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Extreme sport as an intervention for physically injured military veterans: the example of competitive motorsport

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ABSTRACT

Purpose: Physically or psychologically injured military veterans are motivated and benefited by physical activity or sport that may involve high levels of achievement. The aim of this study was to provide an in-depth insight into the impact of Competitive Motorsport (CM) on physically injured/disabled veterans' subjective well-being and in turn determine if it improves the quality of their lives.

Methods: This is a qualitative study. Two sets of semi-structured interviews were conducted with 14 male British military veterans including a 6-month follow-up. All participants were subjected to a permanent, moderate or severe, physical injury/disability. Data were analysed in accordance with the principles of Thematic Analysis.

Results/Conclusions: Five key elements (familiar environment, team spirit, adrenaline rush, competition and equality) made CM a unique experience for physically injured/disabled veterans. Various psychological and physical benefits were found, including an increased sense of accomplishment, opportunity to socialise in a non-clinical environment, embracement of body image and adoption of a healthier lifestyle. Since physical activity and sport are among growing research on alternative interventions for military veterans, they deserve serious consideration as part of the treatment regimens and rehabilitation programmes to improve physically injured/disabled veterans' physical and mental health.

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► IMPLICATIONS FOR REHABILITATION



- Competitive Motorsport is an effective means of improving physical health and subjective well-being of physically injured/disabled military veterans.
- Multiple perceived psychological and physical benefits were identified over time, including motivation for living, embracement of body image and adoption of a healthier lifestyle.
- Competitive Motorsport deserves consideration as part of the treatment regimens and rehabilitation programmes to improve physically injured/disabled veterans' physical and mental health while facilitating transition to civilian life.


Introduction

The UK Armed Forces (UKAF) have been involved in several conflicts over recent years including Iraq and Afghanistan, resulting in a significant number of deployed personnel returning physically and/or psychologically injured [1]. A recent analysis of UKAF and veteran statistics indicated that at least 67 515 veterans are likely to have sustained physical and/or mental health problems at some point as a result of their service between 2001 and 2014 [2]. Definitions of a “veteran” and the benefits associated with veteran status vary among countries. For the purposes of this article the inclusive definition of the UK government has been used, considering a “veteran” all personnel who have served more than one day [3].

The transition from military to civilian life is a period of reintegration, which includes the practical, cultural, and personal

changes people undertake as they leave the military and re-enter civilian society [4]. The experience of leaving the military can vary greatly among veterans, and while many will successfully transition to civilian life, a significant minority may face difficulties due to physical and psychological health issues [4,5]. One of the cultural consequences of being physically or psychologically injured is that veterans might be left “stuck” at a particular point of their military life, where challenging events occurred, making it difficult to continue their life in a meaningful way after transitioning to civilian life [6]. Identity adjustment difficulties have been reported after transition to civilian life including a lack of purpose or motivation, missing the military culture and structured lifestyle or feeling misunderstood and out of place in civilian society [7,8]. Accepting and coping with ill health can trigger different patterns of behaviour, such as alcohol misuse or aggressive outbursts [9]. Different types of treatments including psychological, medical or

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technology-based treatments, are available to veterans yet these treatments are not always effective for all of them due to the stigma attached to mental health or permanent physical injuries or disability [10,11].

Masculinity & disability

Research in masculinity and male identity indicates that men have to be competitive, powerful, successful in their professional and personal life, able to strive and not demonstrate vulnerability or weakness, in order to be considered adequately masculine by others [12]. The military has traditionally been considered a masculine institution because it constitutes a setting for the construction of masculine identities but also contributes in shaping images of masculinity in wider society [13]. Masculinity is reflected in military's practices, values and structure and accepted as part of a successful adaptation to military culture [14]. Masculinity refers to power and autonomy and thus any form of physical injury/disability or mental health condition can be associated with being weak, helpless or dependent [15]. Despite this, aspects of masculinity are related to health-promoting behaviours, such as working out or avoiding alcohol. Physical activity and sport are linked to physical strength, health and ability and can become alternative routes through which men can recover or reconstruct their masculinity [15].

Physical activity & sport

Activities such as physical activity (many different forms of exercise and recreation), sport (competitive, structured activity) [16,17], or nature-assisted approaches [18] can enhance the psycho-social health of individuals who are physically injured/disabled or have developed mental health conditions. Any type of physical activity can play a key role in health maintenance, while sport can offer individuals the opportunity to find enjoyment, express intrinsic motivation and provide potential space to renew self-esteem, which may have been lost in other areas of life, such as work or personal relationships [19]. A systematic review [20] on the impact of physical activity and sport on the subjective and psychological well-being of combat veterans, who are physically injured, disabled or diagnosed with Post-Traumatic Stress Disorder (PTSD), showed multiple benefits. Different types of alternative activities have been presented including climbing, river running, military sport camp, outdoor adventure pursuits, fly-fishing, adapted sport and adventurous training or Paralympics. These alternative activities are valuable for supporting rehabilitation, increasing active coping, determination and inner strength, providing a sense of achievement and enhancing motivation for living. A similar systematic review of quantitative evidence [21] suggested that physical activity, such as yoga, horse-riding or scuba diving, had an overall positive effect on veterans' social well-being, quality of life, mental health and perceived functional impairment. For the purposes of this article, the subjective well-being is defined as the individuals' appraisal of their own level of life satisfaction, which refers to the presence or absence of a pleasant effect (e.g., feelings of happiness vs. depressed mood) and their evaluation of specific experiences (e.g., work life) and life overall [22].

Extreme sport

Extreme sport covers a wide range of high-risk activities, which are related to the adrenaline rush and emotional arousal, while

most of the time requiring particular equipment and safety gear [23]. Competitive motorsport (CM) is a dangerous sporting activity, which includes high speed driving and injury risks for drivers yet it is one of the most popular extreme sports in the world [24]. Individuals who undertake extreme sport report deep, meaningful experiences, a sense of freedom and joy, intense feelings of connection and integration with the natural environment [25]. Extreme sport is associated with several positive psychological benefits, such as courage and humility, being resourceful and demonstrate a strong sense of reality and emotional control. These attitudes along with cognitive and physical skills, such as resilience, inner and physical strength, are common and necessary among military personnel [26].

The present study

Sport is increasingly recognised as an advantageous alternative method of increasing the well-being of veterans who are physically injured and/or have developed mental health conditions, such as PTSD [20,21]. CM reflects similar qualities to the military experience, such as dedication, discipline and competitiveness. Such alternative extreme sporting activities, which go beyond psychological treatment, could be effective for physically injured/disabled veterans, as a way to show they are still capable of new achievements and physical accomplishments [27]. Despite the increasing research in this field, a review of the literature did not reveal any studies that investigate the impact of CM on physically injured/disabled veterans. The purpose of this study is to explore if and how the participation in CM can enhance injured/disabled British veterans' subjective well-being and in turn determine if it improves the quality of their lives after transitioning to civilian society. The longer-term impact of participation in CM, over a six-month timeframe, will also be investigated, aiming to gain a richer understanding of its impact and if potential improvements have been sustained.

Method

Study design

This is a qualitative study design using qualitative interviews for data collection. The concept of this study is in line with the generic qualitative approach aiming to investigate individuals' subjective reports [28]. Such approach is not guided by an explicit set of philosophic assumptions, such as phenomenology [29], yet it is not atheoretical. It allows researchers to draw on the strengths of established methodologies while maintaining flexibility [30]. Studies which employ a generic qualitative approach are theoretically interpretive studies and, similar to all qualitative research studies, seek to understand how individuals interpret, construct or make meaning from their world along with their experiences and reflections on actual external happenings and events [28,31]. Additionally, such studies give a rich description of the phenomenon under investigation and are generally highly inductive, with the use of Thematic Analysis being the most common [32].

Recruitment

Participants were recruited using opportunity sampling, through KartForce, which was set up to support, mainly but not exclusively, physically injured veterans by engaging them in racing go-karts and cars for leisure or semi-professionally. Of note here, the vehicles that veterans use are specially adapted where necessary

Table 1. Participants' demographics.

Code number	Age	Military service ^a	Marital status	Education	Profession	Mental health problems	Member of KartForce
P1	33	10	Cohabiting	DipHe adult nursing	Casual worker	Yes (PTSD)	1 year and 8 months
P2	31	7	Single	BTEC	Full-time	Yes (subjective self-report for anxiety)	2 years
P3	25	8	Single	GCSE military engineering	Not employed	No	1 year
P4	26	4	Single	GCSE	Not employed	No	7 months
P5	35	7	Married	GCSE	Not employed	Yes (PTSD)	2 years
P6	36	6	Married	GCSE	Not employed	Yes (PTSD, depression)	1 year and 6 months
P7	36	14.5	Married	A-levels	Full-time	No	6 months
P8	27	8	Cohabiting	GCSE	Full-time	No	10 months
P9	33	6	Single	GCSE	Full-time	No	2 years
P10	32	6 ^b	Single	A-levels	Full-time	Yes (subjective self-report for anxiety)	6 months
P11	39	19	Married	NVQ Level 5	Full-time	Yes (PTSD)	2 years and 4 months
P12	47	21	Single	BTech	Retired	Yes (Severe depression)	4 months
P13	41	19.5	Married	GCSE	Not employed	No	5 months
P14	51	20	Married	Secondary education	Self-employed	Yes (PTSD, Depression)	1 month

^aYears, ^bRoyal Marines, PTSD: Post-Traumatic Stress Disorder.

to also enable the ones who have lost limbs to drive them. The gatekeeper of KartForce agreed to advertise the research on their website and allow the researchers to approach potential participants (at the racetrack facilities) and discuss the purpose of the research or answer any questions. Individuals who decided to participate and share their experiences contacted the first author directly.

Participants

Fourteen veterans took part in this study (Table 1). Participants were all male British army veterans, except for one who served in the Royal Marines. The inclusion criteria were as follows: (a) physically injured (permanent minor/severe injuries, e.g., one or more limbs lost), (b) military veterans injured in combat, during training or deployment, (c) active members of KartForce for at least one month before participation. Participants' age was between 25 and 51 years ($M=35.14$, $SD = 7.5$) and their military experience between 4 and 21 years ($M=9.7$, $SD = 5.48$) before medical discharged. Four participants had been members of KartForce for more than 2 years, three for more than 1 year and seven for less than 1 year. Twelve participants had suffered severe physical injuries (amputees, brain injuries, back pain injuries) and two suffered minor, yet chronic physical injuries (knee pain). Eight participants had developed mental health conditions (some had an official diagnosis and some self-reported it). Mental ill health was acknowledged as a key barrier yet it was not part of the inclusion criteria for this study. None of the participants had any form of psychological treatment (e.g., counselling) during this study.

Data collection

Two sets of interviews were conducted, either face-to-face or *via* telephone. During the first interview participants received the relevant documents (Information Sheet, Consent Form, Demographic Sheet) in person or *via* email. The second was a follow-up interview conducted after six months. Members of KartForce live all around the UK and meet in a different location each time, based on the racing events organised, thus interviews were scheduled accordingly, to accommodate the participants. Twelve interviews and five follow-ups were conducted face-to-face, (a) either in the racetrack facilities in a seminar room booked in advance by the gatekeeper or (ii) in participants' hometown in a seminar room of the local library booked in advanced by the researcher. Two interviews and five follow-ups were conducted over the phone.

A semi-structured, in-depth interview protocol was developed to elicit data in line with the research questions and allow for flexibility around the participants' experiences. The interview protocol consisted of two parts. The first part explored participants pre- and post-military experiences along with challenges during their transition to civilian life. The aim of the second part was to gain a more sophisticated understanding of veterans' perceptions and subjective experiences regarding CM. Two pilot interviews were conducted. No major changes were made to the interview protocol. Pilot interviews were neither recorded nor used as part of the analysis. The follow-up semi-structured interview protocol included questions regarding the reasons participants continue and additional changes the might had occurred, to explore the long-term impact of CM on all aspects of participants' lives. Ten follow-up interviews were conducted. Four participants were not able to participate in the follow-up interviews due to personal circumstances, but they remained active members of KartForce.

Ethical considerations

Full ethical approval for this study was granted by the ethics committee of the University of Nottingham. Issues of anonymity and confidentiality were explained at the beginning of the interview, along with the right to withdraw from the study with no further explanation. During face-to-face interviews participants signed the consent form and for telephone interviews participants sent a signed consent form *via* an email. Additional verbal consent was obtained to record prior to the interviews. All participants were offered debriefing following the interview and if it was required, they were given guidance on how to seek further support, such as contacting their GP or relevant Armed Forces charities. For confidentiality and anonymity reasons, participants' names have been replaced by a code number (i.e., P1, P2) and at transcription potentially identifying information (e.g., names, locations) has been removed/changed.

Data analysis

All interviews were transcribed from audio-recordings. Only the second part of the first interview (which focused primarily on participants' experience with CM) and the follow-up interviews have been analysed and reported separately in this paper.

Data from both sets of interviews were analysed based on the six-phase guide for Thematic Analysis (TA) [33], which is also recommended in sport and exercise research [34]. These phases

include reading and re-reading the data to achieve familiarisation with the data, producing codes, searching for and developing early themes, revising and refining themes and writing up the results. These six phases are not necessarily linear and thus analysis remained an active and reflexive process. The analysis was primarily inductive, aiming to identify key aspects of participants' experiences of CM and consider the ways they perceived and explained them. A semantic approach was employed to identify themes within the explicit meanings of the data as described by Braun & Clarke [33]. The analytic process involves a progression that goes beyond a simple description of the data, to an interpretation, attempting to present the significance of these patterns and their meanings in relation to previous literature (Patton, 2002). The same author (DS) who conducted the interviews also analysed the interview data, following the procedure outlined above. Discussions with the co-author (NH) about the derived themes served the process of triangulation, ensuring that the themes were accurately reflected in the raw data. Quotations are verbatim, with non-verbal elements removed to improve readability. NVivo 11 software was used for data analysis (QSR International, 2016).

Results

Analysis of the first set of interviews yielded two key themes, each described by several sub-themes (Supplementary material 1): (i) *Competitive Motorsport as an intervention* outlines the five key elements of CM as identified by participants indicating why this sport is perceived as having a positive impact, (ii) *Perceived Benefits of Competitive Motorsport* explores the health and personal benefits gained from their participations in CM. The analysis of the follow-up interviews (iii) *Processing & Reflection* describes the long-term benefits of participation in CM, which continued to be in line with the initial participants' views and perceptions.

Competitive motorsport as an intervention

Familiar environment

Participants reported that their transition to civilian life was challenging. Learning to live with a physical injury/disability along with limited opportunities to be productive, increased the emotional strain and reduced their confidence on a day-by-day basis. Regardless of participants' prior knowledge of or ability to drive go-karts, they reported that what they enjoyed the most was being part of a familiar environment and re-living experiences similar to those in the military.

P5: "... Because some of the races we do like are 24-hour, so you need ... your leadership skills, planning skills but you also ... your communication skills to make sure that the next guy knows all of the plan and the information ... I enjoy the responsibility of it and it's kind nice to be given back that bit of responsibility".

Racing was considered an inspiring alternative resource, which increased the sense of belonging and made them feel comfortable again. The unique aspect of the sport was not just the racing itself, but the process overall, such as briefings, time for preparation or practice and discussion of tactics. This facilitated the development of a sense of purpose, allowing participants to undertake new responsibilities and to actively apply prior knowledge and skills.

Team spirit

Team spirit was an element lacking in civilian life and being around like-minded fellow veterans, who share similar experiences and are bound together by common values and beliefs, was appreciated by participants.

P8: "I think it's having that band of brothers sort of thing again. We're all in the same boat. We all enjoy the karting. We've all been places, seen stuff and that. It's like being in the Army again but not having someone micro-manage every single aspect of your day".

Team bonding happened naturally as part of becoming a team, helping each other learn new tactics and improve their driving skills. This was perceived as helping them to feel more confident and comfortable to openly communicate, build new strong friendships, share ideas but also offer and receive peer support.

Adrenaline rush

Racing is a high-risk activity yet the multiple opportunities to replicate similar emotions to when they were participating in other risky activities while serving, such as military training or combat, was considered a key element of CM.

P1: "Feeling of being alive. I am alive. It also makes me feel like it's the closest feeling I've got to being, going to Afghanistan, where I was at my best ever ..."

P2: "Now I'm quite good at karting and it's an adrenaline rush and it's that competitive edge. Like I've had a few crashes and it really hurts but, you know, you push yourself to the limit [...] it's the thrill, I think ..."

Participants were constantly acknowledging all the positive emotions, such as pump of adrenaline and the thrill of risk-taking not only while racing, but also when practicing or preparing for a race with other teams. Being able to relive such emotions multiple times in civilian life, despite the risks involved, was viewed as a way of enjoying life again.

Competition

Participating in CM promoted healthy competition and the self-respect that comes with being able to overcome the hurdles of each racing event.

P10: "It's competitive. I like beating people ... I couldn't go to a track and just go around by myself. I'd have to have somebody else there. So, getting in the car ... I'm starting to race cars now as well. And, yeah, that's it, really, that you very much live in the moment. So, there's nothing else that really matters ..."

Being able to compete, either at an amateur or professional level, was what participants perceived as an opportunity to constantly gain exciting experiences, while setting the bar higher every time aiming to accomplish new goals, such as improving their driving skills or lap times.

Equality

What was noted for CM, compared to other sports, was that participation provided equal opportunities, especially for individuals with severe physical injuries or disabilities. It was very positive to be able to compete not only with individuals who have a different physical impairment, but also with able-bodied individuals. Participants argued that in other sport, one has to compete with individuals who have the same form of disability in order to get a fair play, let alone a game competing with able-bodied individuals.

P11: "... definitely I think that motorsport is good for people at all levels, no matter what their level of injury is, whether it be extremely physical or mental health. It puts everybody on a level playing field. So, we're out

there now competing against guys that have got no injuries or mental health issues but they're no better than us [...] it's not like going out and playing a football match, 11 people with injuries against 11 people without injuries. It would be totally unfair. This makes everything fairer".

Equality and fair play boosted their confidence and self-esteem and made racing the most preferable option compared to other forms of physical or sporting activities.

Perceived benefits of competitive motorsport

Psychological benefits

Through CM, participants managed to progress and steadily achieve inner peace and psychological healing. This kind of transformation was evident in their accounts, as they moved from negative stories of loss and hopelessness to more positive, hopeful stories. They noted that some of the positive effects of CM was developing a sense of purpose again. They were able to improve their performance and skills relating to racing resulting in increased self-esteem. They felt happier and more emotionally stable, something which steadily increased their self-motivation on a day-to-day basis. This enabled them to feel more independent and ready to undertake daily responsibilities while reducing their reliance on family or friends.

P6: "I can control myself. I have quite a lot of incidents where I can't but, yeah, it's managed better now than it was... I actually want to go karting because I'm getting quicker now in my racing [...] it gives you purpose. It gives you something to focus on [...] I have a hobby to do and it's getting me out of the house as well. I'm a lot happier for it rather than sat in front of the TV or looking at the walls, like I used to do".

Some participants decided to start racing with cars and pursue a professional career as racing drivers with Team BRIT (a branch of KartForce). Competing at a professional level was stressful but establishing a strong sense of purpose enabled them to progress as individuals and feel more confident undertaking new professional responsibilities.

P5: "I've stepped up and I'm part of Team BRIT as well... If you asked me a couple of years ago, it's something I could never have imagined I would be able to do... have the ability to drive a race car, let alone deal with the pressure that comes with it..."

Physical benefits

Participants reported that they were able to come to terms with their physical injury/disabilities and learn how to manage their pain levels. Through racing they managed to become physically active again and focus on changing unhealthy behaviours. This did not just included their desire to become better at racing, but also to eat healthier and exercise more to improve their physical health and appearance.

P6: "...I started karting with KartForce, I've gone from 13 and a half stone down to 11 stone... It has made me conscious of my weight [...] I'm managing my pain levels a lot more now...it makes me feel a bit better with myself [...] I feel like I have a bit more energy..."

Participation in CM was described as the stepping stone that enable them to improve holistically and move towards building a better life. Accepting their physical injury/disability was a way to increase their confidence and self-esteem. Evident in their accounts was a sense of immersion in this activity, which led to embodied acts of doing, experiencing joy and distraction from troubling thoughts.

P2: "I can't bike anymore, I can't run and even when I race, I come off and my legs are all twisted and it's in pain but you feel like you're still pushing yourself. You feel like you've actually got a purpose and you're not useless..."

Social reconnection

Participants noted an improvement in their social and interpersonal skills. The key elements of CM, such as its team nature, contributed to the development of strong bonds with other fellow veterans, which in turn reduced the feelings of loneliness and isolation that they have been experiencing since leaving the military. Socialising in a "sheltered area" (in a non-clinical setting), was perceived as a key factor that allowed them to make a step towards feeling comfortable and safe to reconnect with others.

P3: "I see like old friends who I've met through here and friends I knew before and I enjoy doing it. I absolutely love it."

P7: "...you're part of a team and actually even interaction with other teams, you get smiles and chats and bits and pieces, it's been a positive thing..."

P11: "...I've made some good new friends. I think I'm a little bit more level-headed when I'm here. You don't have to worry about what's said as much as you do outside. I just like being back in a group of people that are of the same mind-set..."

Additionally, participants argued that gradually they identified improvements in their civilian social life, either regarding their family, friends or civilian community in general. This sense of confidence and accomplishment, which was developed through their participation in CM, was viewed as contributing to the development of stronger communication skills and an active engagement in family and social roles.

P1: "I'm back to being me... I had this streak in me, I just wanted to win. I'm that guy again. The best thing is, I can teach that to my daughters, because before I couldn't teach them what it meant to be competitive and what benefits you're going to get from it..."

Processing & reflection

Through their continuous participation in CM participants acknowledged a steady improvement in their mental and physical health. Racing events remained a unique and positive experience, which constantly motivated them. This continuous motivation became a source of inspiration, which made them feel happier and more energetic. At a personal level some participants reported continuous improvements regarding the relationships with their family and friends and a sense of ability to establish open and honest communication and re-build trust.

P6 (follow-up): "I mean, before KartForce, I did nothing, I was lazy, I was at home just sitting there, but now I have joined KartForce and I can't wait for races, it gives you motivation, it gives you a big buzz [...] I mean because of all this as well it brought me down to a level where I can see my daughter again, I don't think I will ever be 100% but ... rather than being down here, just below the middle, I am kinda between middle and top again..."

At a professional level, finding and maintaining a job or having the opportunity to build a new career and progress as a professional driver was highlighted. Reflecting on their journey so far participants felt even more independent and confident in taking initiative, acknowledging CM as the main activity which "opened a door" to a better future and enabled them to better manage their transition to civilian life.

P10 (follow-up): "Progressing was a huge opportunity and I need to make sure I will do everything I can to just stay in the team... 100%, absolutely it has helped me... Motorsport is fantastic for keeping me on track... I am also trying to build a business at the moment and that has taken a lot of my time... other than that it is pretty much racing..."

For them, long-term benefits were being achieved effortlessly through co-operation, socialisation and fun, something that was

described as an advantage compared to any other activity or treatment they had tried in the past. Participants noted that CM is not an activity that would benefit all veterans who are physically injured/disabled yet they would recommend it.

P8 (follow-up): “... I look forward to it, and when it is over even my missis says I am extremely happy even like a week afterwards... I see the benefits... I really enjoy racing and I don't think there is something that would stop me from doing it”.

Discussion

The purpose of the study was to explore if and how the participation in CM can enhance injured/disabled British veterans' subjective well-being and in turn if it is perceived as improving the quality of their lives after transitioning to civilian society. The long-term impact, over a six-month timeframe was also investigated. Permanent physical injuries/disabilities, which remain unaddressed can lead to social devaluation and low self-regard, causing serious problems to individuals, who may be unable to accomplish daily activities or fully participate in family, occupation and social roles [35]. Physically injured/disabled male veterans for whom masculinity is deeply embedded in their conscience and identity, which were shaped while serving, may desire to reinvent themselves through (extreme) sport that involve high levels of adrenaline, competition and achievement. The results suggested that participation in CM was viewed as overwhelmingly and continuously positive. CM was considered a unique option due to the combination of key elements that distinguished it from other sports. These were the sense of a familiar environment, the strong team spirit, the adrenaline rush, the healthy competition and the equal opportunities to compete regardless of the type of disability. Multiple psychological and physical benefits along with opportunities to socialise with fellow veterans and civilians have been identified. These findings are consistent with previous research demonstrating an immediate positive impact on veterans' subjective well-being after participation in alternative activities [36,37], but also identified improvements in psychological symptoms, which were sustained over time [38].

For veterans, CM did not just represent the traditional risk and pleasure-seeking, but rather it was perceived as a path to reinvent themselves [25]. Participation in CM allowed veterans to re-gain a sense of belonging and re-live experiences and feelings that were lacking in their civilian lives. Excitement for replicating emotions of military training or combat was well-reported among the findings. The procedure before and after a race, such as briefings, deciding on an action plan for the race and establishing a performance improvement plan with fellow veterans, created a structured and familiar environment similar to the military. In addition, veterans fully endorsed some key aspects of CM including the adrenaline rush and the competition, which were also contributing to a perceived familiar environment similar to the military. Overall, the opportunity to reconnect with aspects of their military routine increased the sense of “doing things again”, being active and sociable and provided veterans with a renewed sense of direction on how to re-constitute their self-concept in a positive way [39]. Most participants did not have previous experience racing with go-karts or cars yet the opportunity to learn new skills through practice and improve by applying prior knowledge and military skills, made progress appear as an achievable target, thus encouraging a sense of accomplishment. In line with other studies, pursuing meaningful and challenging activities, which have similarities to the military, can help veterans to feel comfortable and confident to draw upon their pre-existing personal resources

and military skills and effectively use them again in real situations [19,40,41]. In turn, striving for and achieving valued goals through CM was perceived to be linked with an increased need to remain motivated; for example, to build healthy habits, change their diet or exercise regularly, aiming to improve their mood and track their progress through racing. This has been found in a similar study indicating that veterans remained motivated and thus increased their participation in alternative activities [42]. Some veterans started racing professionally or semi-professionally, while others were considering it, something that indicated that continuous engagement with CM did not only become a new path for inner fulfilment, but it opened doors for a new career. Apart from being occupied with training, veterans were able to improve their interpersonal and negotiation skills, learn how to promote themselves and interact with civilians at a professional level. Taking responsibility for their actions gave them the satisfaction and contentment of knowing that they can re-build a productive life in the civilian world. Similarly, veterans who have participated in elite disability sport, developed feelings of confidence, self-efficacy and satisfied their need for achievement in a publicly recognised domain by representing their country on the sports field rather than the battlefield [40]. In combination with competition, the principles of equality and inclusion gained through participation in CM were highly regarded and central among findings. Comparing to other sport or different types of physical activities, CM was distinguished, as it was perceived to combine the unique opportunity of competing on equal terms, not only with physically injured/disabled individuals but also able-bodied individuals. The opportunity to engage with, and many times beat, such individuals, sustained their desire to continue participating and challenging themselves, increased their self-determination and overall motivation for living. Social comparison has been reported in other studies yet results indicated that what helped disabled veterans to maximise their capabilities was to compare their abilities with those perceived to be more physically impaired [19]. Other studies suggested that achieving difficult goals and slowly becoming more autonomous increased self-determination [39].

Continuous participation in CM resulted in “normalising” the experience of becoming disabled and reconstruct a positive self-image post-injury. Veterans gained a better understanding of the nature of their injury/disability but also identified their capabilities, through which they developed a stronger sense of self-acceptance. Similar studies also suggested that alternative activities, even those that many times endure physical pain, such as driving the specially adapted go-karts/cars, helped disabled veterans to re-shape their understanding of what it meant to live with a permanent physical impermeant or disability and thus negotiate their post-injury status and place within civilian society [19,40,41]. Additionally, current findings indicated that veterans used CM as a form of active coping to become more proactive and undertake new responsibilities to better negotiate their sense of self in a personal or professional level. This enhanced their confidence and allowed them to become more independent on doing things by themselves including attending racing events without their spouse/partner or travelling long distances alone depending on the location of the racing events.

The re-development of self-concept and identity formation after leaving the military are key facilitators of a smoother transition in civilian life, whereas the lack of these can cultivate a negative sense of self-identity and continuously challenge veterans' transition [7,43]. Long-term participation in CM enabled veterans to re-establish their sense of self over time and reduced feelings of loneliness and isolation. The socialisation with peers, both

fellow veterans and civilians, in non-clinical environments also played a key role in veterans' continuous development and ability to control their emotional outbursts. This positive reinforcement had a direct impact on their personal and social life including the establishment of healthier and stronger relationship with their families and friends.

The unique bond among veterans and the value of sport in building team spirit and camaraderie are present in the current findings as well as in other studies [44–46]. Being part of a team was perceived as increasing veterans' sense of belonging, self-esteem, social and communication skills. Similar studies also highlighted the importance of team spirit in group alternative activities, especially when social support took the form of camaraderie with fellow veterans [47,48] and developed on the basis of their shared experiences [39]. Having a "shared" physical injury or disability helped veterans to connect with and inspire each other [39]. Such shared experiences and the connection developed among them have been found to be highly significant in terms of recovery [19,41]. These positive social interactions and emotional ties were also crucial for supporting veterans overcoming a pervasive sense of social isolation associated with mental or physical conditions [42]. Some studies which investigated the long-term effects of different alternative activities indicated that positive post-intervention effect was not sustained over time (e.g., 2, 3 or 6 months post-intervention) [49–51]. Nevertheless, current findings suggested that continuous participation steadily enhanced veterans' subjective well-being and in turn led to improvements in many aspects of their personal and professional lives. It allowed veterans to better engage with "here and now", achieving a sense of relaxation in their daily life. Similarly, other studies also indicate long-term improvements in reduced PTSD symptoms [38], perceived mood, happiness and an overall positive life outlook [52,53].

Strengths & limitations

The current study contributes to knowledge on the impact of different alternative activities on the well-being of physically injured/disabled veterans. This is the first study, to our knowledge, to explore the long-term impact of an extreme sport, specifically CM, indicating its direct and continuous perceived positive impact on veterans' subjective well-being. In addition, it identified indirect benefits, such as improvements at a personal and professional level, with participants being able to re-build and maintain a healthier relationship with themselves (e.g., body image satisfaction and healthy eating habits), but also their families, while for some CM became a new career path.

Despite these contributions, the current study was limited in several important aspects. The study findings are based on a small number of participants and thus cannot be considered representative of all physically injured/disabled veterans. All participants were male and served in the Army, apart from one who served in the Royal Marines. This limits our understanding of how CM could benefit other veterans. Participants had different types of physical injuries/disabilities from minor to severe and many of them had also developed different types of mental health conditions. The data presented a snapshot of a six-month participation period; not all participants had started racing at the same time and not all of them were at the same level in terms of progress. Despite the overall perceived positive impact on all veterans' subjective well-being, these differences could limit our ability to identify specific details or points in time, which actively contributed to this positive change.

Implications & future research

Physical activity or (extreme) sport play an important role as a simple, inexpensive and effective intervention for physically or psychologically injured veterans. In line with other studies [20,21], the findings indicated that there is a need to provide a wider range of effective options for veterans through novel alternative activities, apart from psychological or pharmacological treatments, allowing them to choose or combine those that best accommodate their needs. Resettlement programmes or clinicians who work with the veteran population can promote involvement in safe, affordable and exciting physical activities or team sport, after accounting for relevant individual characteristics, such as physical limitations or severity of mental health symptoms. Qualitative, quantitative or mixed-method studies are necessary to improve and expand research on this topic and longitudinal research to understand the effects of alternative activities over the following months and years. Since weak methodology has been identified in the current literature [21] future research may benefit from adopting a randomised controlled trial (RCT) design to reduce bias. Standardising the clinically-administered and/or self-administered measures used to collect data could promote a holistic understanding as it will facilitate a future meta-analysis.

Conclusions

Veterans viewed their participation in CM as a way to better understand their strengths, improve their weaknesses and start re-shaping an identity as part of the civilian society. The similarities between the procedures and values of CM and military training, such as team spirit and adrenaline rush, were key elements of the sport which allowed veterans to feel comfortable, confident and able to demonstrate positive attitude to change. The importance of socialising in a non-clinical environment and competing with fellow veterans who had severe or minor physical injuries, but also able-bodied civilians were central among the findings. Results also indicated more positive perceptions of body image and the maintenance of healthy eating and exercise attitudes. Since the growing body of research indicates that alternative activities are beneficial for physically or psychologically injured veterans, they deserve serious consideration from the various relevant organisations, such as the military or the NHS, as part of the resettlement process and transition to civilian life.

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ORCIDDanai Serfioti  <http://orcid.org/0000-0003-4175-0652>Nigel Hunt  <http://orcid.org/0000-0002-8492-6577>**Data availability statement**

The data that support the findings of this study are available from the corresponding authors, [DS/NH], upon reasonable request. The data are not publicly available due to privacy and ethical restrictions (i.e., containing information that could compromise the privacy of research participants).

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