%)	
4+	10 (16.7%)	2 (5.9%)	8 (30.8%)	
Missing/unsure	4 (6.7%)	4 (11.8%)	0 (0%)	
<i>Current Psychological Treatment</i>				.006*
Yes	44 (73.3%)	30 (88.2%)	14 (53.8%)	
No	11 (18.3%)	2 (5.9%)	9 (34.6%)	
In the past	5 (8.3%)	2 (5.9%)	3 (11.5%)	
<i>Current Relationship Status</i>				.622
Married	22 (36.7%)	14 (41.2%)	8 (30.8%)	
De-facto/Partner	15 (25.0%)	9 (26.5%)	6 (23.1%)	
Divorced/Separated	8 (13.3%)	3 (8.9%)	5 (19.2%)	
Single	15 (25.0%)	8 (23.5%)	7 (26.9%)	

Note: Data presented as mean \pm standard deviation (percent of total participants). * Psychological conditions (Anxiety, Depression, PTSD) were self-reported by participants as part of the demographics questionnaire. Differences between male and female participants measured by independent *t*-tests, Fischer's exact test or Pearson Chi Square.

* $p < .05$. ** $p < .001$.

Sample Retention Rates and Group Differences at Pre-intervention

All 60 participants completed the Trojan's Trek program (100% intervention retention rate). Of these 60 participants, all completed the outcome measures at pre- and post-intervention, however 9 did not complete outcome measures at follow-up (follow-up retention rate = 85%). Therefore, a total of 51 participants were included in the final analysis. There were no significant differences in outcome measures

at pre-intervention between participants who did and did not complete follow-up questionnaires, *ts* ranged from -1.37 to 1.90 , *p* ranged from .063 to .839.

As shown in **Table 2**, there were no differences between male and female groups with regard to mean participant age, whether or not the participant has children, ethnicity, employment status, service type, and current relationship status. However, significant gender differences were found regarding deployment overseas (82.4% of males reported

overseas deployment versus 34.6% of females, $p < .001$), self-reported psychological condition (94.1% of males reported having a psychological condition versus 76.9% of females, $p = .037$), self-reported PTSD (70.6% of males reported having PTSD versus 42.3% of females, $p = .013$), and current psychological treatment (88.2% of males reported currently receiving psychological treatment and 53.8% of females, $\chi^2 = 12.6$, $p = .006$). No significant differences were found between male and female groups on any outcome measure at pre-intervention, ts ranged from -2.23 to 1.76 , p ranged from $.083$ to $.946$.

Mixed-Factorial ANOVAs

A series of mixed-factorial ANOVAs were conducted to compare scores on the psychosocial outcome measures

across three assessment points: pre-intervention, post-intervention, and follow-up for male and female participants. Means and standard deviations of all outcome measures are reported in **Table 3** and main effects are reported in **Table 4**.

Time \times Gender

There was a significant main effect between time (pre-intervention, post-intervention, follow-up) and gender (male, female) for anxiety and stress. This effect indicates that time of assessment had a different effect on anxiety and stress for male and female participants. Simple main effects ANOVAs were conducted separately for male and female participants to compare anxiety and stress scores across assessment points between groups. Results indicated there was a sig-

Table 3: Means and Standard Deviations.

Variable	n	Pre-Intervention	Post-Intervention	Follow-Up
		Mean \pm SD	Mean \pm SD	Mean \pm SD
<i>DASS-21</i>				
Depression	51	10.1 \pm 5.43	3.45 \pm 3.39	7.16 \pm 5.20
Male	30	10.6 \pm 5.27	2.93 \pm 2.53	7.90 \pm 4.96
Female	21	9.48 \pm 5.72	4.19 \pm 4.30	6.10 \pm 4.37
Anxiety	51	7.76 \pm 4.57	3.98 \pm 3.93	5.04 \pm 4.05
Male	30	7.90 \pm 4.57	2.80 \pm 3.00	5.23 \pm 4.22
Female	21	7.57 \pm 4.69	5.67 \pm 4.53	4.76 \pm 3.88
Stress	51	11.9 \pm 5.25	4.92 \pm 4.04	8.47 \pm 5.04
Male	30	12.4 \pm 4.90	4.00 \pm 3.01	8.60 \pm 4.75
Female	21	11.1 \pm 5.25	6.24 \pm 4.96	8.29 \pm 5.53
<i>PCL-5</i>				
Male	30	42.4 \pm 18.1	28.2 \pm 17.5	32.5 \pm 18.8
Female	19	47.3 \pm 15.8	30.4 \pm 17.0	35.0 \pm 18.7
Female	19	34.8 \pm 19.3	24.7 \pm 18.3	28.6 \pm 18.9
<i>PNI- Friend</i>				
Positive	50	6.24 \pm 1.27	7.06 \pm 1.13	6.30 \pm 1.47
Male	29	5.72 \pm 1.10	6.86 \pm 1.27	5.83 \pm 1.44
Female	21	6.94 \pm 1.24	7.33 \pm 0.86	6.95 \pm 1.28
Negative	47	4.53 \pm 1.41	3.87 \pm 1.36	3.83 \pm 1.26
Male	28	4.75 \pm 1.51	3.71 \pm 1.33	4.04 \pm 1.37
Female	19	4.21 \pm 1.23	4.11 \pm 1.41	3.53 \pm 1.02
<i>PNI- Family</i>				
Positive	49	6.29 \pm 1.76	6.94 \pm 1.21	6.16 \pm 1.78
Male	29	6.21 \pm 1.57	6.93 \pm 1.22	6.14 \pm 1.83
Female	20	6.40 \pm 2.04	6.95 \pm 1.23	6.20 \pm 1.77

(Contd.)

Variable	n	Pre-Intervention	Post-Intervention	Follow-Up
		Mean ± SD	Mean ± SD	Mean ± SD
Negative	47	5.21 ± 1.55	4.64 ± 1.42	4.75 ± 1.89
Male	28	5.07 ± 1.51	4.43 ± 1.26	4.86 ± 1.88
Female	19	5.42 ± 1.61	4.95 ± 1.61	4.58 ± 1.95
<i>PNI- Partner</i>				
Positive	29	9.44 ± 2.38	10.5 ± 1.35	9.79 ± 2.18
Male	20	9.40 ± 2.16	10.4 ± 1.39	9.50 ± 2.44
Female	9	9.56 ± 2.96	10.6 ± 1.33	10.4 ± 1.33
Negative	30	7.47 ± 2.99	6.57 ± 2.51	7.17 ± 2.36
Male	20	7.75 ± 2.86	6.85 ± 2.64	7.20 ± 2.42
Female	10	6.90 ± 3.31	6.00 ± 2.26	7.10 ± 2.38
<i>GSE</i>	50	27.9 ± 5.28	31.5 ± 5.14	30.5 ± 5.02
Male	29	28.3 ± 3.61	31.5 ± 5.17	29.9 ± 5.00
Female	21	27.3 ± 7.03	31.5 ± 5.14	31.4 ± 5.05
<i>LSQ</i>	50	5.38 ± 1.74	7.01 ± 1.43	5.78 ± 1.61
Male	30	5.46 ± 1.50	7.11 ± 1.52	5.80 ± 1.30
Female	20	5.27 ± 2.10	6.87 ± 1.33	5.77 ± 2.03

Note: DASS-21 = Depression Anxiety Stress Scale-21. PCL-5 = PTSD Checklist for DSM-5. PNI = Positive and Negative Interactions Scale. GSE = General Self-Efficacy Scale. LSQ = Life Satisfaction Questionnaire.

Table 4: Mixed ANOVAs Main Effects Comparing Scores on Measures across Assessment Time Points and Between Gender.

Variable	Time			Gender			Time × Gender		
	F	df	η_p^2	F	df	η_p^2	F	df	η_p^2
<i>DASS-21</i>									
Depression	39.8***	2, 49	0.448	0.275	1, 49	0.006	2.45	2, 49	0.048
Anxiety	–	–	–	–	–	–	5.46**	2, 49	0.100
Stress	–	–	–	–	–	–	3.46*	2, 49	0.066
<i>PCL-5</i>	17.2***	2, 47	0.268	3.35	1, 47	0.066	1.26	2, 47	0.026
<i>PNI- Friend</i>									
Positive	8.34***	2, 48	0.148	13.5**	1, 48	0.220	1.95	2, 48	0.039
Negative	5.02**	2, 45	0.100	0.569	1, 45	0.012	2.53	2, 45	0.053
<i>PNI- Family</i>									
Positive	5.47**	2, 47	0.104	0.060	1, 47	0.001	0.066	2, 94	0.001
Negative ^a	3.35*	1.75, 45	0.069	0.244	1, 45	0.005	1.50	1.75, 45	0.032
<i>PNI- Partner</i>									
Positive	2.86	2, 27	0.096	0.379	1, 27	0.014	0.603	2, 54	0.022
Negative	4.62*	2, 28	0.142	0.386	1, 28	0.014	0.952	2, 56	0.033
<i>GSE</i>	12.1***	2, 48	0.201	0.018	1, 48	0.000	1.24	2, 96	0.025
<i>LSQ</i>	34.2***	2, 47	0.416	0.143	1, 48	0.003	0.152	2, 96	0.003

Note: DASS-21 = Depression Anxiety Stress Scale-21. PCL-5 = PTSD Checklist for DSM-5. PNI = Positive and Negative Interactions Scale. GSE = General Self-Efficacy Scale. LSQ = Life Satisfaction Questionnaire.

^aGreenhouse-Geisser correction. * $p < .05$. ** $p < .01$. *** $p < .001$.

nificant effect for time for anxiety ($F[2, 28] = 31.1, p < .001, \eta_p^2 = 0.517$) and stress ($F[2, 28] = 45.3, p < .001, \eta_p^2 = 0.610$) in male participants. Additionally, there was a significant effect for time for anxiety ($F[2, 19] = 4.05, p = .025, \eta_p^2 = 0.168$) and stress ($F[2, 19] = 9.98, p < .001, \eta_p^2 = 0.333$) in female participants. Post-hoc comparisons are presented in **Table 5**.

Results revealed that for males, stress and anxiety were significantly lower at post-intervention compared to pre-intervention, and significantly lower at follow-up compared to pre-intervention, indicating improvements were maintained at time of follow-up. However, scores on both the anxiety and stress subscales were significantly higher at follow-up compared to post-intervention. In females, anxiety scores were not significantly different between pre-intervention and post-intervention or between post-intervention and follow-up. However, scores at follow-up were significantly lower compared to pre-intervention, indicating a gradual improvement in anxiety levels. Stress was significantly lower at post-intervention compared to pre-intervention and significantly lower at follow-up compared to pre-intervention. Scores were not significantly different between post-intervention and follow-up, indicating improvements to stress were maintained at follow-up for females.

According to the interpretive guidelines of the DASS-21 (Lovibond & Lovibond, 1995), male participants' anxiety and stress subscale scores started in the "severe" range at pre-intervention, dropped to the "normal" range at post-intervention, and increased to the "moderate" range for anxiety and the "mild" range for stress at follow-up. Female anxiety subscales also started in the "severe" range at follow-up, dropped to the "moderate" range at post-intervention, and dropped further to the "mild" range at follow-up. Female stress subscales scores started in the "moderate" range at pre-intervention, dropped to the "normal" range at post-intervention, and increased to the "mild" range at follow-up.

Time

There was no significant main effect between time and gender interaction for depression, PTSD symptoms, life satisfaction, general self-efficacy, positive relationships with family and partners, and negative relationships with friends, family, and partners; however, there was a significant main effect for time for all measures except positive relationships with partners. Post-hoc comparisons are presented in **Table 5**.

Results revealed that scores on the depression subscale were significantly lower at post-intervention compared to pre-intervention, and significantly lower at follow-up compared to pre-intervention. However, scores were significantly

Table 5: Post-hoc Comparisons between Assessment Time Points for Outcome Measures.

Variable	Pre-Intervention – Post-Intervention		Pre-Intervention – Follow-Up		Post-Intervention – Follow-Up	
	<i>t</i>	<i>d</i>	<i>t</i>	<i>d</i>	<i>t</i>	<i>d</i>
<i>DASS-21</i>						
Depression	6.48***	1.48	3.04***	0.56	-3.44***	0.85
Anxiety (Male)	5.10***	1.32	2.67***	0.61	-2.43**	0.66
Anxiety (Female)	1.90	0.41	2.81*	0.65	0.905	0.22
Stress (Male)	8.43***	2.07	3.83**	0.79	-4.60***	1.16
Stress (Female)	4.86**	0.91	2.81*	0.39	-2.05	0.50
<i>PCL-5</i>	13.5***	0.80	9.22**	0.54	-4.25	0.24
<i>PNI- Friend</i>						
Positive	-0.759**	0.67	-0.052	0.04	0.708**	0.58
Negative	0.570	0.48	0.699**	0.53	0.129	0.03
<i>PNI- Family</i>						
Positive	-0.637*	0.43	0.134	0.07	0.772*	0.51
Negative	0.558*	0.39	0.528	0.27	-0.03	0.06
<i>PNI- Partner</i>						
Negative	0.900*	0.33	0.175	0.11	-0.725	0.24
<i>GSE</i>	-3.70***	0.69	-2.86***	0.52	-0.847	0.19
<i>LSQ</i>	-1.62***	1.02	-0.417	0.24	1.20***	0.80

Note: DASS-21 = Depression Anxiety Stress Scale-21. PCL-5 = PTSD Checklist for DSM-5. PNI = Positive and Negative Interactions Scale. GSE = General Self-Efficacy Scale. LSQ = Life Satisfaction Questionnaire.
 * $p < .05$. ** $p < .01$. *** $p < .001$.

higher at follow-up compared to post-intervention. Scores on the PCL-5 were significantly lower at post-intervention compared to pre-intervention, and significantly lower at follow-up compared to pre-intervention. Post-intervention and follow-up scores were not significantly different, indicating improvements in PCL-5 scores were maintained at follow-up.

Participants' depression subscale scores started in the "severe" range at pre-intervention, dropped to the "normal" range at post-intervention, and increased to the "moderate" range at follow-up. Regarding the PCL-5, interpretive guidelines (Weathers et al., 2013) indicated that 79.7% of participants met criteria for a provisional PTSD diagnosis at pre-intervention, 42.4% met criteria at post-intervention, and 49.0% met criteria at follow-up. The mean PCL-5 scores reduced by >10 points from pre-intervention to post-intervention, and from pre-intervention to follow-up, indicating clinically significant change.

With regard to the PNI, scores for perceived positive interactions with friends and family were significantly higher at post-intervention compared to pre-intervention. Scores for positive interactions with friends and family were significantly lower at follow-up compared to post-intervention, and there were no significant differences in all positive interaction scores between pre-intervention and follow-up. Therefore, the initial gains found for perceived positive interactions with friends, family, and partners were not maintained 2 months following program cessation. Scores for perceived negative interactions with family and partners were significantly lower at post-intervention compared to pre-intervention; however, scores were not significantly different between pre-intervention and follow-up indicating improvements were not maintained. Conversely, negative interactions with friends was significantly lower at follow-up compared to pre-intervention, indicating an improvement over time. There were no significant differences in scores between post-intervention and follow-up.

Scores on the GSE and LSQ were significantly higher at post-intervention compared to pre-intervention; however, only GSE scores were significantly higher at follow-up compared to pre-intervention. LSQ scores were significantly lower at follow-up compared to post-intervention.

Gender

There was no significant main effect for gender for any measure except positive relationships with friends. Post-hoc analysis indicated that ignoring time, female participants reported significantly higher mean scores for perceived positive interactions with friends ($t = 0.941, p = .001$) than male participants (7.08 ± 0.89 vs 6.14 ± 0.89).

Discussion

In light of the substantial rates of mental health disorders among veterans and barriers to first-line treatment options, peer-to-peer interventions and adventure-based therapy programs are of particular interest for military populations.

This study aimed to evaluate the psychosocial outcomes of the Trojan's Trek program including experiences of depression, anxiety, stress, posttraumatic stress, perceived positive and negative relationships, self-efficacy, and life satisfaction. Analysis from the Queensland Trojan's Trek programs between March 2018 and March 2019 indicated, on average, significant short-term improvements were observed for self-reported depression, anxiety (male only), stress, posttraumatic stress, perceived positive interactions with friends and family, self-efficacy, and life satisfaction. Furthermore, improvements were maintained or were established at follow-up for depression, anxiety (male and female), stress, posttraumatic stress, negative interactions with friends, and perceived self-efficacy compared to pre-intervention.

Results from this study are in line with previous Trojan's Trek evaluations and adventure-based therapy research demonstrating positive outcomes in military populations (e.g., Bennett et al., 2017; Bird, 2015). In particular, the current study confirms findings from the Trojan's Trek evaluation by Bird (2015) in which improvements to symptoms of depression, stress, and anxiety were maintained at follow-up. However, in contrast to previous evaluations, the current study also identified sustained improvements in self-efficacy and negative interactions with friends, potentially due to an increased sample size and improved follow-up rates. It is important to note that these improvements are in the context of ongoing psychological treatment, with over 70% of participants receiving treatment at the time of the program. However, our results are consistent with outcomes from other peer-to-peer interventions (Nelson et al., 2014; Possemato et al., 2019; Romaniuk et al., 2019) and adventure-based therapeutic programs such as Outward Bound for Veterans (OB4V), a similar program to Trojan's Trek in the US and Canada (Bettmann et al., 2019; Ewert, 2014; Harper et al., 2014; Scheinfeld et al., 2017; Scheinfeld & Spangler, 2013). In a recent study by Bettmann and colleagues (2019), 77 ex-service personnel taking part in the 6-day OB4V program reported significant improvements including increased life purpose satisfaction and self-confidence post-program and decreased mental health symptomology at follow-up.

To our knowledge, this is the first Australian study to examine the impact of adventure-based therapy on symptoms of posttraumatic stress. Participants reported significantly fewer symptoms of posttraumatic stress post-intervention and at follow-up compared to pre-intervention. Additionally, at follow-up, the number of participants who met criteria for a provisional diagnosis of PTSD decreased by 30%. Existing research investigating PTSD symptomology and adventure-based therapy is sparse and conflicting. In a randomised controlled trial investigating the impact of a 12-month sailing adventure program for Israeli veterans with PTSD, significant improvements to PTSD symptoms were reported immediately after program completion (Vella et al., 2013). Conversely, in a controlled repeated measures study in US veterans with PTSD there was no significant

effect on PTSD symptoms following participation in the OB4V program compared to inpatient treatment as usual (Gelkopf et al., 2013). This study contributes to the limited literature regarding the impact of adventure-based therapy on PTSD symptomology.

Previous adventure-related therapeutic research has been conducted primarily in male participants, despite women representing a growing proportion of Defence members (Danan et al., 2017). In this study, almost half of participants were female, enabling insights into the application of adventure-based therapy for women veterans. Overall, both male and female participants demonstrated similar improvements for the majority of outcome measures. However, there were several differences between genders to note when interpreting outcomes, including self-reported mental health conditions, deployment history, and gender-specific differences in anxiety and stress scores over time.

More male participants reported having a mental health condition (94.1% versus 76.9%) and PTSD (70.6% versus 42.3%), which may explain differences in gender-specific patterns of anxiety and stress over time. Self-reported rates of PTSD were in contrast to the general military population and the general Australian community, whereby reports indicate PTSD is more common in women (Van Hooff et al., 2018). However, in recently transitioned ADF members, rates of PTSD are higher in individuals who had been deployed (20.1%) compared to those who had never deployed (3.5%; Van Hooff et al., 2018). A significantly greater number of male trek participants were deployed overseas compared to female participants (82.4% vs 34.6%). Nonetheless, there were no significant gender-specific differences in PTSD severity scores.

The gender-related differences identified in this study are in line with previous research demonstrating a disparity between male and female military personnel not only in prevalence of mental and physical health conditions, but also in experiences of military service and transition (Burkhart & Hogan, 2015; Crompvoets, 2011; Danan et al., 2017; McGraw, 2016; Polusny et al., 2014; Xue et al., 2015). For example, female military personnel are more likely to experience sexual assault or sexual trauma in and outside of the military, whereas male military personnel have been reported to have greater exposure to potentially traumatic combat situations (Polusny et al., 2014; Tolin & Foa, 2006). Studies have also demonstrated differences in mental health-related treatment retention among male and female patients (Choi et al., 2015; Pedrelli et al., 2016), highlighting potentially different treatment preferences between genders. In particular, a recent study from the US reported that women veterans in women-only PTSD programs had greater treatment retention and higher levels of commitment to therapy compared to participants in mixed-gender programs (Stefanovics & Rosenheck, 2019). Through providing separate male and female programs, Trojan's Trek may be able to facilitate tailored environments for both genders

accounting for potential differences such as trauma-exposure or treatment preferences.

In addition to separate treks for male and female participants, additional components of the Trojan's Trek program including peer-led CBT-based content, peer-support, and time in nature, possibly contribute to the positive improvements in psychosocial well-being. The relationship between spending time in nature and well-being has been demonstrated throughout the literature (Annerstedt & Währborg, 2011; Capaldi et al., 2014; Hartig et al., 2014). Additionally, in previous adventure-based therapy studies, data have indicated that spending time with individuals from a similar background can promote open communication, which may help to establish social recognition (van der Velden et al., 2019) through validation, acceptance, or acknowledgement of experiences by peers (Bird, 2015; Bennett et al., 2014b; Burke & Utley, 2013). Through utilising peer-facilitation and a group format, social support and social recognition are key components of the Trojan's Trek program, and this may help contribute to improved mental health outcomes. While CBT is a common and first-line treatment for mental health conditions including depressive and anxiety conditions as well as PTSD (Carpenter et al., 2018), utilising peer-delivered CBT or components of CBT, may provide participants the opportunity to learn psychological-based skills in a more relatable manner than from a health provider. Furthermore, participants are able to see past "success stories" from peer facilitators, which may help to provide context for applying new skills. This finding has been demonstrated in military peer-support and peer facilitated programs which contribute to improvements to overall psychological well-being (Romaniuk et al., 2019; Travis et al., 2010; Westwood et al., 2010).

Other components of the Trojan's Trek program including a focus on skills building and participation in adventurous activities, may have also contributed to positive psychosocial outcomes. For example, learning new psychological and physical skills has previously been reported to increase confidence and provide an outlet for coping with various difficulties (Bennett et al., 2014b). Correspondingly, this study demonstrated increased self-efficacy at post-trek and follow-up compared to pre-trek which may be associated with positive health outcomes (Cusack et al., 2019). In a systematic review, self-efficacy was significantly negatively correlated with posttraumatic stress following multiple types of trauma (Simmen-Janevska et al., 2012). Previous studies have also suggested both adventure-based therapy and peer-to-peer interventions may help to maintain positive outcomes through improved attitudes towards help-seeking (Bettmann et al., 2019; Hamblen et al., 2019; Jain et al., 2013). However, help-seeking was already high in this cohort, with over 70% of participants reporting current psychological treatment. Further studies are required to determine how the various components of the Trojan's Trek program may facilitate positive outcomes for veterans.

Limitations

This evaluation has several limitations that must be outlined to aid interpretation of results. First, as the study design does not include a control group, and given that a high proportion of participants were receiving psychological treatment at the time of the trek, we cannot be certain if improvements identified in this study are attributed to the Trojan's Trek program or other non-controlled factors such as participation in other therapeutic activities. Therefore, conclusions are limited regarding the effectiveness of the Trojan's Trek program and contribution to improved psychosocial outcomes among Australian veterans. As follow-up data was collected 2-months post-trek, this study is unable to make any conclusions on extended long-term outcomes. Nonetheless, the relatively large sample size and high response rate at follow-up have improved upon past evaluations. Additionally, since the Trojan's Trek program includes both CBT-based content and adventure-based outdoor activities, it is difficult to determine the primary mechanism or primary program component associated with improvements in participant outcomes. Further studies will be necessary to determine the most beneficial components of Trojan's Trek, and adventure-based therapy in general. Finally, the short length of time between completion of outcome measures limits interpretability of differences between pre- and post-intervention psychosocial outcomes.

Conclusion

Overall, this evaluation provides evidence for the utility of the Trojan's Trek program as an adjunct program to first-line treatments for Australian veterans with mental health difficulties. The results of this evaluation indicate that the Trojan's Trek program may promote sustained improvements to depression, anxiety, stress, posttraumatic stress, and self-efficacy. Additionally, results from this study indicate the Trojan's Trek program promotes similar improvements in both male and female participants. Further research, including a controlled trial, is required to determine program efficacy.

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Competing Interests

The authors have no competing interests to declare.

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