



**Oura Ring and Team Red, White & Blue:
Feasibility and Acceptability of Virtual Health Education to Improve Veterans' Sleep
Quality, Physical Activity, and Enrichment**

Team Red, White & Blue's (Team RWB) vision for this project was to explore the feasibility and acceptability of offering a virtual health education program to improve veterans' sleep, physical activity (daily step count), and enrichment. A licensed clinical psychologist, implemented four, 30-minute, weekly group coaching sessions over a 28-day intervention. We examined changes in sleep, step count, and enrichment between baseline and follow-up period. Oura Ring provided personalized sleep and activity feedback to participants over the course of the program.

Background

Team Red, White & Blue ([Team RWB](#)) is a veteran service organization, founded in 2010 with the mission of ["enriching veterans' lives"](#) by forging the leading veterans' health and wellness community. Since its inception in 2010, Team RWB has grown to 194 community-based chapters serving over 220,000 members (77% veterans, active-duty service members, reservists, and guard members). One of Team RWB's focuses from the beginning has been helping veterans to become more physically active. When veterans leave military service they lose the routine of daily physical training and accountability partners (fellow servicemembers) and standards (conditioning requirements) to which they are accustomed. Without sustained activity routines, many often gain weight with obesity becoming an increasing challenge for the population. With weight gain and its associated cardiovascular diseases, many veterans have become more susceptible to co-morbid sleep problems as well. Decreased sleep quality and duration are also co-occurring with other common mental and physical health conditions that can result from military service experiences, like post-traumatic stress and traumatic brain injury. Veterans' interest in increasing sleep health may also be inhibited by the military's historic ["anti-sleep" culture](#), which devalues rest. Therefore, improving sleep and physical activity for veterans has become a specific focus for Team RWB. In 2019, Team RWB launched virtual programming via [a mobile and web based app](#), which was enhanced during Covid-19. Team RWB saw an opportunity to offer virtual health education programming alongside its virtual fitness classes.

Team RWB's mission of this pilot project was to explore the feasibility and acceptability of offering a health education program as an accompaniment to the Oura Ring biofeedback to improve veterans' sleep, physical activity (daily step count), and enrichment.

Methods

Participants

50 Oura rings were available to provide to Team RWB veteran members who were interested in the health education program. When we invited members to participate in the program, those prioritized for recruitment were those that demonstrated sleep, physical activity and enrichment needs (based upon self-reported, application pre-screening questions), yet we did not prioritize those with only the highest level of need across these domains. The final sample of participants were randomly selected from the available pool of most eligible participants, and balanced by gender. Only one female participant who was invited to participate did not respond to any of our attempts to follow-up, diminishing the final available sample to 49 members.

Program

Team RWB members were invited to participate in four, clinical psychologist-led, 30-minute educational sessions on sleep and physical activity. Topics included: 1. overview of the sleep process and impact of physical activity on sleep quality; 2. creating a healthy sleep environment and addressing unhelpful thoughts; 3. sleep quality and mindfulness meditation; and 4. overcoming hurdles around sleep habits and forming new habits. Each week, participants were assigned behavioral change "homework" and were asked to share their challenges, successes, and questions with the group the following week.

Participants were also invited to provide their anonymous Oura Ring biofeedback data to the project for objective tracking of sleep and physical activity (steps per day).

Enrichment was measured pre and post program participation by Team RWB's [Enriched Life Scale](#), a 40-item instrument measuring physical health, mental health, genuine relationships, sense of purpose, and service to others ("engaged citizenship"). It also contains a single-item measure of enrichment. It is scored on a zero to 100 scale, for each item and average scores.

Because of the small sample size, we followed an intention-to-treat analytic approach. We included all participants with available data at the surveyed intervals in the analysis, irrespective of their attendance at the program classes or receipt of their Oura Ring by the May 5th start of the program. We chose to initiate the class on May 5th to coincide just prior to the start of the Team RWB national event, Marching Orders, an event open to all Team RWB members, broadly advertised and designed to increase daily step count in participants over a one week period (May 8th to 15th). We excluded from the analysis members with insufficient data in the follow-up period between May 6 to June 2, 2021. We also dropped from the analysis days in which non-wearing of the ring exceeded 500 minutes (8 hours) for steps, although included sleep and activity scores where a data point had been recorded.

Results

Descriptive Statistics

25 male and 24 female veterans participated in the program. Fifty-five percent deployed to combat operations during their military service (roughly the same as the general Team RWB veteran membership) and 84 percent reported a service-connected disability (which is substantially higher than the 63.7 percent of the general Team RWB veteran membership).

Given the correlations between disability, sleep quality, and physical activity, these participant characteristics were aligned to our expectations.

Feasibility and Acceptability

Over 600 people applied to participate in 50 program spots. Survey response rates (final sample size, n=49) were 100% for the pre-program Enriched Life Scale, 78% for the post-participation ELS, and 78% for the follow-up period. Voluntary participation spanned from April 9, 2021, to June 2, 2021, and included the Oura Ring sizing and delivery process, participation in a four-class health education program, and donation of anonymous Oura Ring data for insight and analysis. 37 people opted into anonymous data collection by their Oura Ring to provide to Team RWB for analysis. Twenty-six members had their rings by the start of the program on May 5th, with at least one data point prior to the May 5th start.

Based upon self-reported attendance gathered from the feedback survey (n=38), cross-referenced with our attendance taking at the live sessions and Oura Ring delivery date receipts, two people attended one or less program sessions and did not receive their Oura ring by the second week of the program, 30 people attended two or more live program sessions and also had their Oura ring delivered by the second week of the program; 14 people attended two or more live program sessions but did not receive their ring by the second week of the program; and three people did not attend any live or virtual program sessions but did receive their Oura Ring by the second week of the program.

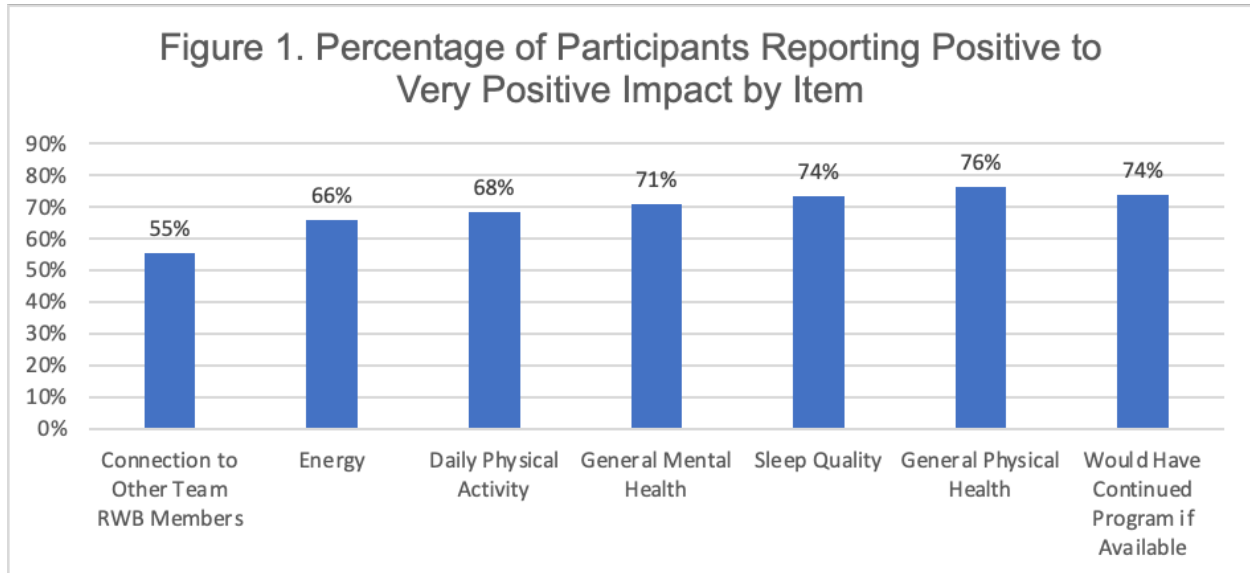
We used the net promoter score (NPS) as a “customer experience measure”. Scores 6 and below are considered “detractors”, 7 to 8 “passive” and 9 to 10 “promoters.” To calculate the overall NPS, the percentage of detractors is subtracted from the percentage of promoters. -100 to zero is considered “needs improvement”, zero to 30 is considered “good”, 30 to 70 is considered “great” and 70 to 100 is considered “excellent”. Participants were asked:
How likely are you to recommend the Team RWB sleep and activity program to a fellow veteran or friend?

How likely are you to recommend Oura Ring to a fellow veteran or friend?

38 members provided the following feedback:

For the sleep and activity health education program, 73.7% gave the program a 9 or 10, with an overall 68.4 or “great” NPS score. For the Oura Ring, 71% gave the ring a 9 or 10, with an overall 65.8 or “great” NPS score.

The percentage of 38 participants who stated the program had positive to very positive impact is shown by item in Figure 1 .



Preliminary Evidence for Efficacy

Although evaluating feasibility and acceptability were our primary goals of the pilot, we also explored preliminary evidence for the virtual health education program’s efficacy in improving veterans’ sleep, physical activity (daily step count), and enrichment.

Sleep

Feedback from the anonymous data collection (n=24) yielded additional exploratory insights. We are limited in our analyses because of a lack of baseline data available. We were surprised to discover that baseline data of our members indicated that 4 members already had an optimal night sleep, 10 members had good night sleep, and 10 members had an indicator to “pay attention to their sleep”. Therefore we explored data analysis based upon Oura Ring’s stated cutoff scores and evidence informed norms.

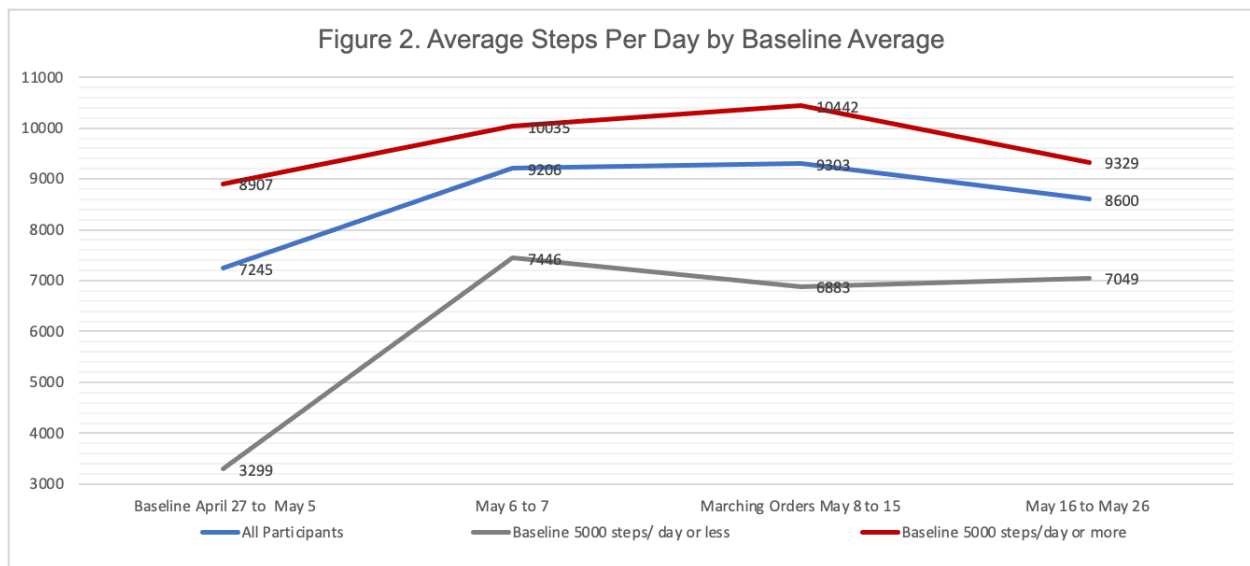
- *Amongst 10 members with sleep scores below 70 on average at baseline, scores increased by 3 points, yielding a medium effect with 5% increases. Across all participants, sleep scores demonstrated no significant change.*
- *Amongst 19 members with total sleep time below 7 hours on average at baseline, time asleep increased 18 minutes 37 seconds, yielding a medium effect with 6% increases.*

While total sleep increased 10 min 39 seconds for all participants, this was not a statistically significant increase.

- Amongst 11 members with sleep efficiency scores below 85% on average at baseline, scores increased by 3.38 points, yielding a medium effect with 7% increases. Across all participants, sleep efficiency scores demonstrated no significant change.

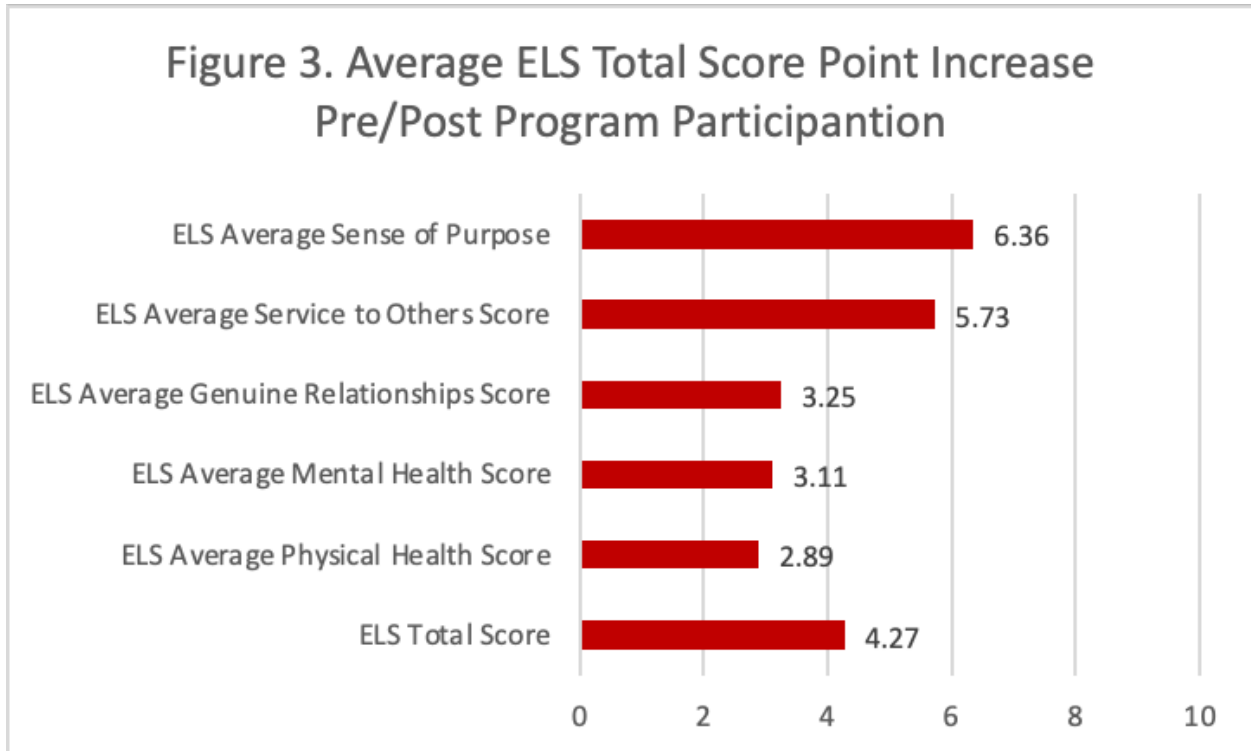
Physical Activity (Steps per Day)

Prior to and including the onset of the first program class, average baseline scores were 7245 steps (baseline data available days ranged from one to nine days). After the first class on May 5, 2021, average steps increased to 9206 before the start of Marching Orders (an increase of 1961 steps, $p=.011$, Cohen’s $d= .555$), with Marching Orders increasing steps by an average of 96 steps. Between baseline and the end of Marching Orders (May 6 to May 15), steps increased 2041 steps, from 7244 to 9286 ($p=.001$, Cohen’s $d= .800$). While steps declined significantly after Marching Orders until the final follow-up day (June 2) by 1092 steps ($p=.002$, Cohen’s $d= .689$), average steps were still significantly higher than baseline (7245 to 8600 over the program period, 33% increase; $p=.018$, Cohen’s $d= .508$). Eight individuals with baseline average steps of less than 5000 (considered “sedentary”) as tracked by Oura Ring experienced an increase of 3057 steps (about 1.5 miles) over the course of the program, yielding a large effect with 82% change increases from baseline. Figure 2 demonstrates how step count changed by all participants, participants with baseline average steps below 5000/day, and participants with baseline average steps above 5000/day.

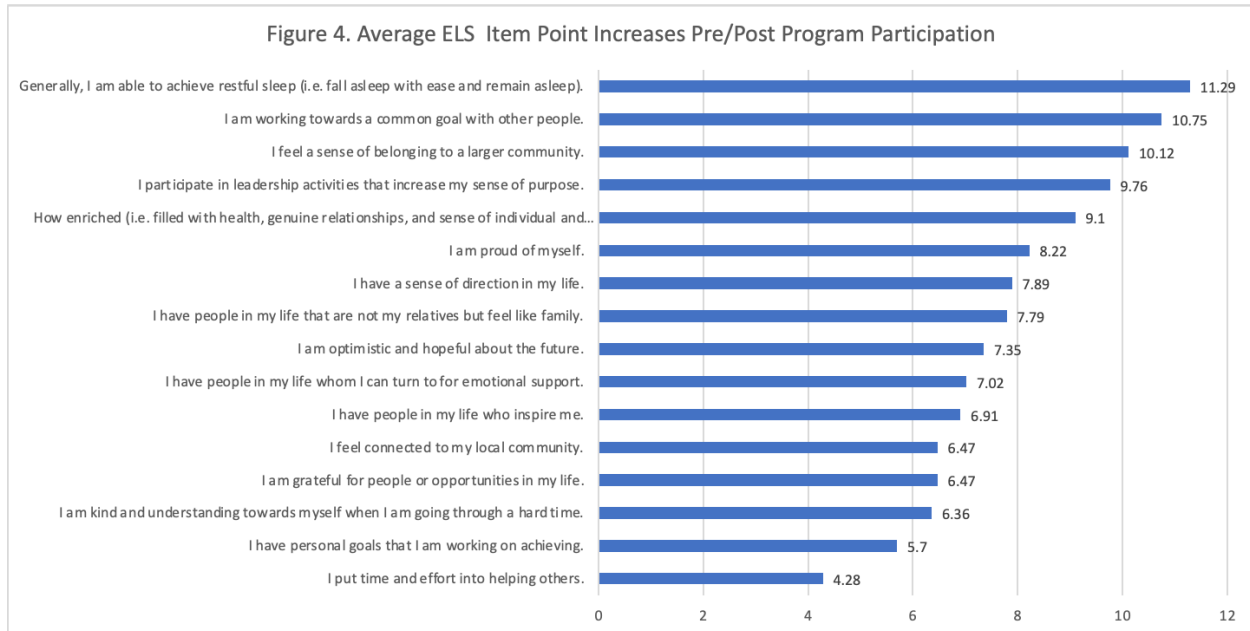


Enrichment

Overall, member enrichment was increased by program participation; participants' total enrichment score demonstrated an 8 percent increase from baseline, with a medium sized effect.



Over ten point gains were seen on the individual items for sleep, feeling a sense of belonging to a larger community, working towards a common goal with other people, and participating in leadership activities that increase a sense of purpose.



Discussion

In our pilot project, we sought to evaluate the feasibility and acceptability of Team RWB’s virtual health education program to improve veterans’ sleep, physical activity (daily step count), and enrichment. Overall, participation had positive to very positive self-reported participation gains, and participants would recommend the program and Oura Ring to others. While not a rigorous test of efficacy, positive preliminary trends warrant launching a longer and more robust scientific investigation.

With our pilot feasibility and acceptability groundwork complete, our next steps are to explore whether weekly group coaching sessions on sleep, physical activity, and enrichment, supplemented with personalized coaching leveraging Oura Ring feedback amongst the highest need Team RWB veteran members, improves sleep outcomes, and increases daily step count and member enrichment.

Based upon the Spring 2021 pilot, we propose the following program refinements to achieve our goals:

1. Increase the program length. While the 28-day intervention was useful to explore member engagement and retention, [10 weeks is an advised length of time](#) to develop lasting behavioral change. We propose that the program launches on January 1, 2022 to coincide with the Team RWB national event, Take Flight. [Take Flight](#) is a 31-day virtual engagement providing fitness plans, daily inspiration, and virtual coaching via four activity-interest tracks (yoga, functional fitness, running, and healthy habits). Just like timing the pilot health education sessions to coincide with Marching Orders utilized the existing Team RWB national event structure as a supplement to the health education sessions, Take Flight is an opportunity to engage veterans with health education around general health topics of interest before honing in during February on sleep specific



content. Depending upon the emerging needs/interest of the project participants, we will craft health education content for March to reflect the group needs.

2. Target members with the highest needs for project participation. Exploring subgroups indicated that those with the most to gain from the program yielded larger program effects. In our pilot, we prioritized individuals for recruitment that demonstrated enrichment, sleep, and physical activity needs, yet we did not prioritize those with only the highest level of need across these domains. Given the volume of need across the Team RWB member population, and our capacity to support a range of needs at varying stages of transition, we will refine the eligibility requirements to focus on higher need groups.
3. While pre/post testing is an acceptable exploratory method to gain insight into preliminary program effectiveness, it does not minimize bias to the extent randomized controlled research designs are capable of. Therefore, our research design we proposed to modify as follows: (a) increase Oura Ring baseline window from between one to nine days to two weeks. We will achieve this by allowing eight weeks between participant selection and launch of the program (January 1, 2022 commencing with Take Flight) (b) the January month of Take Flight will help us to identify members with Oura Rings who will become eligible for personalized coaching; members who stay engaged with the 31-day Take Flight challenge and also agree to share identifiable data with a personal coach will be randomly assigned to personalized coaching or an 8 week treatment control wait-list group (they will be eligible to receive personalized coaching at the end of the program).

We propose to launch project recruitment in October 2021 so that ring sizing and delivery can be completed by December 2021. Therefore, members will have up to potentially four weeks to establish baseline data. While participants will follow Take Flight programming in January 2022, they will be randomly assigned to personalized coaching plus sleep education classes (from the pilot) in February, with personalized coaching and to be determined health education content continue through March. Members in the 8 week treatment control wait-list group will receive only the health education without personalized coaching during the tracked intervention period.