The impact of sport and physical activity on the well-being of combat veterans: A systematic review

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Abstract

Objectives: This review examined the potential impact of sport and physical activity upon the subjective and psychological well-being of combat veterans in the aftermath of physical or psychological combat trauma.

Design: A systematic review was conducted. The question guiding this review was 'what is the impact of sport and physical activity on the well-being of combat veterans?'

Methods: Key databases were searched for articles relating to the use of sport *and/or* physical activity in supporting combat veterans. 11 studies were identified as relevant for inclusion. Data from these studies were extracted by means of a directed content analysis, the results of which were reported in a narrative synthesis.

Results: Sport and physical activity enhances subjective well-being in veterans through active coping and doing things again, PTSD symptom reduction, positive affective experience, activity in nature/ecotherapy, and quality of life. Impact on psychological well-being includes determination and inner strength, focus on ability and broadening of horizons, identity and self-concept, activity in nature/ecotherapy, sense of achievement/accomplishment, and social well-being. Participating in sport and/or physical activity can also enhance motivation for living.

Conclusions: The review advances knowledge by producing a synthesis of evidence that highlights the value of sport and physical activity for supporting the well-being and rehabilitation of disabled combat veterans and combat veterans diagnosed with Post-Traumatic Stress Disorder. It also develops knowledge by identifying the type of sports and physical activities used to promote well-being, offering the first definition of combat veterans in the sport literature, taking a critical approach, and highlighting the under researched role of nature-based physical activity.

Keywords: sport; physical activity; combat veterans; well-being; rehabilitation; PTSD

In recent years, research has attested to the value of both sport (i.e., competitive, rule-bound, structured activity) and physical activity (a broad term that encompasses many different forms of energy-expenditure, including 'exercise' and 'recreation') for enhancing the psycho-social health and well-being of disabled people (e.g., Day, 2013; Martin Ginis, Jörgensen & Stapleton, 2012; Smith, 2013; Yazicioglu, Yavuz, Goktepe & Tan, 2012) and people diagnosed with mental illness (e.g., Carless & Douglas, 2010; Hefferon, Mallery, Gay & Elliot, 2013). One population in which there is mounting interest surrounding the potential impact of sport and physical activity on well-being is that of combat veterans.

Recent military operations in Iraq and Afghanistan, for instance, have thrust the issue of combat veterans' well-being into the public consciousness and onto political agendas. Serving in these and other theatres of war can incur heavy costs to the health and well-being of military personnel, and cause much suffering both before *and* after leaving the military. For example, as of August 2013, the number of US and UK troops listed as 'wounded in action' in Afghanistan was 19,141 and 2146 respectively (DOD, 2013; MOD, 2013). These 'wounds' include physical injuries, such as amputations, traumatic brain injuries (TBI) and spinal cord injuries (SCI), all of which may damage well-being. In addition, the number of veterans being diagnosed with Post-traumatic Stress Disorder (PTSD) is increasing. In the US, estimates place the prevalence of PTSD among soldiers returning from Iraq and Afghanistan as high as 31% (Tanielian & Jaycox, 2008). In the UK, data collected in a military context suggest that the rate of PTSD among combat-deployed troops is around 6.9% (Fear et al., 2010). Whilst this figure may appear low, given the on-going military presence in Afghanistan, the *total number* of veterans seeking support for PTSD is likely to rise. Besides PTSD, the incidence of other common mental health problems such as anxiety (20.6%) and alcohol misuse (22.5%) among combat-deployed British troops is of concern (Fear et al., 2010). As a consequence of not only the physical disabilities, but also the psychological traumas sustained in war, there currently exists among combat veterans a high level of need for treatment and support (Walker, 2010).

One way of addressing this need might potentially be through sport and physical activity. There are several reasons to believe that sport and physical activity might influence the well-being of combat veterans seeking support for PTSD and/or who have crossed the border from able-bodied to disabled as a result of war. First, sport is now routinely used in the rehabilitation of disabled combat veterans in the US (Messinger, 2010). A core assumption embedded in this use of sport is that it helps veterans refashion their lives and identities as disabled individuals (Messinger, 2010). Second, in relation to PTSD, research by

Leardmann et al. (2011) indicates that higher levels of physical activity are associated with decreased odds of PTSD symptoms among US service members. These authors further suggest that physical activity may be a valuable component of treatment programs for PTSD. Third, previous research (highlighted above) indicates that both sport and physical activity have the potential to influence psycho-social health and well-being among disabled people or individuals diagnosed with mental illness. Finally, there is a growing international literature exploring the impact of sport and physical activity upon various aspects of well-being in both disabled veterans and veterans diagnosed with PTSD (e.g., Brittain & Green, 2013; Hawkins, Cory & Crowe, 2011; Otter & Currie, 2004). However, no attempts have yet been made to review this literature and to draw conclusions regarding the impact of sport *and/or* physical activity upon the well-being of combat veterans.

The purpose of this study was to evaluate the current evidence base surrounding the impact of sport and physical activity upon the well-being of combat veterans. In order to achieve this aim, the systematic review method was chosen. Systematic reviews allow researchers to evaluate and interpret all the available research evidence relevant to a particular question (Glasziou, Irwig, Bain, & Colditz, 2001). The question guiding this review was 'what is the impact of sport and physical activity on the well-being of combat veterans?' Having defined the question, systematic reviews follow a set process for finding relevant studies, appraising and selecting studies, and summarising and synthesising the studies (Glasziou et al., 2001). Procedural guidelines (e.g., Glasziou et al., 2001; Jackson & Waters, 2005) are followed for searching, selecting, and appraising studies in order to ensure that the methods are transparent and the conclusions reproducible (Grant & Booth, 2009; Swann, Keegan, Piggott & Crust, 2012). One key strength of this review type is it enables researchers to draw together all the knowledge on a topic area (Grant & Booth, 2009). Systematic reviews are thus valuable for condensing scientific findings from multiple studies and generating comprehensive evidence.

Focus of the review: Well-being

Well-being is important to focus on since it is a key indicator of psychological functioning and positive human health (Ryan & Deci, 2001). There are two kinds of well-being associated with the literature on positive human health. The first is termed Subjective Well-Being (SWB). SWB is purportedly comprised of a person's subjectively perceived satisfaction with their life and the balance of positive and negative emotions they feel. As

Diener (2000) suggests, the experience of SWB is characterised by feeling many pleasant and few unpleasant emotions, being engaged in interesting activities, and being satisfied with one's life. According to Ryan and Deci (2001), the SWB concept derives from the *hedonic* tradition of philosophical thought on what constitutes well-being, which suggests that happiness or pleasure are the primary goals of life. Summarising research on SWB, Lundqvist (2011) notes that objective "goods" such as health, wealth and social advantage do not always determine people's happiness and SWB. Thus, SWB is emphasised as a *subjective* evaluation of one's life (Diener, 2000).

The second type of well-being is Psychological Well-Being (PWB). Contrary to SWB, PWB derives from the *eudaimonic* tradition of philosophical thought which considers well-being in terms of personal flourishing and the fulfilment of human potential (Ryan & Deci, 2001). PWB is thought to consist of six dimensions including a sense of self-acceptance, positive relationships with others, a sense of purpose in life, living with a degree of self-determination or autonomy, the ability to manage one's environment effectively, and feeling that one is growing or progressing toward one's potential (Keyes, Shmotkin & Ryff, 2002). Ryff (1989) argued that PWB be distinguished from SWB on the basis that happiness and pleasure do not necessarily equate with positive psychological health. Thus, she proposed that well-being may be cultivated by experiences and relationships that bring meaning and fulfillment to life, and that may result in personal growth as opposed to, predominantly, in pleasure.

Method

Search strategy

Key databases were searched including SPORTDiscus, PsychARTICLES, PsychINFO, Web of Science, Scopus, and Medline. These databases are similar to those used for other systematic reviews in sport and exercise (e.g., Jefferies, Gallagher, & Dunne, 2012; Swann et al., 2012). The primary search was supplemented by hand searching of relevant journals, citation searching of all articles accepted at abstract, and by contacting lead authors in the field in order to identify articles that may not have been indexed in the above databases. This additional searching was deemed necessary because research literature is often widely dispersed and relevant studies might not be indexed in all databases (Jackson & Waters, 2005). Five articles were added through this process. The primary search was conducted using the following search strings in combination with each other:

- String 1: Veteran* OR Military OR Soldier* OR Combat
- String 2: Trauma* OR PTSD OR Posttraumatic* OR Post-traumatic* OR Disab* OR Amput* OR injur* OR wound*
- String 3: "Leisure Time Physical Activity" OR Training OR Recreation OR Fitness OR Sport* OR Exercise OR "Physically Active" OR "Physical Activit*"

String one was used to identify articles relating to the target population (i.e., combat veterans). The term 'veteran' can have different meanings (Burdett et al., 2012). None of the studies eventually included in the review provided a definition of a 'combat veteran'. However, a number of assumptions appear to be embedded in this term. For instance, 'veteran' implies that the individual has previously served in the military, while 'combat' may conceivably include all who are deployed to a warzone and exposed to the risks of combat (whether or not they occupied a fighting role). These assumptions guided our search strategy and helped us focus on the population of interest. The strategy was inclusive at this stage (including the terms 'military' and 'solider') so as not to exclude potentially relevant articles. String two was used to narrow the target population to veterans who were identified as impacted by combat in the form of acquired disability *and/or* psychological trauma.

In this study, we were interested in all the various types of sport *and/or* physical activity that might be used to influence well-being in combat veterans. We therefore incorporated a broad range of terms in string three in an attempt to capture the diversity of activities and approaches that might be utilised with veterans. The combined search yielded an initial corpus of 7464 articles. From there, 58 studies were deemed relevant for further review, whilst 11 studies were eventually considered suitable for inclusion in the review.

Inclusion/exclusion criteria

As per the systematic review method (Smith, 2010), criteria were used to select studies suitable for inclusion in the review. These criteria included: (a) the study must be published in full in the English language, (b) the study must be based on empirical data published in a peer reviewed journal (i.e., excluding reviews, magazine articles and book chapters), (c) published no earlier than 1990, (d) centre on combat veterans as the target population (i.e., studies specifically relating to recruits or non-deployed personnel were excluded), (e) the study must relate specifically to some form of psychological trauma or acquired disability (i.e., prospective studies and those not investigating the impact of trauma

or disability were excluded), and (f) the substantive content of the article must relate specifically to some variation of sport or physical activity in veterans following combat trauma. These criteria were employed to ensure that only the most relevant, up-to-date, and 'reliable' sources of knowledge were included as part of the review.

Data extraction and synthesis

The studies included at the final stage of the review were read repeatedly in full by the first author in order to ensure familiarity with the data. Following these initial readings it was necessary to extract and synthesise findings from the studies reviewed (CRD, 2009; Smith, 2010). Systematic reviews in sport often use a variant of thematic analysis for extracting and synthesising findings (e.g., Jefferies et al., 2012; Swann et al., 2012). For this review, however, it was decided that a form of directed content analysis (Hsieh & Shannon, 2005) would be most appropriate for extracting relevant themes from the studies. This decision was made following the repeated readings of the studies, when it became clear that this form of analysis would be useful in parsing out the studies' findings according to impact on well-being. A directed content analysis uses existing concepts or theoretical frameworks (e.g., well-being) to focus the research question and acts as the basis for initial coding categories. Data that cannot be categorised within the initial categories is assigned a new code. Applying this process, findings were divided up into two broad categories depending on whether these findings related more to subjective or psychological well-being. A third category was created for themes pertaining to 'motivation', which could not be reasonably classified under subjective or psychological well-being and was deemed to warrant a separate category.

Methodologically, the studies were composed of seven qualitative and four quantitative papers. Further characteristics of the studies included in the review are presented below (table 1). Due to the heterogeneous nature of methods used and the way findings were reported in the studies it was decided that a narrative synthesis was most appropriate for reviewing the findings (Jackson & Waters, 2005). Following Swann et al. (2012) and Pope, Mays and Popay (2007), this constitutes an interpretive/integrative process of constructing a textual summary to explain the findings of multiple studies. An element of narrative synthesis is present in all systematic reviews and 'should not be confused with broader terms like 'narrative review', which are sometimes used to describe reviews that are not systematic' (CRD, 2009; p. 48). The narrative synthesis summarises the results of the directed content analysis (Hsieh & Shannon, 2005).

[Table one see end of paper]

Results

Following the process of gathering and analysing the literature, it was found that the majority of findings (except for the additional category of motivation) fell into the domain of either subjective or psychological well-being. Accordingly, study findings are presented and reviewed below under the two broad categories of SWB and PWB. That said, it is acknowledged that there is likely to be overlap between these two categories, with well-being in one domain affecting well-being in the other. By presenting the findings for each 'type' of well-being separately, we are therefore adopting the position of Keyes et al. (2002) who treat SWB and PWB as 'related but distinct'. Where relevant, we also distinguish between the different types of activities (e.g., sport, physical activity, recreation, exercise, 'challenge events') that were used with veterans in order to point out the different ways these activities might impact upon well-being.

Subjective well-being

As indicated above, SWB involves an individual's balance of positive and negative emotions over time and their satisfaction with life. Sport and physical activity influenced veterans' SWB in a number of ways:

Active coping and doing things again

Findings from two studies revealed that different activities can help injured or disabled veterans to better manage the stresses and problems they faced in relation to combat-acquired disability (Brittain & Green, 2012; Burke & Utley, 2013). For instance, Burke and Utley (2013) described the psychosocial responses of four injured male veterans to a nine-day climbing challenge on Mt. Kilimanjaro. Each of the veterans were recovering from serious injuries (e.g., multiple limb amputations and broken/shattered joints) sustained in combat. As Burke and Utley suggested, these men responded to the climb as a form of active coping, that is, they were proactive and took responsibility for *doing things* to enhance their own well-being. Alternatively, in an elite sport context, Brittain and Green (2012) reported that participation in the Paralympics enabled veterans to better manage their physical injuries and to deal with the psychological impact of combat-acquired disability. These authors analysed media coverage of combat veterans competing in a variety of elite sports, suggesting that being involved in the Paralympic Games assisted disabled veterans in cultivating an optimistic outlook on life post-injury.

With similar implications, Carless, Peacock, McKenna and Cooke (2013) discussed the psychosocial outcomes of an inclusive adapted sport and adventurous training (AT) course for 11 male military personnel with physical disabilities and/or mental health problems sustained while on deployment. These men were participating in sports such as wheelchair badminton and basketball, and AT activities such as caving, rock climbing and kayaking as part of their rehabilitation. Carless et al. suggested that participants in these activities relished the physicality of, in their words, *doing things again*, which contrasted markedly with their experiences of extreme (often enforced) inactivity in the months or years following injury and/or trauma.

PTSD symptom reduction

Three studies considered the impact of various activities including exercise (Otter & Currie, 2004), outdoor adventure pursuits (Hyer et al., 1996), and therapeutic recreation (Dustin, Bricker, Arave & Wall, 2011) upon 'symptoms' in veterans diagnosed with PTSD. For example, Dustin et al. (2011) reported the positive, symptom-reducing effects of a four day 'river running' (kayaking) trip upon three classes of symptoms commonly associated with PTSD. The trip involved ten male and three female veterans paddling down the Green River in Colorado, US, and camping out overnight. A key component of the trip, Dustin et al. suggested, was the opportunity for veterans to 'experience the healing effects of nature'. The trip reportedly allowed veterans to feel engaged in a pleasant and positive activity, experience a 'greater engagement with the here and now', and achieve a sense of peace and relaxation; all of which led to reductions in symptoms of hyper-arousal, less reliving of trauma through nightmares and flashbacks, and relief from the usual numbing of emotional responsiveness that characterised their daily lives.

In a different study, Otter and Currie (2004) suggested that participation in a veterans-only exercise programme once a week for 40 weeks helped Australian Vietnam veterans to feel more in control and to be less dependent on medication to manage symptoms. These authors also highlighted that these supervised exercise classes were perceived to help veterans ease the 'adrenaline levels' that kept them locked in a state of tension and high-anxiety, thereby allowing them to relax. Finally, Hyer et al. (1996) reported the impact of a five day Outward Bound Experience (OBE) upon 219 male veterans in treatment for PTSD. The OBE, similar to Carless et al.'s (2013) research, involved the veterans participating in adventurous outdoor activities such as rock climbing, hiking, and white-water rafting.

However, Hyer et al. observed no discernible impact of the OBE upon PTSD symptomology, and concluded that it performed no differently to standard clinical treatments for PTSD when symptom reduction was taken as the primary outcome of interest.

Positive affective experience

Three studies (Brittain & Green, 2012; Mowatt & Bennett, 2011; Otter & Currie, 2004) described how engaging in various sports and/or physical activities helped combat veterans to 'feel good' in different ways. For example, veterans in Mowatt and Bennett's (2011) study reported feeling that their pervasive sense of regret (surrounding their post-war 'failings' in life) had been replaced by fun, enjoyment, and relaxation during a two day fly-fishing trip. For these veterans, who were in treatment for PTSD, going fishing was an opportunity to relax and enjoy learning a new activity with other veterans.

Whereas fishing was experienced as positive in a relaxing sense (e.g., a *low* positive state of activation), other activities such as exercise were perceived as energizing (e.g., a *high* positive state of activation; Reed & Buck, 2009), with both types of activity having differently positive implications for veterans diagnosed with PTSD. For example, findings from Otter and Currie (2004) revealed that, countering the dampening and depressive tendencies associated with PTSD, participating in regular exercise classes helped veterans increase their energy levels and allowed them to manage their daily activities much better. These veterans became much more mentally alert and reported feeling an intense 'buzz' from exercise, indicating a stimulating effect and an enhancement of positive affect.

Furthermore, in an elite sport context, Brittain and Green (2012) highlighted enjoyment as a key component of disabled veterans' participation in sporting activities. These authors discussed the *restorative* power of sport, in that participation enabled disabled veterans to enjoy life *once again* (i.e., post-injury when other outlets for enjoyment may have been lacking). Collectively, and with a reduction in unpleasant symptoms highlighted, these findings point to a positive shift in the hedonic balance of affect that constitutes (in part) veterans' lived experiences of SWB.

Ecotherapeutic impact of activity in nature

Findings from three studies (Dustin et al., 2011; Hyer et al., 1996; Mowatt & Bennett, 2011) reported that being active in the natural environment was perceived to have therapeutic qualities. Dustin et al. (2011) termed this impact 'ecotherapeutic' and discussed the 'healing

powers of nature' experienced by the veterans as they floated down the Green River. Aspects of this finding are also discussed below in relation to PWB. In terms of SWB however, it was felt (by the veterans diagnosed with PTSD) that nature provided a setting and opportunity for 'time-out' from everyday stressors. Relatedly, these veterans reportedly experienced the natural outdoor world as a more appealing alternative to clinical or medical treatment settings and thus helped facilitate a comforting sense of 'normalcy' in veterans' lives (Dustin et al., 2011). For Hyer et al. (1996), whilst participation in outdoor adventure pursuits in the OBE led to no reductions in veterans' PTSD symptoms, other effects were recorded in terms of enjoyment of the natural outdoor world. These veterans described their feelings of appreciation for the beauty of nature around them, and the sense of peace and happiness they experienced while surrounded by the natural world. Similarly, Mowatt and Bennett's (2011) findings revealed that participating in a pleasurable activity (i.e., fishing) combined with enjoyment of the outdoors led to fun and relaxing experiences for veterans diagnosed with PTSD. Collectively, these studies suggest that enjoyment of nature was made possible through participation in 'therapeutic activities' (e.g., river running, fishing) that allowed veterans to immerse themselves in the environment around them.

Quality of life

The World Health Organisation defines Quality of Life (QoL) as 'individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns' (WHOQOL, 1997; p. 1). QoL is therefore closely related to SWB and is often considered equivalent to or constitutive of SWB (e.g., Dijkers, 2005). Three studies discussed the potential benefits of adaptive multi-sports camps for disabled veterans' QoL (Hawkins et al., 2011; Lundberg, Bennett & Smith, 2011; Sporner et al., 2009). Several domains of QoL (including physical, psychological, social, and environmental) are relevant to these studies' findings. For instance, findings from Sporner et al. (2009) indicated that participation in the National Veterans Wheelchair Games (NVWG) and Winter Sports Clinic (WSC) was felt to impact greatly on mobility skills (an important component of physical QoL), as well as overall perceived QoL. These authors conducted a survey of participants in these multi-sport events, highlighting that 84% felt their mobility skills improved as a direct result of participation and that 'the majority of participants stated that the NVWG/WSC improved their life' (p. 410).

Another study by Lundberg et al. (2011) evaluated the impact of a 5-day adaptive sports programme (including water-skiing, snowboarding, fishing, ice-skating and kayaking)

upon the QoL of veterans with various disabilities including amputations, TBI, and SCI. However, Lundberg et al. found that no significant improvements in QoL were made following participation. The authors suggested that one possible reason for this is the short duration of the camp; that meaningful improvements in QoL may take more time to materialise. Despite this lack of impact on QoL, Lundberg et al. did observe a reduction in mood disturbance over the 5-day camp, and suggested that improved mood may over time lead to changes in QoL.

A further study by Hawkins et al. (2011) explored the psychosocial effects of participation in a US Paralympic Military Sports Camp (PMSC) upon 10 injured combat veterans. Such camps introduce injured and disabled veterans to a wide range of Paralympic sports, as well as existing Paralympic athletes and coaches who can assist them with participation in adapted sport. In addition to motivational effects of the camp (discussed below), participants reported their participation as a catalyst for improving other areas of their lifestyle (e.g., eating habits, smoking cessation, general exercise habits) that can potentially influence QoL in injured and disabled combat veterans.

Psychological well-being

Psychological well-being (PWB) relates to growth and development of the person. Sport and physical activity influenced PWB in combat veterans in the following ways:

Determination and inner strength

Burke and Utley (2013) explored how injured combat veterans responded to the challenge of climbing Mt. Kilimanjaro in terms of their rehabilitation and recovery. These authors reported that the climb facilitated the experience of determination and inner strength by providing injured veterans with a valued goal to strive for. It was suggested that aspects of the climb (e.g., long trekking over harsh terrain and the necessity of withstanding serious physical discomfort) shared relevant features of the veterans' military experiences and thus allowed them to draw upon pre-existing personal resources and experiences to help them reach their goal. Being able to experience these feelings of inner strength was considered by the veterans as highly significant in terms of recovery (e.g., in developing the determination to return to active duty or to move on with overcoming the 'challenge of disability').

Focus on ability and broadening of horizons

Three studies emphasised the power of sport for helping injured or disabled veterans to focus on ability as opposed to limitations or impairment (Brittain & Green, 2012; Hawkins et al., 2011; Sporner et al., 2009). Focusing on ability involved veterans being able to see beyond their injuries and understand what they could still achieve (Brittain & Green, 2012; Hawkins et al., 2011). For example, participating in a Paralympic sports camp was seen by veterans as valuable for 'normalising' the experience of becoming disabled (Hawkins et al., 2011). For these veterans, sport enabled them to re-construct a positive self-image post-injury; one that was consonant with their prior image of themselves as active as 'physical' beings. In addition to sport, participating in a physical challenge such as climbing Mt. Kilimanjaro facilitated a process of discovering and accepting the individual nature of impairment and working out what one's capabilities were (Burke & Utley, 2013). Taking part in the climb reportedly enabled combat veterans to adapt to disability by focusing on *ability* – on what they were able to accomplish. Collectively, these studies suggest that sport and rigorous 'physical challenges' such as mountain climbing can be valuable for developing the 'self-acceptance' component of PWB at least in injured or disabled combat veterans.

In a related sense, Carless et al. (2013) described a 'broadening of horizons' that veterans underwent as a result of their experiences on a 5 day inclusive sport and adventurous training (AT) course. The authors referred to this theme as opening up 'new rooms to explore' in life following injury and/or trauma. Similar to a focus on ability, the notion of new rooms to explore captures the sense that sport and AT helped veterans to re-think what was possible in the aftermath of combat trauma. In this sense, Carless et al. suggested that participating in new or different activities offered individuals new possibilities and/or psychological resources to help them move forward in meaningful ways.

Identity and self-concept

In addition to the above findings, participation in elite sport (Brittain & Green, 2012), physical challenge (Burke & Utley, 2013) and inclusive sport and AT (Carless et al., 2013) were considered useful in cultivating a positive sense of self-identity in veterans. Burke and Utley (2013) argued that undertaking the challenge of climbing Mt. Kilimanjaro despite enduring great pain from their injuries enabled veterans to re-shape their understanding of what it meant to be an injured war veteran and thus who they might become. In a similar

manner, Brittain and Green (2012) suggested that elite/Paralympic sport helped disabled veterans to negotiate their post-injury status and place within society. For Brittain and Green, participation in elite sport thus provided veterans with a renewed sense of direction in life and became a useful tool to aid transition to disability and re-integration into society. Further, Carless et al.'s (2013) theme of 'bringing me back to myself' highlights the way in which inclusive sport and AT helped participants to reconnect with aspects of their previous identity and sense of self that were highly valued in a military context (for example, *doing things again* by using their bodies and sharing laughter and 'banter' with their peers).

In addition, Cordova et al. (1998) emphasised the positive impact of participation in the National Disabled Veterans' Winter Sports Clinic upon veterans' self-concept (i.e., an individual's emotional evaluation of their personal worth in various domains). Cordova et al. suggested that in order to accept the presence of a disability, a person needs to adapt some aspects of their self-concept. Their findings revealed an elevated self-concept in veterans following participation in the Winter Sports Clinic, thereby providing further evidence that sport can help disabled veterans adapt to disability and re-constitute their self-concept in a positive way.

Ecotherapeutic impact of activity in nature

The ecotherapeutic properties of activity in nature discussed above in relation to SWB also extend into the realm of PWB. For example, Dustin et al. (2011) suggested that interacting with the "bigness" of nature helped veterans diagnosed with PTSD to put their own lives and problems into perspective as they became immersed in the world around them. As part of the 'therapeutic recreation' orientation of Dustin et al.'s study, veterans were encouraged to see themselves as part of a bigger whole and develop a 'spiritual awareness' of their connection to the natural world. Furthermore, both Dustin et al. and Mowatt and Bennett (2011) suggested that immersion in nature provided a space for introspection and quiet reflection that was perceived by veterans diagnosed with PTSD as 'therapeutic' in nature (Dustin et al., 2011; Mowatt & Bennett, 2011). Such "ecotherapeutic considerations" as Dustin et al. referred to them, bear potential relevance for dimensions of PWB such as meaning and purpose in life (e.g., place within the world and sense of perspective) and positive relations with others (where 'other' in this case is conceptualised as the natural world rather than a human other).

Sense of achievement/accomplishment

Involvement in sport and/or physical activity also provided a sense of achievement or accomplishment for both disabled veterans (Brittain & Green, 2012; Hawkins et al., 2011) and veterans diagnosed with PTSD (Dustin et al., 2011; Hyer et al., 1996). In the context of PTSD, Hyer et al. (1996) reported that simply engaging in recreational outdoor activities and learning new skills was viewed by veterans with a sense of accomplishment. This sense of accomplishment was linked thematically to enhancements in self-confidence. Indeed, both Dustin et al. (2011) and Hyer et al. (1996) noted that being active and developing physical skills in a novel setting (i.e., river running and outdoor adventure, respectively) cultivated feelings of self-efficacy and confidence in veterans diagnosed with PTSD. Alternatively, for disabled veterans, the realm of elite sport appeared to satisfy their need for achievement in a publically recognised domain. For example, as Brittain and Green (2012) suggested, playing elite disability sport provided veterans with a strong sense of achievement; one in which they were able to continue their affiliation with the military by representing their country albeit in a different capacity (i.e., on the sports field as opposed to the battlefield). Moreover, a consistent theme across the media sources analysed by Brittain and Green was that striving for and achieving valued goals through sport was an important aspect of rehabilitation and recovery for recently injured or disabled veterans. This finding has relevance for veterans' sense of PWB, as through this process of striving for meaningful sporting goals veterans may begin to cultivate a sense of purpose in life and the feeling of progressing towards their potential.

Social well-being

The PWB concept may also be taken to include the sub-component of Social Well-Being (Social WB). This refers to an individual's social function and perceived flourishing in social life (Keyes, 1998). Eight out of the eleven studies indicated that sport and physical activity provides a context for the enhancement of Social WB in combat veterans. For instance, Burke and Utley (2013) identified social support as a vital component of injured veterans' experiences of climbing Mt. Kilimanjaro. These authors emphasised the degree to which veterans worked together, offering practical and emotional support to each other, to ensure that all four of them achieved their goal of summiting the mountain.

In many cases, social support took the form of camaraderie with other veterans (e.g., Carless et al., 2013; Dustin et al., 2011; Mowatt & Bennett, 2011; Sporner et al., 2009). Camaraderie here refers to positive social interactions and emotional ties between combat veterans. Mowatt and Bennett (2011) discussed the necessity of this form of relationship in the lives of veterans diagnosed with PTSD. For these authors, as well as Otter and Currie (2004), such relationships were perceived as crucial for helping veterans overcome a pervasive sense of social isolation associated with PTSD. Moreover, in four of the studies, camaraderie and connections between veterans reportedly developed on the basis of their shared experiences (Carless et al., 2013; Hawkins et al., 2011; Mowatt & Bennett, 2011; Sporner et al., 2009). Having endured similar traumas and a shared military background, veterans were able to understand and communicate with each other easily, facilitating supportive relationships. For example, having a 'shared' injury or disability enabled some of the veterans in Carless et al.'s (2013) study to connect with, and draw inspiration from, each other. Witnessing both the physical progress and positive outlook of a similarly disabled veteran reportedly provided a resource that influenced the kind of future veterans were able to envisage for themselves post-injury (Carless et al., 2013). Furthermore, such shared experiences and the connections forged through them were considered by Burke and Utley (2013) and Hawkins et al. (2011) to be highly significant in terms of recovery. This finding concurs with previous research which suggests that 'being understood is an important component of recovery' (Carless & Sparkes, 2008; p. 194).

Source of motivation

In addition to well-being, participation in sport and/or physical activity was reported to have an impact on motivation in combat veterans. Whilst elements of motivation overlap with those of well-being (e.g., purpose in life), it was deemed that a separate section was needed to capture the specific impact upon motivation. This impact involved both a general increase in motivation to be active and do things, and specific motivational processes that influenced how veterans responded to their involvement in sport and/or physical activity:

Motivation for living

Otter and Currie (2004) expressed the impact of an exercise program in terms of its impact on veterans' desire to do things outside the 'normal' and repetitive daily routine. Contrary to the lack of interest in meaningful or interesting activities often felt by veterans

diagnosed with PTSD, exercise was perceived to exert a positive influence upon daily habits and lifestyle such that veterans were motivated to do more than simply work, eat, sleep and watch television. Exercise was credited as helping them overcome a pervasive lack of motivation and with injecting energy into their daily lives. For example, the veterans in Otter and Currie's study reported feeling motivated to increase the amount of walking they do and spend more time participating in enjoyable activities. In this sense, increased motivation for living may be seen as complimentary to (and perhaps also constitutive of) enhanced well-being in combat veterans undertaking sport and exercise.

Motivational processes

In addition to general motivation for living, specific motivational processes through which veterans sustained their desire to participate in sport and/or physical activity were identified as social comparison and self-determination. For example, in Hawkins et al.'s (2011) research, injured veterans were able to sustain an increased desire to participate and compete in Paralympic or adapted sport through downward social comparison (i.e., comparing their limitations and abilities with those perceived to be worse off). Seeing and being around those who were more physically impaired prompted veterans to feel content with their capabilities and to maximise them through commitment to participation.

In relation to self-determination, Burke and Utley (2013) argued that participation in a physical challenge helped satisfy veterans' basic psychological needs for competence, autonomy and relatedness (Deci & Ryan, 1985). As these authors suggested, climbing Mt. Kilimanjaro helped veterans 'take command over their lives, feel capable of achieving difficult goals and feel connected to others' (p. 738). The studies by Hawkins et al. (2011) and Carless et al. (2013) also present similar findings with regard to the psychological needs of competence and relatedness. However, both of these studies indicated that autonomy was less evident in the accounts of their interviewees. Autonomy concerns the degree to which individuals feel that they are 'causal agents' in determining their own lives. The authors suggested reasons why autonomy may have been less prevalent in veterans' accounts. Hawkins et al. noted that many of the injured veterans may have been 'strongly encouraged' by their superiors within the military to attend the sports camp as part of their rehabilitation. Alternatively, Carless et al. suggested that autonomy may have been a less salient need for participants at this moment in their lives. As they noted, autonomy was delayed until such a time that the person felt able to enact personal control in an empowered and meaningful

manner. Depending upon the context, it may be that involvement in sport and/or physical activity could have mixed implications for veterans' psychological needs associated with competence, autonomy and relatedness.

Discussion

This review evaluated the impact of different sports and physical activities upon the subjective and psychological well-being of disabled combat veterans and veterans diagnosed with PTSD. Findings from the 11 studies reviewed revealed that participating in these various activities can have a positive influence on many facets of life related to both SWB and PWB in veterans. That is, sport and/or physical activity has the potential not only to provide enjoyable and pleasurable experiences for combat veterans, but also to help shape their personal growth and development in the aftermath of combat-acquired disability and/or psychological trauma. This review contributes to knowledge on combat veterans and well-being in two significant ways. First, it provides the first empirical synthesis of evidence on the role of sport and/or physical activity in supporting the well-being of combat veterans. Second, the review extends previous knowledge in the area of sport and/or physical activity for health and well-being by highlighting the specific consequences of engaging in such activities on the lives of injured veterans and veterans diagnosed with PTSD.

Based on our review of the studies, a number of observations are worth highlighting. A first observation concerns the *type* of sports and physical activities that were used to promote well-being in veterans. There may be crucial differences between the use of elite/competitive sport, 'physical challenge' activities, and therapeutic recreation activities depending upon the particular group of veterans. For instance, all of the studies specifically targeting veterans diagnosed with PTSD opted for various 'non-competitive' activities, several of which may be associated with 'therapeutic' qualities, such as fly-fishing, river-running or even aerobic exercise. In contrast, injured or disabled veterans were more likely to be involved in competitive or elite sports, including at Paralympic level. It may be that researchers sought to draw on specific properties associated with these various activities (e.g., relaxing qualities vs. achievement-oriented) depending on the 'problems' they attempted to address in the participants' lives. Differences between the use of *sport* (at different levels including recreational or elite competition), and various forms of *physical activity*, (including exercise and recreation) should thus be taken into account when considering both future research and the use of any such activities to promote well-being in combat veterans.

Also related to the *type* of activities provided for veterans was the potential exclusivity of some of these activities. For example, given the numbers of veterans becoming injured and disabled, it is highly unlikely that all or even many of them will be offered the opportunity to engage in costly or specialist activities such as climbing Mt. Kilimanjaro. Indeed, Sporner et al. (2009) acknowledge that their sample of veterans taking part in the National Veterans Wheelchair Games and Winter Sports Clinic may have been limited to those veterans who were financially able to participate in these events. All of the studies reviewed here reported on interventions and activities that were specifically organised for, and/or provided cost-free to veterans. One potential barrier to the promotion of well-being through sport and physical activity might thus be a lack of such opportunities or the financial cost of participating in specialist pursuits that are not subsidised for veterans. In part, the challenge of overcoming this barrier may call on governments to make good on the "moral obligations" they have set out for supporting the needs of veterans (for example, in the UK government's 'Armed Forces Covenant') by funding various activities and thereby enabling more veterans to access the benefits of sport and physical activity outlined in this review.

A second observation is concerned with the population(s) being studied in this corpus of research. Many different terms (none of which were defined) were used to describe the participants in these studies (including 'veteran', 'combat veteran', 'war veteran', 'injured service member', 'military personnel', and 'ex-military personnel'). Broadly speaking, the term 'veteran' may be used to describe former serving members of the armed forces. It may also refer to active military personnel who have previously deployed to a warzone (e.g., a 'veteran' of the war in Afghanistan). However, the notion of who qualifies as a 'veteran' differs between countries and governments, and may not even be clear to veterans themselves (Burdett et al., 2012). In the UK, for example, whereas veteran status is conferred upon anyone who serves but a single day in the military, members of the ex-service community themselves may view such status as earned through deployment experiences (Burdett et al., 2012). In this review, we were interested in anyone who had previously deployed to a warzone and who's life had been influenced by combat either in the form of injury/disability and/or psychological trauma (whether or not they had served in a fighting role or were still officially classed as 'active duty'). This ensured that our review was limited to those who had the most potential to gain through involvement in sport and/or physical activity.

In light of the above issues concerning access to opportunities, the specifics of who qualifies as a combat veteran has major implications for who is granted access to activities and opportunities that may enhance well-being. Of all the studies reviewed, Carless et al. (2013) appeared to provide the most inclusive description of participants, describing them broadly as 'military personnel', all of whom were experiencing a form of disability as a result of either physical injuries sustained during deployment, non-battle related injuries, mental health problems, or chronic illness. Their description covers a wide range of potential beneficiaries who were identified as 'in need' in some way. However, just who these 'military personnel' were, and whether or not they had been discharged from the military, remains unclear. Future research on sport and physical activity for combat veterans should provide clearer definitions of the population being studied in order to identify who is, and is not, benefitting from opportunities to engage in life-enhancing sport and physical activity. In order to guide future research and assist conceptual clarity, we propose the following definition of a combat veteran as: *any current or former member of the military who has previously deployed to a warzone and been exposed to the risks of combat*. This definition offered, we recognise that not all deployed personnel will become 'damaged' as a result of combat. Rather, this definition is intended to encompass a particular sub-group of military personnel (active or retired) whose lives may have been impacted as a result of their deployment experiences.

Third, whereas the majority of studies seemed to uncritically promote sport and/or physical activity as a vehicle for enhancing well-being, it is necessary to guard against viewing such activities as a panacea for improving veterans' lives in general. For example, focusing too heavily on sport and physical activity as part of rehabilitation may deter veterans from other important areas such as employment. Accordingly, a more balanced model of rehabilitation may be required which incorporates such things as employment skills and planning for the future (Messinger, 2010). Equally, when promoting sport and/or physical activity it is important to foreground the social, cultural, and material forces that can restrict activities and oppress people. For example, in addition to financial barriers noted earlier, engaging in sport or physical activity can be restricted due to inaccessible environments, problems with travel, and negative societal attitudes to disability or mental health problems. Further, it is important to critically consider the language used when talking about sport and physical activity. Language after all is never neutral but *constitutes* our realities (Smith & Sparkes, 2009). For example, Hyer et al. (1996) found that participating in an adventurous

outdoor pursuits program had no impact on veterans' PTSD symptoms. This 'negative' finding is certainly at odds with the vast majority of findings reported in these studies. Hyer et al. suggested several reasons for the lack of impact, including that the "dose of treatment" received was not sufficient, or that some veterans' "level of pathology" may have been too severe for them to experience meaningful benefits from the program. However, referring to involvement in sport and/or physical activity with terms such as 'dose', 'treatment' and 'pathology' can position people within a medical model of understanding disability and/or mental health problems.

A medical model treats illness and disability as a sickness to be cured, or as some part of the individual that has broken and requires fixing (Smith & Perrier, in press). There are however major problems with a medical model. As Smith and Sparkes (2012), and Smith and Perrier (in press) highlight, it locates the 'problem' of disability or PTSD squarely within the individual. In so doing, the social and cultural construction of illness and disability is ignored. As part of this, the social world that can oppress disabled people and respond negatively to combat veterans with PTSD is overlooked and left unchallenged. There is the danger too that in positioning people within a medical model autonomy is undermined and the various kinds of pleasure that can go with being active, and which help in motivating people, are elided. Likewise, adhering to a medical model may result in defining any positive outcomes that can go with playing sport or being physically active simply according to whether or not symptoms can be reduced or impairments lessened. Whilst these certainly are worthwhile aims for some, a more positive approach to recovery or rehabilitation may be to consider what sport and physical activity can *add* to life, in the form of positive experiences, rather than simply what they might *take away* in the form of problems (Carless & Douglas, 2010).

A fourth observation is that, whilst indoor sport and physical activity can undoubtedly be very useful, there seems to be an emerging interest in exploring the role of nature-based physical activity in supporting the well-being of combat veterans (e.g., Dustin et al., 2011; Hyer et al., 1996; Mowatt & Bennett, 2011). These studies connect with a broader literature which is beginning to examine the role of engaging with nature for human health and well-being (e.g., Nisbet, Zelenski, & Murphy, 2011). Moreover, the studies reviewed here point to the possibilities of combining the already-established well-being benefits of physical activity with the potential 'therapeutic' effects of exposure to natural environments. However, there are some concerns that may need to be addressed before the potential use of natural environments to promote veterans' well-being can be maximised. For instance, two studies

(Dustin et al., 2011; Mowatt & Bennett, 2011) make rather vague references to 'nature's healing power' as a component of their approach to supporting veterans diagnosed with PTSD. The exact nature of this mysterious 'healing power' and how it impacts upon veterans' well-being needs to be better specified if its potential is to be fully realised. In addition, it is unclear at present what opportunities might exist for disabled combat veterans to access the potential benefits of being active in nature. More research needs to consider how disabled combat veterans might negotiate access to and use of various natural environments in order to enhance well-being. As part of this, future research might consider how notions of the "green gym" or "blue gym" (Depledge & Bird, 2009; Smith & Sparkes, 2012) could provide unique ways of supporting the well-being of both disabled combat veterans, and veterans diagnosed with PTSD. Such concepts suggest appealing ways of interacting with nature for health benefits and call for further work to investigate the psychological and embodied processes at play here in relation to well-being. As part of this work, and other work within the psychology of sport and exercise more generally, experimental designs are required. Further, qualitative research methods are needed which go beyond the 'one-shot/drive-by' interview, that is, a single and short interview. Such methods might include longitudinal interviewing (i.e., interviewing people over time), mobile interviews, relational mapping, vignettes, and visual methods like autophotography and timelining (see Smith & Caddick, 2012; and Sparkes & Smith, 2013). Further, such methodological development requires researchers to use appropriate criteria to judge the quality of work in this area (see Sparkes & Smith, 2009).

Conclusion

This review provides the first synthesis of empirical evidence on the impact of sport and physical activity upon the well-being of combat veterans. As such, it offers a key resource for evidence based practice and for informing policy and decision making in this area (Grant & Booth, 2009). Findings identified multiple positive affects upon the subjective and psychological well-being of combat veterans, as well as on motivation. We also identified several areas of caution that researchers and practitioners should keep in mind when seeking to utilise sport and/or physical activity to promote well-being in veterans. The review adds to previous knowledge by highlighting the specific impact of sport and physical activity upon the well-being of combat veterans in the aftermath of combat-acquired disability and/or psychological trauma. Future work should continue to explore how sport and

physical activity can contribute to long-term recovery and rehabilitation, particularly through programmes that support the enhancement of well-being over time.

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Study	Participants	Design	Methods	Type of sport or physical activity	Main findings
Brittain & Green (2012)	Injured or disabled veterans reported on in the media (ages and gender unspecified)	Secondary analysis of qualitative data	Synthesis of media coverage from a life course theory perspective	Elite sport - Paralympics	Participation in elite sport provides a source of inspiration and achievement, fosters self-actualisation and direction in life, and facilitates re-integration and acceptance of disability
Burke & Utley (2013)	4 injured male veterans aged 22-44 years	Descriptive cross-case analysis	Multiple semi-structured interviews and observations	9 day climbing challenge on Mt. Kilimanjaro	Participants approached the challenge with a sense of self-determination and experienced it as a form of active coping. Strong sense of social support evident between the veterans
Carless et al. (2013)	11 male veterans aged 20-43 with either physical disability, chronic illness or mental health problems	Descriptive qualitative study	Multiple narrative life story interviews and participant observation methods	5 day inclusive adapted sports and adventurous training course	Participants experienced a 'rekindling' of things that were previously important to them including doing things again, reconnection to others and sense of purpose. Also experienced a sense of 'broadened horizons' in terms of new activities, being valued, respected and cared for, and being inspired by others
Cordova et al. (1998)	44 male disabled veterans (aged 19-70)	Repeated measures longitudinal design	Questionnaires addressing self-concept and leisure satisfaction administered one month prior to, during, and one month after a sports clinic	National Disabled Veterans Winter Sports Clinic	Total leisure satisfaction and self-satisfaction scores improved across the three data collection points
Dustin et al. (2011)	10 male and 3 female veterans diagnosed with PTSD (ages unspecified)	Pilot intervention study	Journal writing and observational methods	4 day 'river running' trip	Reduced PTSD symptomatology, enhanced perceived coping skills, confidence and self-efficacy and 'ecotherapeutic' impact of nature
Hawkins et al.	9 male and 4 female injured combat	Descriptive qualitative study	Interviews (unspecified type and format)	3 day military sports camp	Participation provided a source of motivation, sense of competence,

Table 1: Summary of included studies

(2011)	veterans aged 20-40				autonomy, relatedness, connection with previous interests, general perceived health and fitness benefits, and normalisation of disability
Hyer et al. (1996)	219 male veterans diagnosed with PTSD (mean age = 41)	Mixed methods design with quantitative measures taken at 3 time points and qualitative data collected at 1 time point	Questionnaires addressing PTSD, depression, locus of control, and anxiety. Qualitative 'self-report data' (unspecified)	5 day 'Outward Bound Experience' (outdoor adventure pursuits)	No discernible impact on measures of PTSD symptomatology. Self-report data highlighted benefits of OBE as Improved self-esteem, enjoyment of outdoors, overcoming negative emotions, being more in control, and enhanced relationships
Lundberg et al. (2011)	18 male veterans (mean age 30-34) with acquired disability and/or PTSD diagnosis	Quasi-experimental pre-post test design	Questionnaires addressing mood, QoL and perceived competence	5 day adaptive sports and recreation program	No impact upon QoL. Less mood disturbance and increased vigour post-program. Increase in perceived competence post-program
Otter & Currie (2004)	14 male veterans (mean age = 55) diagnosed with PTSD	Qualitative grounded theory investigation	Series of focus groups conducted at weeks 10, 25, and 40 of the program	40 week community exercise rehabilitation program	Participants reported positive impact on work and lifestyle habits, motivation, daily habits and energy levels, social support, and reduced anger
Mowatt & Bennett (2011)	67 veterans (age and gender unspecified) diagnosed with PTSD	Descriptive qualitative study	Narrative analysis of letters written by the veterans to program leaders	2 day therapeutic fly-fishing program	Fishing provided a context and location for veterans to experience camaraderie, enjoyment and relaxation, an opportunity for reflection, and positive experience of the outdoors
Sporner et al. (2009)	132 disabled veterans (87% male, 13% female; mean age = 47.4)	Cross-sectional	Questionnaires addressing self-esteem, QoL, and community participation	National Veterans Wheelchair Games and Winter Sports Clinic	Participants rated overall improvements in self-esteem and QoL, interaction with other disabled veterans, acceptance of disability, and mobility skills as important outcomes of participation

Table 1: Summary of included studies