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The enduring well-being impacts of attending the Battle Back Multi Activity Course for the lives of recovering UK armed forces personnel

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ABSTRACT

Few adventurous training courses have been formally designed to assist military personnel in their recovery and/or transition into civilian life by supporting psychological health and well-being. This study examines, for the first time, the longitudinal effects of a five-day Multi Activity Course (MAC) on the mental well-being of serving but wounded, injured, and/or sick (WIS) UK armed forces personnel. The MAC is delivered using a participant-centered approach to encourage engagement in adaptive sports, adventurous activities, and personal development coaching sessions. This work extends previous research showing powerful short-term well-being benefits. Measures of positive well-being and psychological need satisfaction were provided by participants before and after attending the course, as well as two weeks, three months, six months and 12 months later. Self-reported well-being measures of psychological need satisfaction and positive mental well-being improved significantly throughout the course. These remained significantly higher at six and 12 months after the course, respectively.

ARTICLE HISTORY

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KEYWORDS

Military; recovery; well-being; outdoor activities; physical activity; health coaching

What is the public significance of this article?—This is the first longitudinal study into the effects of an adaptive sport and adventurous training recovery programme on the mental well-being of in-service, wounded, injured and/or sick (WIS) UK armed forces personnel. Participants reported significant and sustainable improvements in their mental well-being throughout the 12-month research period. Engaging in this supportive programme whilst still serving in the armed forces is intended to foster a positive approach in individuals so they can support themselves over what may be a lengthy recovery process. Early intervention with recovering in-service WIS personnel may offset future pressure on dedicated Veterans services.

Introduction

UK Military Personnel who become WIS may make a full recovery and return to duty, but many are medically discharged. The most recent Ministry of Defence data states that in the 12 months leading up to April 1, 2017, the percentages of trained regular personnel in recovery who subsequently left the Services were as follows: 62% of Army WIS personnel, 72% of Royal Air Force (RAF) WIS personnel and 7% of Naval Service WIS personnel (Ministry of Defence, 2017). Whatever the outcome, the uncertainty accompanying

injury or diagnosis of a career-impacting illness or injury can be challenging for many individuals. As of October 2017, 3,233 in-service regular trained UK armed forces personnel were receiving recovery support, 8% of the UK armed forces (Ministry of Defence, 2017). The number of in-service regular trained personnel receiving recovery support increased by 27% from 2,544 to 3,233 between October 01, 2015 and October 01, 2017 (Ministry of Defence, 2016a). WIS personnel have been identified as needing novel, early, preventive interventions to protect well-being and to develop self-directed stress management, implemented upstream of clinical services (Bauer et al., 2018). This need is supported by the observation that the average mental well-being scores of 978 WIS UK armed forces personnel still in service between 2012 and 2015 were below the UK national average (Peacock et al., 2019). A large-scale study of 1,187 US Veterans also observed that civilians scored higher on every item on the Enriched Life Scale than military Veterans (Angel et al., 2018).

In 2018, Bauer et al. documented that 76 UK organizations within the charitable sector, just 7% of all the charities supporting UK armed forces, provide specific support for the mental well-being of armed forces personnel. These charities do this either as a clinical or a non-clinical service. The need for effective and

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inclusive approaches to recovery, delivered beyond hospitals and clinical settings is increasingly recognized (Burke & Utley, 2013; Dustin et al., 2011; Messinger, 2010). In 2010, only 23% of in-service personnel with common mental disorders were receiving any form of medical professional help (Iversen et al., 2010). Increasingly, non-medical help – featuring social workers, welfare officer and chaplains – is being adopted (Iversen et al., 2010). This exemplifies the strong preferences of military personnel around support; certainly, “formal care” is not common for them. Importantly, these non-clinical residential interventions commonly report benefits for Veterans living with PTSD as well as assisting with psychological well-being, including depression, anxiety, and anger (Burke & Utley, 2013; Caddick & Smith, 2018; Lobban & Murphy, 2019; Murphy et al., 2016). Further, programs using sport and physical activity have also generated these positive effects among armed forces personnel (Caddick & Smith, 2018).

Extending this provision, as more organizations and individuals discover the positive influence adaptive sport and adventure training can have, even beyond that of exercise alone, sporting contexts such as the Multi Activity Course (MAC) are now increasingly being provided for Veterans and recovering military personnel in the UK and around the world (Buckley et al., 2018). Such programs, using activities like surfing, river boarding, and hill walking, have been reported to have positive effects on participant well-being (Caddick & Smith, 2017; Dustin et al., 2011; Zurawik et al., 2019). This has been seen recreationally as well as at high-performance levels, including Invictus Games athletes (Roberts et al., 2019). In the US-based Team Red White and Blue, leaders reported more improved health, genuine relationships and purpose in life attributed to Team Red White and Blue than non-leaders who also participated (Angel & Armstrong, 2016). They also identified that Veterans’ who had ongoing participation in group activities – compared to those with no, or limited engagement – were more likely to report an improved sense of making lasting positive relationships, belonging to a larger community, feeling more valued by others and forming close relationships (Angel & Armstrong, 2016).

Despite increased availability of this type of support and the growing appreciation for the benefits of physical activity interventions that support psychosocial aspects of development, this area is under-researched (Caddick & Smith, 2014). Problematically, even many existing studies can be criticized for their weak methodological quality (Greer & Vin-Raviv, 2019). To address these shortcomings, this current study offers a robust and novel investigation into the long-term impacts of

a 5-day MAC on the mental well-being of WIS personnel who are still serving members of the armed forces, over a 12-month research period. Given the MAC features many elements that provide the necessary meaning and context for participants to sustain learning into post-MAC life, the purpose of the current study addresses the mental health and well-being implications of attending a MAC over the 12 months following that attendance. This is the first longitudinal research study into these effects of an adaptive sport and adventurous training recovery course on the mental well-being of in-service, WIS UK armed forces personnel.

There are good reasons to address this issue within the MAC. The MAC is required to support participants toward their best possible recovery, either to return to duty or make a smooth transition to civilian life, meaning that delivering long-term benefits is essential. The Battle Back program is a series of courses and experiences provided to support the recovery and well-being of WIS personnel and Veterans. The MAC is one of the Battle Back courses and provides the opportunity to research the impact of a bespoke, residential non-clinical service. The course was designed and piloted many times to ensure that high-quality delivery was (i) participant-centered, (ii) focused on meaningful events and activities and (iii) sufficiently integrated to secure long-term participant benefit. MACs feature indoor climbing, caving in an indoor artificial caving system, wheelchair basketball, tennis, clay pigeon shooting, lawn bowls, kayaking, archery, seated volleyball, and mountain biking, supported by daily session planning and post-event debriefs.

Distinctively, the MAC is provided for in-service personnel, rather than Veterans. It is now the only mandatory course for WIS personnel in the British Army and RAF using adaptive sport and adventurous training as a context for personal development and growth (Ministry of Defence, 2016b). Before attending the MAC, WIS participants have already been re-assigned; none are actively serving in their intended job role due to injury or illness. Once an individual in the Army has been WIS for 28 days, or 56 days in the RAF, they are to attend the mandatory MAC at the Battle Back Center. Early attendance in the participants’ individual recovery plan is intended to release the adaptive capacity of everyone for their recovery.

The design and delivery of the MAC derives from the principles of Self-Determination Theory (SDT) (Deci & Ryan, 2000). SDT considers that social contexts and individual differences facilitate distinctive types of motivation, especially autonomous motivation and controlled motivation, and this – in turn – predicts learning, performance, experience, and psychological health (Deci & Ryan, 2015). SDT is the foundation for

initiating positive change in MAC participants and these underpinning concepts drive the approach to teaching and delivery by the MAC coaches. For many, being assigned as WIS can undermine preexisting in-service experiences of core SDT constructs; this compounds many problems affecting recovery.

The SDT proposes that all humans have three basic psychological needs: autonomy, competence, and relatedness. Autonomy represents individuals' need to feel in control of their lives and their future. In every MAC, participants are encouraged to make their own decisions, independently selecting from among many program options. This is supported with the delivery of educational sessions about human information processing and how this influences behavior, always contextualized to that day's outdoor and physical activities. Competence concerns personal achievements, knowledge, and skills; individuals have a need to build competence and develop mastery over tasks that are important to them. Sport offers a rich context for experiencing competence at a range of levels. Given the human imperative for feeling a sense of belonging and connectedness with others, relatedness is the third SDT need; staff-student ratios of 1:3 ensure regular opportunities for individual and small group engagement with course-mates and/or experienced coaches (Ryan & Deci, 2000).

In recent years, health coaching has been widely used as an approach to supporting individuals in initiating changes in their behavior to improve physical and/or mental health (Butterworth et al., 2006; Frates et al., 2011). Over the five days, each participant works with the same coaching staff member, yielding ~50 hours of possible contact time with their coach. In the MAC, health coaching aims to increase self-awareness, to harness heartfelt motivation connected to personal values, to help achieve realistic goals, and to adopt a resilient and confident mind-set as they work toward implementing healthy behaviors to promote their recovery. Within-session reflections are used to complement and refine end-of-day reflections, which then contribute to end-of-course planning for post-MAC life.

A significant lack in any of one, or combination, of these three SDT needs will have a detrimental impact on an individual's well-being (Deci & Ryan, 2000). The MAC aims to improve participants' mental well-being and aspects of psychological need satisfaction. Given that peer support represents a promising way to offer direct help and to complement psychological intervention, this plays a significant part in the MAC (Dalton et al., 2018). All coaching staff have been trained to coach using SDT principles within a health coaching relationship. While daily post-activity reflective sessions encourage participants to consider how well each upheld

these principles during the activities, coaches use these sessions to reflect on how well they individualized that day's activities for each participant.

Previous research into interventions relying on health and well-being coaching have been weakened by inconsistencies in defining their logic model/theory of change (Wolever et al., 2013). Palmer et al. (2003) reported an emerging consensus around effective health and wellness coaching, namely that it should be patient-centered, based upon behavior change theory and delivered by staff with diverse backgrounds. The coaching process emphasizes not only goal-setting but also encourages self-discovery in response to (in) formal experiences and content through follow-up activities that enhance accountability, reflection, and planning (Wolever et al., 2013). Having a definition helps to clearly address these themes and supports health and well-being coaching research to develop more accurate assessments of its effectiveness (Wolever et al., 2013).

It is important to emphasize the distinctiveness of how MAC staff develop a supportive relationship with participants, compared to that between clinical experts and patients. Linguistically, a clinician treats patients, a coach helps clients to help themselves. Epistemologically, a clinician may strive to have all the right answers for a patient, coaches strive to help their client find their own answers. A clinician-patient relationship relies on the skills and knowledge of the expert and is often unidirectional, the coach-client relationship builds on the client's self-awareness, personal values, and insights (Frates et al., 2011). In the MAC, the health coaching approach is the central plank – beyond the specific outdoor and sport-based activities – in delivering a participant-centered experience aimed at encouraging and equipping participants to improve their health and promote immediate, mid-, and long-term self-management (Butterworth et al., 2006; Hawkins et al., 2016; Palmer et al., 2003).

Previous studies have identified the powerful short-term effects of the MAC, based on research conducted at the start of a course and again immediately following attendance. This pre-post design identified statistically significant improvements in all measures ($M + SD$ change), with a large positive effect size in positive mental health (7.19 + 9.61), competence (0.46 + 0.9), autonomy (0.27 + 0.84), and relatedness (0.26 + 0.86) (Peacock et al., 2019). These results not only confirm positive desirable outcomes but also confirm the treatment fidelity of the MAC around SDT. Yet, these findings are limited to immediate (Carless et al., 2013) and six-month (Kaiseler et al., 2019) outcomes, meaning that their long-term sustainability remains unknown. Following the qualitative findings around the positive impact evidenced after six

months, we hypothesize that the MAC will lead to sustained increases in well-being and need satisfaction throughout 12-month research period

Method

Participant recruitment and obtaining consent

Prior to arriving at the Battle Back Center for the MAC, WIS personnel received an information sheet and informed consent form within their military joining instructions. This provided detailed information on the research and invited individuals to participate in the study. This process provided personnel with more than 24 hours to consider voluntary consent. On arrival at the Battle Back Center, personnel were reminded about the research, this time verbally by a research staff member and, again, invited to participate. Written informed consent was obtained from willing participants. Continued consent was confirmed online, prior to completing each of the four follow-up surveys. Within the research time period, November 7, 2016 to December 31, 2018, 804 participants attended a MAC for the first time. After data screening, the 759 participants that provided consent and responses at the start of the course were 81% Male, 19% Female, ranging from 20 to 52 years of age ($M = 33.75$ years). Their military distribution was: 70.5% Army, 15% RAF and 14% Navy. The most common rank was Corporal. [Table 1](#) details the distribution of the participant's ranks. Of the 797 participants that gave an answer, 6% considered themselves to be wounded (battle casualty), 45% injured (non-battle casualty) and 66% sick (mental health problem/physical illness). Participants could select more than one response option, as such, percentages can sum to more than 100%. Nine hundred and forty-two answers were collected from 797 participants, indicating that many consider themselves as more than one of those categories.

Ethical approval

Ethical approval was awarded by Leeds Beckett University and The Ministry of Defense (MoD) Research Ethics Committee (Protocol number: 562

MoDREC 14). The Committee is an independent body comprising of MoD and non-MoD members, expert and lay. The Committee operates according to guidelines set out by the UK's Health Research Authority. Prior to final review and approval by MoDREC, scientific and technical rigor is assured through assessment by the appropriate Scientific Advisory Committee.

Data collection

Upon arrival at the Center and prior to any formal interaction with center staff or activities, a nonmilitary member of the Leeds Beckett University research staff met with all the participants. The research staff informed the participants about the aims of the research and obtained consent from volunteers. Following this, participants then completed two surveys – the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) (Tennant et al., 2007) and the Basic Need Satisfaction in General Scale (BNSG-S) (Deci & Ryan, 2015) – to provide a baseline measure of positive mental well-being and basic psychological need satisfaction. Throughout the whole research period, data were requested at six time points over a 12-month period from each participant: upon arrival at the MAC, at the end of the MAC, then at four post-MAC time points: two weeks, three months, six months, and 12 months later. For each stage of follow-up, participants were contacted via e-mail, as they consented to during the course. The e-mail contained a web link directing participants to the online study. On opening the web page, participants had to accept a statement of consent before completing the surveys. Beyond the BNSG-S and WEMWBS, the survey also asked participants to reflect upon their Battle Back experience and identify their views on its role within their recovery to-date. The overall process was familiar to all respondents since all had completed these surveys pre- and post-MAC. All contact details were stored separately from participant data to maintain anonymity. Participants were also provided with the researchers e-mail address and research phone number, allowing them to ask – and have addressed – any questions or concerns.

Quantitative measures

The WEMWBS is a positively worded scale measuring an individual's positive mental well-being. The scale has been extensively validated and widely used in well-being research (Maheswaran et al., 2012). It was used in the UK National health survey every year between 2010 and 2016 (NHS, 2016). More specifically, this measure has been shown to be appropriate for this population having been a feature of psychological research with serving and

Table 1. Ranks of participants.

Rank	Quantity	Rank	Quantity
Corporal	116	Sapper	18
Lance Corporal	92	Gunner	16
Private	76	Warrant Officer 1	15
Sergeant	70	Major	12
Staff Sergeant	35	Marine	12
Airman Basic	26	Trooper	12
Senior Aircraftsman	25	Flight Lieutenant	11
Leading Hand	19	Rifleman	10
Warrant Officer 2	19	Other (<9 of that rank)	147

Veteran military populations, in the UK and US (Brennan, 2016; Everill et al., 2020; Peacock et al., 2019; Roberts et al., 2019). The scale is a psychometrically credible measure of mental well-being, with high internal consistency and it also aligns with the intended outcomes of the MACs: to increase positive mental well-being. The 14-item scale measures aspects widely accepted as key components of well-being, including positive affect (feelings of optimism, cheerfulness, and relaxation), positive relations with others and positive functioning (autonomy, self-acceptance, environmental mastery and personal growth and purpose in life). It covers subjective well-being from a hedonic perspective and psychological functioning from a eudaimonic perspective, for example, “I’ve been feeling optimistic about the future.” Responses are measured on a 5-point Likert scale (from 1 “none of the time” to 5 “all of the time”). For the full list of items, see Appendix A. The scored answers are summed (14 to 70) to provide an overall score; low scores indicate low positive mental well-being while higher scores signal incrementally higher positive well-being. A score of 40 and below corresponded to probable depression and a score of 41–44 to possible depression (Bianca, 2012). The scale is suitable for use in measuring mental well-being with such a large number of participants due to its strong psychometric performance and lack of ceiling effects (Tamminen et al., 2020). NHS Direct use the cut point of 40 and below as the cut point for low mental well-being in their self-assessment scales (Dixit, 2020).

The BNSG-S assesses need satisfaction in daily life and has also been used widely in a sports research context (Quested et al., 2011; Sheldon et al., 2013). SDT suggests three universal needs must be continually satisfied for an individual to maintain optimal psychological health: i) the need for autonomy, ii) competence, and iii) relatedness. The 21-item scale contains three subscales which address each of the three basic psychological needs, each with seven contributing items. For example, “I feel like I am free to decide for myself how to live my life.” For the full scale, see Appendix B. Responses are recorded on a 7-point Likert scale (from 1 “not all true” to 7 “very true”). Following reversal of the nine negatively worded items, an average score for the three subscales is calculated. These responses provide an important test of treatment fidelity, given that the MAC was designed to influence these key SDT domains.

Questions around attribution of the participants attendance on the MAC in relation to changes in behavior and well-being were utilized in the follow-up research surveys. Participants were asked “What impact

has the Multi Activity Course had on you since the course ended?” Answer options were provided on a five-point likert scale of “negative impact,” “mostly negative” “no impact,” “mostly positive,” and “positive impact.” They were also asked “Since being at the Battle Back Center have you made any changes in your day-to-day life?.” They were able to answer “yes” or “no” and were invited to complete the following sentence in relation to their answer; “I have stopped”

Data screening and analysis

Quantitative subscale scores were tested for within-subjects differences using SPSS software. Not all participants contributed to the follow-up research after the MAC, some provided information at one time point but not another. Consequently, Linear Mixed Model analysis was utilized to assess statistical variability of participants scores in quantitative assessments between the pre-course values and all the follow-up time points. The Bonferroni post-hoc test was applied to counteract the increased likelihood of false positives that occurs with multiple comparisons. Pair-wise comparisons identified statistically significant differences between the average scores across the six data collection time points. This method considers and manages the variation in n values at each time point as part of the analysis. Incomplete data sets, i.e. quantitative assessments that rely on the summation of scores from all answers, that did not have answers to all the questions were removed from analysis. Through the process of “long string analysis,” data sets from the quantitative assessments that resulted in a SD of 0.00 – indicating where participants have answered the same Likert score for all questions – were also removed. This addresses the assumption that those individuals who are responding carelessly may do so by choosing the same response to every question. This helps to clean the data set of “careless or insufficient effort responses” (Curran, 2016). In total 45 sets of data were removed from the 804 sets, 41 for being identified as having the same answer to every question and four for being incomplete data sets. This left 759 complete sets at course arrival.

Data provided by the same participants at the first and last time points allowed for paired comparative analysis. This was done using a paired samples t -test.

Questions that allowed for an open text answer to be given by participants were analyzed to identify themes within the results. After having read all the responses, coding was done manually before identifying named themes. This allowed for groupings of answers to be linked to educational content on the MACs.

Results

Changes in positive mental well-being

As displayed in Table 2 and Figure 1, upon arriving at The Battle Back Center, the average WEMWBS score was 20% lower than the 2016 UK national average of 49.85 (NHS, 2016). This increased by 33% by the end of the five-day course, now above the 2016 national average. Average WEMWBS scores reduced in the two weeks following the course ($n = 180$). WEMWBS scores for the duration of the research period are shown in Table 2. Linear Mixed Model analysis showed a statistically significant increase in WEMWBS scores between pre-course and post course values ($P < .001$). Average scores at each time point in the 12 months follow-up after the MAC were significantly higher than pre-course values (two weeks to six months, $P < .001$; 12 months $P = .016$).

Of the participants that completed the WEMWBS pre-course and 12 months after, 34 had identified as having a mental health condition or physical illness when they attended the MAC. Of this paired data, the average pre-course WEMWBS score was 38.94. This increased significantly by 13% to 44.03 by 12 months $t(33) = 3.304, p = .02$, paired t-test. The increase is less in the 11 participants that identified as being wounded or injured but not living with a mental health condition or

physical illness. Their average pre-course score was 24% higher than those with mental health problems or illness. It increased by 4% to 50.45, now higher than the 2016 UK national average 12 months after the MAC.

In summary, all paired data sets from pre-course to 12 months increased. Those who identified as having a mental health condition or physical illness experienced a greater increase in the 12 months following the MAC than those wounded, or injured, 13% and 4%, respectively.

Other participants that completed the WEMWBS pre-course and 12 months after, identified as more than just one of the WIS options, wounded, injured, or sick and were not included in this subsection of analysis.

Changes in psychological need satisfaction

Data from the BNSG-scales showed the total psychological need satisfaction of the participants improved significantly throughout the course. This significant increase was sustained 6 months after attending the MAC ($P = .013$).

All reported measures at the four time points after attending the course are shown in Table 3 as well as the statistical significance of the values at each follow-up time point compared to pre-course values.

Table 2. Changes in self-reported WEMWBS score throughout the research period (* = Statistically significant difference to course arrival ($P < .05$)).

	Course arrival	Course departure	2 weeks ($n = 180$)	3 months ($n = 166$)	6 months ($n = 94$)	12 months ($n = 82$)
WEMWBS score	39.69	52.76*	47.31*	45.41*	44.53*	44.75*
Standard Deviation	11.14	9.57	9.20	10.14	9.34	11.15

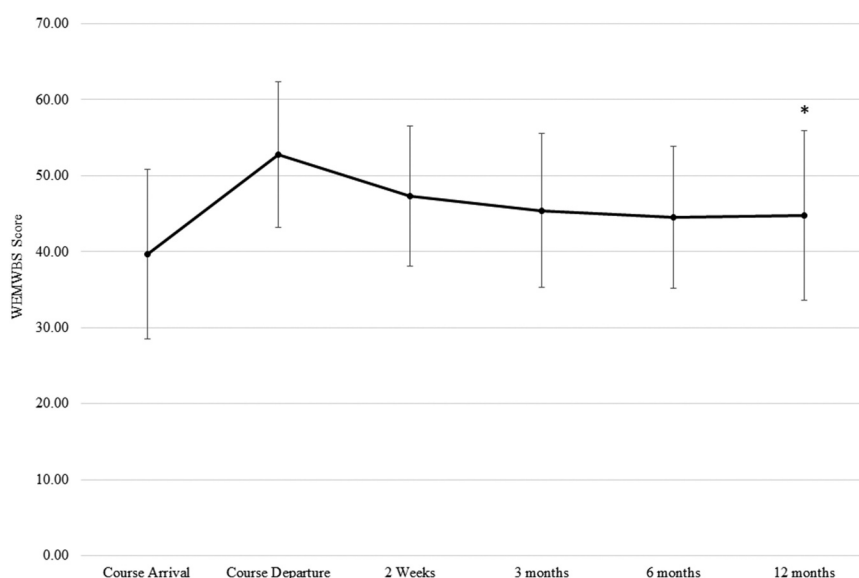


Figure 1. Changes to participants positive mental wellbeing. Course arrival (39.69 ± 11.14), Course departure (52.76 ± 9.57), two weeks (47.31 ± 9.20), three months (45.41 ± 10.14), Six months (44.53 ± 9.34) and 12 months (44.75 ± 11.15).

The BNSG-scale has subsections of analysis that quantify autonomy, competence, and relatedness; there was an increase in all three aspects by the end of the 5-day MAC. Feelings of competency increased by 13%, autonomy improved by 8%, and relatedness by 7%. Levels of reported competence increased most and remained comparatively highest at 12 months relative to the values reported prior to the course. Levels of competence were lower than autonomy and relatedness at the start of the course, yet increased the most and maintained the largest change from pre-course values over 12 months. Autonomy gradually declined throughout the 12 months of follow-up, however the average at 6 months was still 6% higher than at the beginning of the MAC. Relatedness to others also significantly improved during the course. This reduced over time back to a similar level reported before the course (4.19 at 12 months, 4.18 prior to the course). Changes in autonomy only remained significantly higher for two weeks and relatedness was only significantly increased between the beginning and the end of the course.

Attribution to the MAC

Two weeks after attending a MAC 91% of respondents indicated that the personal impact of the MAC, had been “Positive or Mostly Positive” since they attended the course (42% and 49%, respectively, $n = 183$). Twelve months later 89% of 82 participants said the MAC had a “Positive or Mostly Positive” impact on them since they attended the course (46% and 43% respectively). Seventy-four percent ($n = 182$) reported making “changes in day-to-day life since being at the Battle Back Center,” with 75% of 82 participants sustaining this at the 12-month time point. At the 12-month time point they were also asked, “If yes, what changes have you made?” and invited to complete the sentence, “I have stopped” Analysis of these responses showed almost four in 10 (38%) had either stopped behaviors/thoughts related to having a negative mind-set, worrying about things out of their control, bottling things up, or being hard on themselves or avoiding thoughts and feelings. A smaller group (14%) commented on stopping behaviors such as drinking alcohol, smoking, or using recreational drugs. A similarly sized proportion (13%)

had stopped finding excuses and were now taking responsibility for their recovery, stopped self-isolating and/or feeling less self-pity. One in 20 described being more present and not thinking about the past as much or worrying about “what might have been.”

All these elements of behavior change feature in the educational content and coaching approach implemented on the MAC. Given this prominence, it is reasonable to assume some level of attribution to attending the MAC. Although it is clear that while participants are influenced by other factors in their lives, the types of behavior change they report, align so closely to the MAC educational content and aims to be simply coincidental.

Discussion

Sustainable improvements in participants well-being

This study provides important new data showing long-term effects of participation in a tailored recovery course for serving military personnel. The well-being measures of psychological need satisfaction and positive mental well-being improved significantly throughout the MAC, remaining significantly elevated above baseline at 6 and 12 months post-MAC, respectively. While autonomy and relatedness returned to pre-course levels, competence remained significantly improved 12 months later. The improvements in mental well-being scores were not only statistically significant but also likely to represent “meaningful” change for individuals, given they were below national norms at baseline. While it is difficult to be precise about how much change in WEMWBS is considered “meaningful,” best estimates range from 3 to 8 WEMWBS points difference between pre and post time points for grouped data sets (Putz et al., 2012). This contextualizes the comparative impact of the MAC; from pre-course to course departure, this study reports average increases of 13.08, whereas the increase was 5.06 from pre-course to 12 months. These scores indicate a meaningful and sustainable improvement, albeit reflecting steady decline, in positive mental well-being scores. In the absence of active intervention support, this level of sustained change is encouraging.

Table 3. Changes in self-reported Basic Psychological Need Satisfaction throughout the research period (* = Statistically significant difference to course arrival, $P < .05$).

	Course arrival	Course departure	2 weeks	3 months	6 months	12 months
Autonomy	4.19	4.51*	4.48*	4.42	4.46	4.36
Competence	3.97	4.48*	4.35*	4.21	4.41*	4.40*
Relatedness	4.18	4.48*	4.38	4.27	4.35	4.19
Total psychological need satisfaction	4.28	4.62*	4.59*	4.46	4.60*	4.47

Changing well-being among WIS military personnel

Many research studies deploy quantitative measures to evidence the effectiveness of health care and behavior change interventions in influencing aspects of well-being, such as anxiety with the GAD-7 scale and depression using the PHQ-9 scale (Kroenke et al., 2001; Spitzer et al., 2006). The measure of mental well-being used in this study was included in the annual UK national health survey between 2010 and 2016 to measure positive mental well-being (NHS, 2016). On the MAC, average pre-course scores (39.69 ± 11.14) were ~10 points below the national average (49.85), indicating a need for intervention (NHS, 2016). By the end of the 5-day MAC, the scores were above the national average, indicating an important Public Health benefit. At all other time points, average scores were significantly higher than the pre-course scores, showing the immediate, mid-term, and longer-term impacts.

To understand these changes, it is interesting to note that since 2010 average pre-course mental well-being scores have also fallen. It is also possible that, even with lower pre-course scores, an upper threshold may restrain the magnitude of change documented. Previously (Peacock et al., 2019) the observed increase in immediate post-MAC WEMWBS scores – conducted between March 2010 and April 2015 – was 7.19. This increased throughout the period of this research – November 2016 to December 2018 – to 13.08; 82% greater than in the previous study. This indicates that not only is the MAC consistently beneficial but also its impact on well-being is heightening. This may be due to changing needs among participants; temporally, more participants now identify themselves as “sick.” Indeed, between 2010 and 2017 20% more MAC participants identified as “sick” (i.e., mental or physical illness), corresponding to 14% fewer wounded and 6% fewer injured.

Contextualizing these impacts with those from other interventions

Studies using WEMWBS to investigate well-being impacts of programs with similar intentions to the MAC help contextualize the results of the current study. Exercise projects run by Mind and Rethink Mental Illness associations as part of the Time to Change project investigated three-month changes in the mental well-being of 2,663 participants (Malcolm et al., 2013). Unlike the five-day MAC, this involved weekly, nonresidential exposure to program activities. Based on 531 respondents, well-being data showed a 6.9% increase at the three-month follow-up. In the current study, from pre-course to three-month follow-up, scores averaged a 14% increase.

Research conducted with in-service military personnel, like this work at The Battle Back Center, is rare and we can find no comparable studies in terms of sample, design, or assessments. There is, however, a significant volume of research with military Veterans; while this is dominated by US data, UK evidence is growing. In previous MAC research (Peacock et al., 2019), the immediate improvements in well-being, from pre-course to the end of the five-day course, were comparable to, or greater than existing interventions. The research presented here builds on that work, showing that the magnitude of short-term improvements is now 82% higher than the increases seen in participants between 2012 and 2015.

In the absence of extensive research with serving personnel, research with UK military Veterans represents the best comparison to the current study. Research with 40 UK participants of the Invictus Games showed a 10.7% increase in WEMWBS scores, measured seven weeks apart; one-week prior to, and then six weeks after, participating in the Games. During that research period, the participant’s average WEMWBS scores declined in the lead-up to, and during the Invictus Games, from 45.05 six weeks prior to the Games to 43.75 during them (Roberts et al., 2019).

In Operation Nightingale, 40 recovering military Veterans reported a significant improvement of 29% in WEMWBS scores following between 7 and 21 days of continuous involvement in archeology activities. Notwithstanding the uneven exposure in Operation Nightingale compared to the five-days of the MAC, from pre-course to the end of course, MAC participant averages increased 33% in those five days. Although many other studies have used WEMWBS, they lack methodological comparability. Some only collected WEMWBS data at the start of an intervention; of those including follow-ups, all were conducted in shorter time frames than this study (Caddick & Smith, 2017; Lobban & Murphy, 2018; Roberts et al., 2019). Other studies have used quantitative measures but have “yet to identify a quantitative outcome measure that captures the value of [therapeutic interventions] with Veterans” (Lobban & Murphy, 2019, p. 42). In this study, establishing the compatibility between the positive aims of the MAC – expressed in our logic model/theory of change – and the positivity assessed by the WEMWBS is a particular advantage.

Evidence based development of the MAC

All research conducted on MACs since the initial pilots in 2011 has been deliberately developmental, meaning it is designed to quickly inform the delivery and practice of the

courses. This continues to ensure evidence-based program refinement, even today. From a practical perspective, this approach keeps all coaching staff in touch with both the program philosophy while providing regular reminders about the key subscales that determine overall impact. MAC coaching staff are trained to understand and implement SDT by building participant autonomy, competence and relatedness in planning, practical and reflective sessions. Integration of training with outcome measures in-builds treatment fidelity; it ensures program coherence and alignment and is important for reinforcing key messages to MAC participants. Importantly, given Battle Back's commitment to personal development, in any given MAC, the specific Outdoor Education components are always secondary to alignment around autonomy, competence, and relatedness.

Most participants report positive changes in behavior attributable to MAC attendance, and at each of the time points. While this is encouraging, many other non-MAC factors may be influential here. Yet, given their recurrence and prominence, and the efforts to deploy processes known to improve post-course impact – to create a post-MAC “effect” – it is reasonable to assume that at least some of the positive and sustainable changes in well-being and psychological need satisfaction may be attributable to attending a MAC. With 24 planned for each year, our findings will continue to inform the delivery of future MACs. As an example, having discovered the return of relatedness to baseline values after 12 months, we will reinvigorate all MAC coaching staff – in staff training and through MAC staff debriefings – to target transfer of MAC-based learning to participants' day-to-day lives to help support better long-term well-being around socialization.

Strengths and limitations

Importantly, the positive findings we report here have emerged from a study intentionally developed to address the design and implementation shortcomings of the principle studies in this area. Our study addresses many of the methodological weaknesses affecting all of the nine closely equivalent research studies included in a review addressing outdoor-based therapeutic recreation programs among military Veterans, especially in failing to reassess follow-up effects (Greer & Vin-Raviv, 2019). The current study adds insight by conducting a 12-month follow-up. The robustness of this research also stems from the credibility and validity of the methodologies (evidenced by widespread use in other studies), the conceptual alignment with SDT, the confirmation of treatment fidelity, the large number of participants, the significant time frame of the follow-up and the non-clinical setting of the intervention.

Notwithstanding that these are important and impressive findings, they need to be understood in terms of their limitations. The lack of a control group limits generalizability of the scale and scope of the change estimates. There is also the possibility of self-report bias, whereby serving personnel may be motivated to inflate scoring, perhaps influenced by social desirability issues. Equally, because the sample is based on self-referring individuals, they may represent a distinctively responsive group. Future studies are needed that draw on representative samples, compare outcomes from residentially based, and possibly nonresidentially based, interventions and assign to treatment or control conditions using established randomization processes. Blending the strengths of the existing study, while addressing these limitations, provides a powerful agenda for subsequent work in this burgeoning research area.

Conclusion

This work contributes new and rare evidence of the effectiveness of a psychosocial supportive program. It also offers a powerful response to calls for longer-term evaluations of these programs. Even allowing for our reliance on a non-representative sample, our findings are timely and compelling for commissioners and service providers who aim to improve support provided to military personnel. Careful planning to integrate delivery and staff training with evaluation has confirmedly enhanced the human imperatives of autonomy, competence, and relatedness as well as positive mental well-being. Given the baseline WEMWBS scores, the MAC was clearly meeting an otherwise unmet need. These issues relate well beyond military personnel. New programs, focused on positive well-being, can deliver a more research-informed and/or evidence-based provision by mimicking and improving on provision conducted to date.

Delivering this program to in-service participants may also positively impact care services provided to MAC-attendees; it may also build skills and competencies on which they rely on as they become veterans. By successfully resolving issues that have often proved unresponsive in previous or similar provision, the MAC also represents an attractive opportunity to address cost saving. Early intervention with recovering in-service WIS personnel may also offset future pressure on dedicated Veterans services. This research powerfully underlines the positive ongoing contribution to this integrated, comprehensive, and participant-centered health coaching approach, delivered through residentially based sports and adapted outdoor activities, for supporting mental health care in

military in-service WIS personnel. In this understanding, the MAC represents a powerful ally to professional mental health-care services.


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The funders of the research study had a role in the design of the MAC and its delivery but not in the design of the research study process, the collection, analyses, or interpretation of data, in the writing of the manuscript, or in the decision to publish the results.

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Appendix A. The Warwick and Edinburgh Mental Well-being Scale

Questions are answered using a 5-point likert scale of “None of the time,” “Rarely,” “Some of the time,” “Often” & “All of the time”

- (1) I’ve been feeling optimistic about the future
- (2) I’ve been feeling useful
- (3) I’ve been feeling relaxed
- (4) I’ve been feeling interested in other people
- (5) I’ve had energy to spare
- (6) I’ve been dealing with problems well
- (7) I’ve been thinking clearly
- (8) I’ve been feeling good about myself
- (9) I’ve been feeling close to other people
- (10) I’ve been feeling confident
- (11) I’ve been able to make up my own mind about things
- (12) I’ve been feeling loved
- (13) I’ve been interested in new things
- (14) I’ve been feeling cheerful

Appendix B. The Basic Need Satisfaction in General Scale

Questions are answered using a 7-point likert scale of “Not at all true 1” “2,” “3,” “Somewhat true 4,” “5,” “6,” and “Very true 7”

- (1) I feel like I am free to decide for myself how to live my life (Autonomy)
- (2) I really like the people I interact with. (Relatedness)
- (3) Often, I do not feel very competent. (Competence)
- (4) I feel pressured in my life. (Autonomy)
- (5) People I know tell me I am good at what I do. (Competence)
- (6) I get along with people I come into contact with. (Relatedness)
- (7) I pretty much keep to myself and don’t have a lot of social contacts. (Relatedness)
- (8) I generally feel free to express my ideas and opinions. (Autonomy)
- (9) I consider the people I regularly interact with to be my friends. (Relatedness)
- (10) I have been able to learn interesting new skills recently. (Competence)
- (11) In my daily life, I frequently have to do what I am told. (Autonomy)
- (12) People in my life care about me. (Relatedness)
- (13) Most days I feel a sense of accomplishment from what I do. (Competence)
- (14) People I interact with on a daily basis tend to take my feelings into consideration. (Autonomy)
- (15) In my life, I do not get much of a chance to show how capable I am. (Competence)
- (16) There are not many people that I am close to. (Relatedness)
- (17) I feel like I can pretty much be myself in my daily situations. (Autonomy)
- (18) The people I interact with regularly do not seem to like me much. (Relatedness)
- (19) I often do not feel very capable. (Competence)
- (20) There is not much opportunity for me to decide for myself how to do things in my daily life. (Autonomy)
- (21) People are generally pretty friendly toward me. (Relatedness)