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# NHRC

## Use of a Performance-Based Application to Improve Readiness in Future Sailors

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The study protocol was approved by the Naval Health Research Center Institutional Review Board in compliance with all applicable Federal regulations governing the protection of human subjects. Research data were derived from an approved Naval Health Research Center Institutional Review Board protocol, number NHRC.2021.0010.

## EXECUTIVE SUMMARY

CoachMePlus (CM+), a performance management application, was piloted as a tracking and engagement tool in the Navy Recruiting District San Diego Delayed Entry Program (DEP). This research aimed to determine the effectiveness of CM+ in improving readiness of Future Sailors (FS) for basic training at Recruit Training Command (RTC) and Navy life. FS (n=111; 13 females, 98 males) were enrolled, and data were collected on engagement during DEP and performance metrics (i.e., RTC graduation). CM+ facilitated delivery of scheduled training in 3 areas: physical training and general military training (GMT) based on the 2018 Standard-Transitions-Acknowledgement-Required-Training guide, and nutrition education based on the 2019 Navy Operational Fitness and Fueling System. In addition, FS had the ability to log dietary intake, which a registered dietitian nutritionist reviewed virtually. Overall, GMT and nutrition scores on knowledge checks improved (GMT:  $51.7 \pm 1.6$  to  $67.9 \pm 2.9$ ;  $p < .001$ ; nutrition:  $58.1 \pm 1.1$  to  $68.8 \pm 2.0$ ;  $p < .001$ ), and individual improvements in dietary intake were reported, such as reduced consumption of dietary fat and sodium and increased intake of fiber-rich foods. Subjectively, recruiters reported that the CM+ app was useful in tracking FS on training engagement and provided real-time updates on training progress. Recruiters used this information to reach out to FS in need of assistance and to recognize those who were excelling. This pilot study provided initial proof of concept but was not sufficiently powered to determine impact on attrition (i.e., return on investment [ROI]). Thus, an expansion of this study was initiated in November 2022 that includes a larger, more diverse group (n=1000 FS in Navy Talent Acquisition Groups Richmond and Southwest). From these findings, ROI will be estimated and presented in a later technical report.

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## A. INTRODUCTION

Recruitment of new military personnel has become increasingly challenging across all service branches. A key issue is the small candidate pool, with less than one-third of 17- to 24-year-olds meeting initial qualification criteria (e.g., US citizen, high school graduate or equivalent).<sup>1</sup> This pool becomes substantially smaller (~465,000) with disqualifying factors such as obesity, failure to meet academic requirements (e.g., Armed Services Vocational Aptitude Battery test scores), drug/substance abuse, and police records.<sup>1</sup> The willingness to serve has also declined, based on a recent Department of Defense poll with ~11% of potential enlistees indicating they would “probably” serve or “will serve” in the military.<sup>1</sup> In addition, military branches have experienced increased competition from the private sector for these candidates. Thus, with a smaller pool of qualified candidates to recruit from, the retention of our service members is more important now than in past years.

In the Navy, attrition from basic training has been trending higher (fiscal year [FY] 2022=14.4%, FY21=11.2%; unpublished data, Navy Recruiting Command [NRC]). The cost of first-term attrition is high (~\$75,000 per enlistee<sup>2</sup>), which can negatively impact force readiness.<sup>3</sup> In a recent RAND publication, an attrition rate of 23.6% was reported for Navy personnel within their first 36 months of service (FY 2001–2013).<sup>3</sup> Factors consistently linked with higher rates of first-term attrition included lack of a high school diploma, female sex, White race/ethnicity, low physical fitness, and preservice smoking and alcohol use.<sup>4</sup> Psychological health has also been identified as a key factor, specifically hospitalization for mental health disorders.<sup>5</sup> Strategies to prevent attrition include better preparation of new enlistees for military life and increased engagement with recruiters prior to basic training.<sup>6</sup> Before starting basic training in the Navy, non-prior service recruits first enter the Delayed Entry Program (DEP) for up to 365 days. This program provides an opportunity to improve the physical and mental readiness of Future Sailors (FS). Recruiters, however, have limited contact with enlistees, a factor that was further amplified by the COVID-19 pandemic. A virtual recruiting environment, which provides a means for recruiters to engage more frequently with FS, may help improve readiness. Given that ~96% of the target recruit population (ages 19–24 years) are smartphone owners according to Pew Research Center,<sup>7</sup> a downloadable coaching application is an attractive approach to engage, track, and better prepare FS for basic training at Recruit Training Command (RTC) and military life.

Currently, FS receive training via the 2018 Standard-Transitions-Acknowledgement-Required-Training (START) guide, which includes general military training (GMT) and physical readiness guidance.<sup>8</sup> Despite this early training, a 73% rise in overweight/obesity status in active duty members was reported between 2011 and 2018,<sup>9,10</sup> with an estimated 17.4% prevalence of obesity in 2021, based on Periodic Health Assessment data.<sup>10,11</sup> Healthy dietary behaviors can improve weight management; however, service members have been reported to engage in unhealthy dietary practices, such as skipping meals, dining out frequently, and not consuming enough fruits, vegetables, and whole grains.<sup>12</sup> Nutrition education may improve diet quality, and nutrition knowledge has been linked to improved dietary choices in some military groups,<sup>13</sup> although research in this population is limited. In addition, knowledge and practice of physical

training (PT) is also an important factor in decreasing injuries and preaccession attrition in military personnel.<sup>14</sup> Thus, innovative approaches are needed to increase engagement and promote health and behavioral readiness.

CoachMePlus (CM+) is a commercial off-the-shelf application that can provide nutrition education, fitness/physical tracking and training, wellness monitoring (e.g., sleep, stress, hydration), wearable technology integration (e.g., Fitbit, Garmin, Apple) and testing and reporting tools to monitor indicators of health and performance. Civilian institutions (e.g., sports teams, colleges, gyms) are currently using CM+ for health and fitness tracking and assessment. CM+ content can be customized to any military training program (e.g., DEP) to address modifiable health risk factors (e.g., body mass index [BMI, kg/m<sup>2</sup>], fitness level, muscle strength, nutrition, and sleep quality<sup>14-16</sup>). Thus, CM+ provides a virtual recruiting environment that can promote engagement in the DEP and RTC readiness.

The purpose of this study was to evaluate if delivery of DEP training via CM+ would be effective at improving FS readiness. To assess this, CM+ was piloted to deliver PT, GMT, and nutrition education to FS (n=111; 13 females, 98 males) in the NRC DEP in San Diego, California, from June 2021 to January 2022. The primary study aim was to evaluate the viability of CM+ as a tool to improve physical and behavioral readiness for RTC. Viability assessment included qualitative feedback from recruiters on ease of use/impact on readiness and quantitative data, including knowledge assessments, DEP scores, Armed Forces Qualification Test (AFQT) scores, and advancement and graduation status. To validate these data, an expanded pilot was initiated November 2022 to include a larger, more diverse group (n=1000 FS in Navy Talent Acquisition Groups Richmond and Southwest). Results from the pilot study expansion will be presented at a later date.

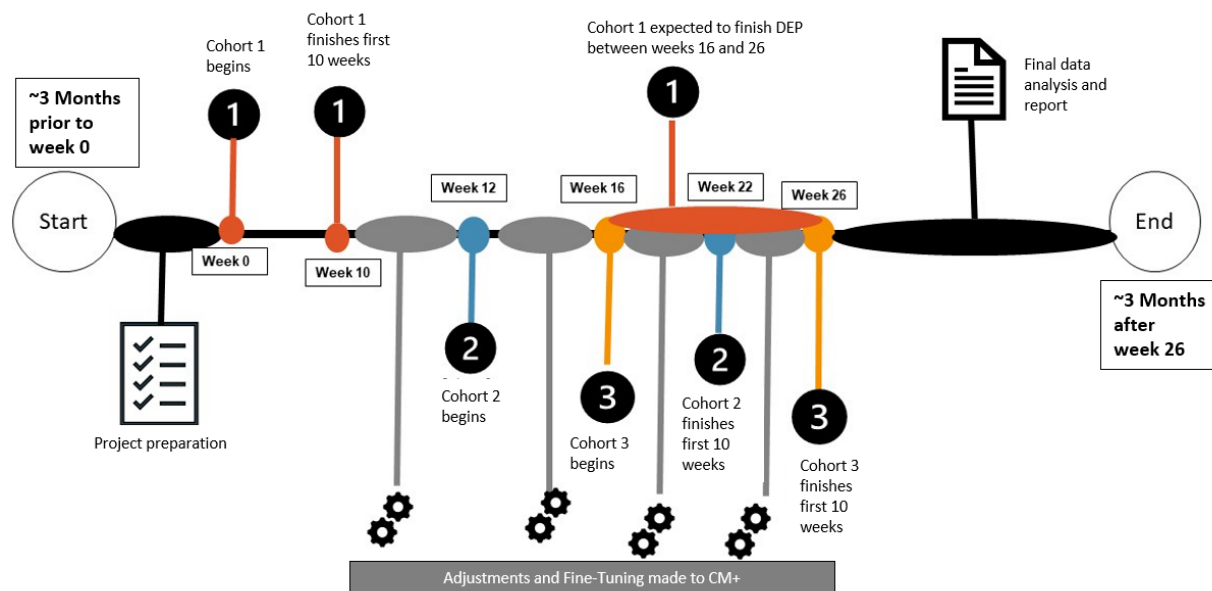
## **B. METHODS**

CM+ was piloted to deliver training on PT, GMT, and nutrition to 111 FS (13 females, 98 males) in the DEP (San Diego, California), June 2021 to January 2022. Customizations were designed specifically for the DEP and included (1) provision of daily PT and weekly GMT and nutrition education; (2) dashboards with real-time feedback to all users (FS, recruiters, and registered dietitian nutritionist [RDN]) on training progress, weight status, dietary habits, and physical activity; and (3) a platform that facilitates communication among users.

### **B.1. Overview**

Training delivery using CM+ was composed of an initial 10-week program to parallel the standard DEP training plan. Programming beyond week 10 included reinforcing GMT and nutrition knowledge and provided further PT based the 2019 Navy Operational Fitness and Fueling System (NOFFS) Large Deck Series.<sup>17</sup> FS were divided into 3 cohorts in a phased approach (Figure 1). The goal was to have the initial cohort complete the first 10-week intervention (Cohort 1=20 FS) and then adjust the program based on lessons learned. Any adjustments or fine-tuning of the program were made with Cohort 2 (40 FS) starting 2 weeks after Cohort 1 completion (week 12). The final cohort (Cohort 3, 40 FS) was recruited 4 weeks

after Cohort 2 began DEP. The delays between cohorts allowed for protocol refinement and testing of any programmatic changes. All FS started the pilot during their first month of DEP.



**Figure 1. Pilot Implementation.** Recruitment of Future Sailors (FS) in the Delayed Entry Program (DEP) was phasic. Cohort 1 (n=20) completed the initial training, followed by a 2-week delay to make any adjustments before Cohort 2 (n=40) were recruited. To allow for final adjustments, Cohort 3 (n=40) were recruited 4 weeks after Cohort 2 began DEP. FS were expected to be in DEP 4–6 months.

## B.2. Recruitment and Baseline Data

For recruitment and baseline data collection, the research team met with FS during the first month of DEP to obtain informed consent (Naval Health Research Center Institutional Review Board protocol number NHRC.2021.0010). Upon enrollment, body weight (BW, kg) and body fat percentage (BF%) were measured using a bioelectrical impedance analysis scale (BF-350 Total Body Composition Analyzer®; Tanita Corporation, Arlington Heights, IL). FS were then assigned to a CM+ account which they used to complete a baseline survey that included demographics, dietary and exercise patterns and behaviors, and chronic disease health history.

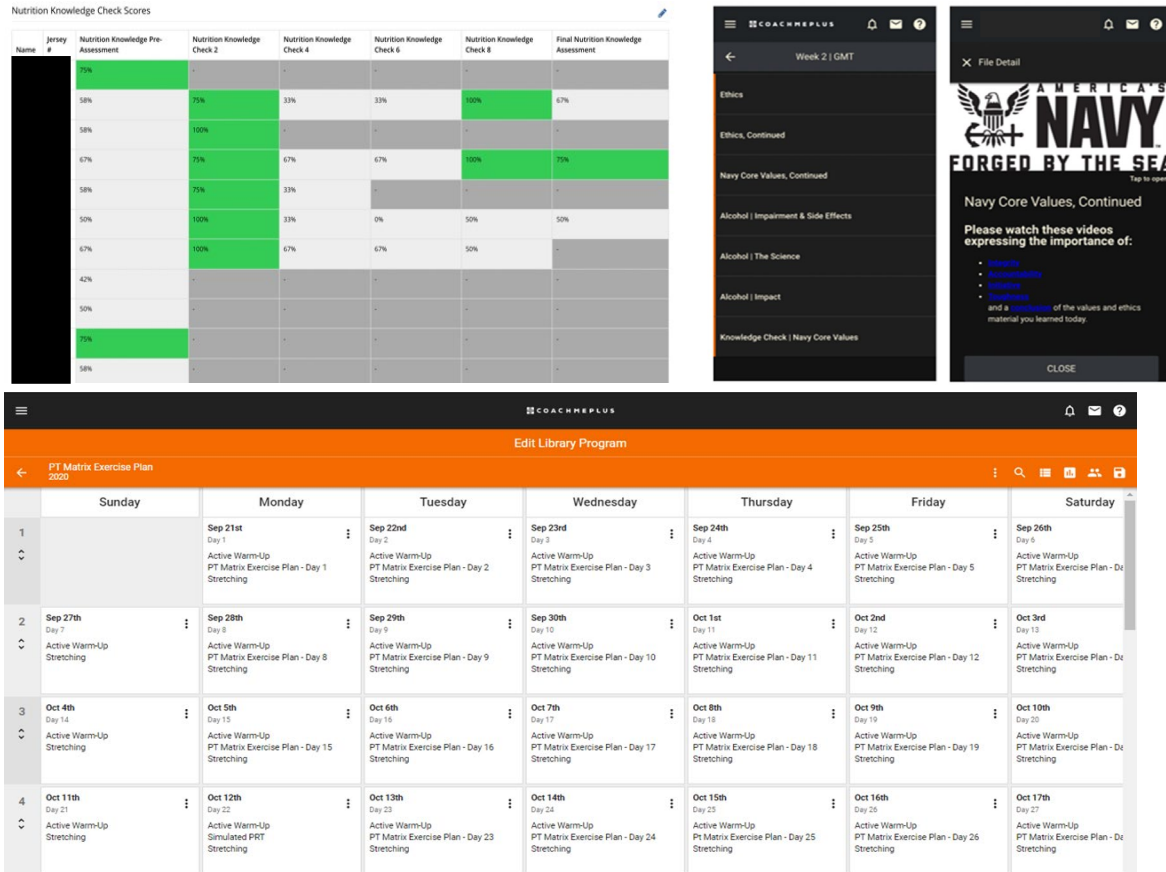
## B.3. Intervention

The intervention had two phases based on the 2019 NOFFS Large Deck Series: (1) initial 10-week program and (2) post 10-week program.

### B.3.1. Initial 10-Week Program

The initial 10-week program for FS consisted of 3 modules delivered via the CM+ app (Figure 2): (1) PT Module, which included the PT Matrix Exercise Plan from the 2018 START guide; (2) GMT Module, which included required training from the 2018 START guide; and (3) Nutrition Module, which consisted of 2019 NOFFS nutrition education content. These trainings

were available to all FS either as a PDF file or on the NOFFS website but were not accessible via a single app. Thus, the main difference from standard practice was the use of CM+ to deliver and track training in these content areas. Knowledge checks for GMT were those delivered to FS via a custom-made app called Virtual Recruitment Tracker, which did not allow for immediate visualization and tracking. The FS also completed a weekly check-in questionnaire with their recruiters via CM+ in place of other communication methods (text, phone call, email, or in person). In addition, the recruiters entered in BW (kg) and BF%, which are assessed at monthly DEP meetings.



**Figure 2. CM+ Applications.** CM+ offers a unique opportunity to promote physical readiness in Future Sailors (FS). Content can be customized to tailor Delayed Entry Program training plans, host general military training, track health and physical readiness, and allow communication between recruiters and FS.

New training elements added in the CM+ app included the nutrition knowledge checks (delivered at weeks 0, 2, 4, 6, 8, and 10) and logging dietary intake records. Participants were asked to log food records (all foods, beverages, supplements consumed) for 3 days prior to each DEP meeting. The research team met with FS during this meeting to discuss dietary intake and obtain feedback on the app.

### ***B.3.2. Post 10-Week Program***

For the post 10-week program, the content delivery was customized for each FS. Specifically, any GMT or nutrition content was reassigned to FS if they performed unsatisfactorily on knowledge checks. For PT, FS were assigned to the appropriate level of the 2019 NOFFS Large Deck Series training based on their training status.

### **B.4. Statistical Analysis**

All data were summarized using means and standard errors or counts and frequencies as appropriate. The 25th, 50th, and 75th percentiles were also presented for relevant variables. Qualitative feedback from recruiters and lessons learned were summarized. One-sample Student *t* tests or Wilcoxon signed rank tests were used to compare basic training outcomes and nutrient intakes to normative values. For basic training, normative values were provided by NRC. Macronutrients were compared with American College of Sports Medicine and Academy of Nutrition and Dietetics Sports Nutrition Guidelines. Vitamin and mineral intakes were considered sufficient if intake was at or above the Estimated Average Requirement (EAR; level sufficient to meet 50% of the general population requirements) or Adequate Intake (AI; established standard if lacking data to determine a Recommended Dietary Allowance (RDA) for a given nutrient) as appropriate. Statistical methods included regression analysis, repeated measure analysis of variance, and nonparametric testing. Significance was set at  $p < .05$ . Factors such as sex and socioeconomic status were controlled for as deemed necessary.

## **C. RESULTS**

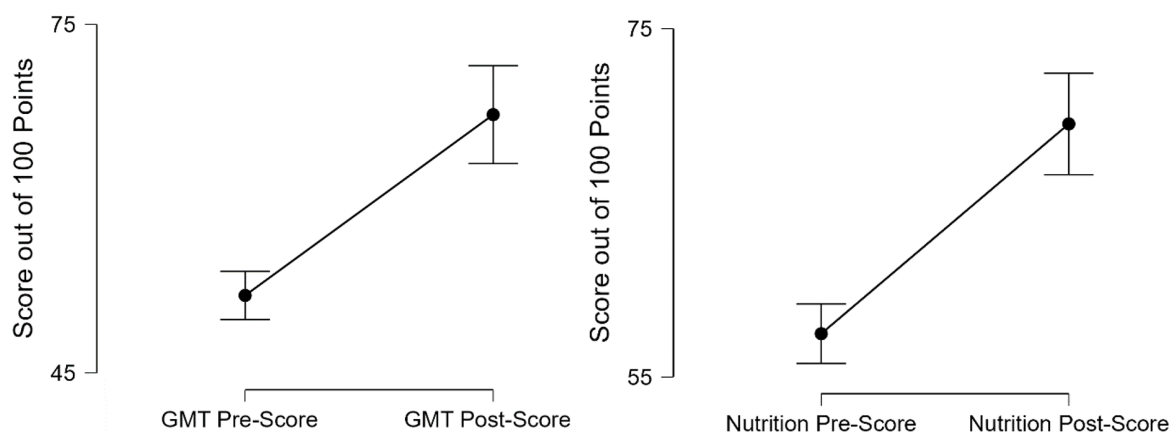
Initially, 111 FS enrolled in the study. Of these, 19 individuals were excluded from the final analysis for failure to complete the baseline assessment ( $n=6$ ) or DEP ( $n=10$ ), or if they withdrew from pilot in first few weeks ( $n=3$ ). The final analysis included a total of 92 FS (13 females, 79 males, age=18–28 years). Of these 92 individuals, 23.6% identified as Asian; 9.0% as Black or African American; 40.4% as Hispanic or Latino; 1.1% as Native Hawaiian, Other Pacific Islander, or some other race; and 25.8% as White. Most FS reported being single/never married (92.1%), with a high school diploma or equivalent as the highest level of education (85.3%). More than half (55.0%) of the participants were students or had a part-time or full-time job.

### **C.1. Basic Training Outcomes and Pilot Engagement**

Of these 92 FS, 92.4% ( $n=85$ ) graduated from basic training, and 6 were discharged (4 preservice discharges, 1 contract breach, and 2 medical discharges). Metrics on pilot participation are presented in Table 1, with  $69.1 \pm 4.1\%$  of GMT modules and  $66.8 \pm 4.2\%$  of Nutrition modules completed. Scores on knowledge checks improved for both GMT and Nutrition (Figure 3;  $p < .05$ ).

**Table 1. Pilot Participation Metrics for 92 Future Sailors**

	<b>Total logins</b>	<b>Days in pilot</b>	<b>Average daily logins</b>
Mean	174.6	83.5	2.1
SE	17.7	4.5	0.2
25th percentile	60.0	60.5	1.0
50th percentile	131.0	81.0	1.5
75th percentile	225.0	111.0	2.9



**Figure 3. General Military Training (GMT) Pre- and Post-Score (left) and Nutrition Pre- and Post-Score (right).** Score for GMT increased from  $51.7 \pm 1.6$  to  $67.9 \pm 2.9$  ( $p < .001$ ; 95% CI for Improvement: 8.9–20.8). Score for nutrition knowledge checks also improved from  $58.1 \pm 1.1$  to  $68.8 \pm 2.0$  ( $p < .001$ ; 95% CI for Improvement: 6.3–14.5).

The Recruit Division Commander (RDC) Assessment rate for the 85 FS who graduated was  $78 \pm 5\%$  (95% CI: 68% to 86%), which was higher than the 2021 global average provided by NRC of 58% ( $p < .001$ ). The rate of advancement in these 85 FS did not differ from the 2021 global average (actual= $18 \pm 4\%$ ; 95% CI: 10% to 27% vs historical average= $12\%$ ;  $p = .130$ ). DEP scores for the pilot participants were lower than the global average (actual= $3.48 \pm 0.62$  vs global average= $3.71$ ; 95% CI for Difference: 0.1–0.4;  $p < .001$ ). AFQT scores ( $65 \pm 2.0\%$ ) were greater than the median score of 50 (95% CI for Difference: 11–19;  $p < .001$ ).

## C.2. Weight Status and Goals

Weight status was obtained for 73 FS, with BW and BMI, respectively, of  $59.6 \pm 3.5$  kg and  $23.1 \pm 1.0$  kg/m<sup>2</sup> for females, and  $76.2 \pm 1.7$  kg and  $25.5 \pm 0.5$  kg/m<sup>2</sup> for males. Self-reported weight goals by BMI classification/weight status are presented in Table 2. Self-reported realistic BW was  $1.3 \pm 0.5$  kg lower than actual BW ( $p = .018$ ; 95% CI: 0.2–2.4). Seventy-three percent ( $73.0 \pm 0.4\%$ ) reported weight change in the past year, with  $11.2 \pm 0.0$  reporting struggles with weight management. In 32 FS with recorded pre/post BW, no change was detected ( $p = .606$ ).

**Table 2. Self-Reported Weight Goal by Weight Status\***

Weight status*	Weight goal				Total
	Lose	Gain	Maintain	None	
Normal weight	6	11	9	1	27
Obese	6	0	0	0	6
Overweight	19	4	8	0	31
Underweight	0	4	1	0	5
<b>Total</b>	31	19	18	1	69

\*Weight status is based on body mass index (kg/m<sup>2</sup>).

### C.3. Energy and Nutrient Intake

Food records  $\geq 1$  day ( $25.6 \pm 4.4$  days) were completed on the CM+ app by 69 FS (75.0%), with 59 (~64%) recording dietary intake for 7 days or more. Energy and macronutrient intake are presented in Table 3. Most FS had underestimated caloric needs, likely due to underreporting, a common issue with self-reported dietary intake. Dietary fat intake was high (>35%) in 43/66 of the FS.<sup>18</sup> Sodium intake exceeded US Department of Agriculture Dietary Guidelines for Americans (>2,300 mg/d<sup>18</sup>) in 31/66 FS (average  $2248.7 \pm 124.1$  mg/d). Fiber intake was low in 62/63 (~98.4%) of FS ( $8.8 \pm 1.0$  vs AI=25 g/d,  $p < .001$  for females;  $15.3 \pm 1.0$  vs AI=38 g/d,  $p < .001$  for males<sup>19</sup>).

**Table 3. Energy and Macronutrient Intake in Future Sailors**

Expressed as mean (SE)	Female (n=12)	Male (n=54)	Recommended**
<b>Energy intake (kcal/d)</b>	1524.4 (87.5)*	1789.5 (58.8)	Female=1600–2800 Male=1800–3600
<b>Carbohydrate</b>			
g/d	173.3 (15.9)	177.3 (8.7)	
g/kg Body weight	3.2 (0.4)*	2.4 (0.2)	3–10
% Total kcal	44.8 (2.1)	39.4 (1.3)	45% to 65%
<b>Protein</b>			
g/d	76.8 (4.5)*	99.6 (4.5)	
g/kg Body weight	1.3 (0.1)	1.3 (0.1)	1.2–2.0
% Total kcal	20.8 (1.8)	22.5 (3.9)	10% to 35%
<b>Fat</b>			
g/d	58.6 (3.9)*	75.3 (2.7)	
g/kg Body weight	1.0 (0.1)	1.0 (0.1)	~1.0
% Total kcal	34.6 (1.4)	38.4 (0.0)	20% to 35%

\*Females differed from males ( $p < .05$ ). \*\*Targeted caloric needs were determined by calculating resting metabolic rate using the Cunningham equation and assuming an activity factor that ranges between 1.5 and 1.9 for moderate to very heavy activity. Macronutrient guidelines are based on the 2016 Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance.<sup>20</sup>

Calcium and vitamin D, two essential nutrients for bone health, emerged as key dietary deficiencies in FS (Table 4). Other nutrient deficiencies included vitamins C and E, and folate, which are found in plant-based food sources (Table 4). For those who monitored dietary intake, individual improvements were documented, such as a decrease in dietary fat and sodium intake and an increase in fiber-rich foods and fruit and vegetable consumption.

Twenty-eight FS recorded dietary intake over a period  $\geq 3$  months (multiple days per month). Of those, 23 had inadequate fiber intake during the first month, with 16/23 (~70%) increasing intake (grams of fiber/1000 kcal) in the second month and 14/23 (~61%) sustaining that increase. Twenty-two of 28 FS had high sodium intake, with 12/22 (~55%) decreasing intake in the second month and 11/22 (~50%) sustaining that decrease (milligrams of sodium/1000 kcal). Eighteen of 28 FS had high fat intake (>35% in the first month), with 44% decreasing fat intake (percentage of kilocalories) in the second month and 61% maintaining that decrease (percentage of total kilocalories in the third month vs the first month).

**Table 4. Dietary Intake for Selected Vitamins and Minerals in Future Sailors**

Vitamins/minerals	Female (n=12)			Male (n=66)		
	Mean (SE)	RDA or AI <sup>1</sup>	Sufficient intake (%) <sup>2</sup>	Mean (SE)	RDA or AI <sup>1</sup>	Sufficient intake (%) <sup>2</sup>
Vitamin A (ug/d) <sup>3</sup>	797.9 (179.7)	700	58.3	1410.9 (201.6)	900	67.9
Vitamin D (ug/d)	8.6 (2.6)***	15	9.1	4.6 (0.6)***	15	5.7
Vitamin E (mg/d)	2.9 (0.5)***	15	0.0	4.3 (0.3)***	15	0.0
Vitamin K (ug/d) <sup>4</sup>	75.3 (18.6)	90	41.7	109.6 (23.8)*	120	20.8
Vitamin B6 (mg/d)	0.9 (0.1)*	1.3	41.7	1.4 (0.1)	1.3	60.4
Vitamin B12 (ug/d)	2.2 (0.4)	2.4	36.4	3.5 (0.3)	2.4	76.5
Folate (ug/d)	212.3 (46.0)**	400	18.2	227.0 (15.2)	400	20.8
Vitamin C (mg/d) <sup>4</sup>	40.7 (5.9)**	75	25.0	59.8 (7.7)*	90	27.5
Calcium (mg/d)	324.2 (44.0)***	1000	0.0	559.8 (34.1)***	1000	18.9
Iron (mg/d)	7.8 (1.0)	18	41.7	10.8 (0.6)	8	92.5

Dietary intake was lower than Estimated Average Requirement (EAR) or Adequate Intake (AI) (\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ ).

<sup>1</sup>Dietary Reference Intakes (DRIs) is a set of reference values that includes recommended dietary allowance (RDA), defined as levels sufficient for ~97% to 98% of healthy individuals, and EAR, defined as sufficient for approximately half of healthy individuals). Adequate Intake (AI) for nutrients (e.g., vitamin K) is provided when those data are lacking to establish RDA and EAR.<sup>18,19,21-24</sup>

<sup>2</sup>Sufficient intake (percentage of total participants) was determined by comparing to EAR or AI.

<sup>3</sup>Vitamin A is expressed as micrograms/day of retinol activity equivalents (RAE).

<sup>4</sup>Vitamin K and C data for male FS were not normally distributed (vitamin K median=49.2, range=0.4–966.2 ug/d; vitamin C median=41.0, range=0.2–252.7 mg/d). Thus, Wilcoxon signed rank test was used to evaluate significance.

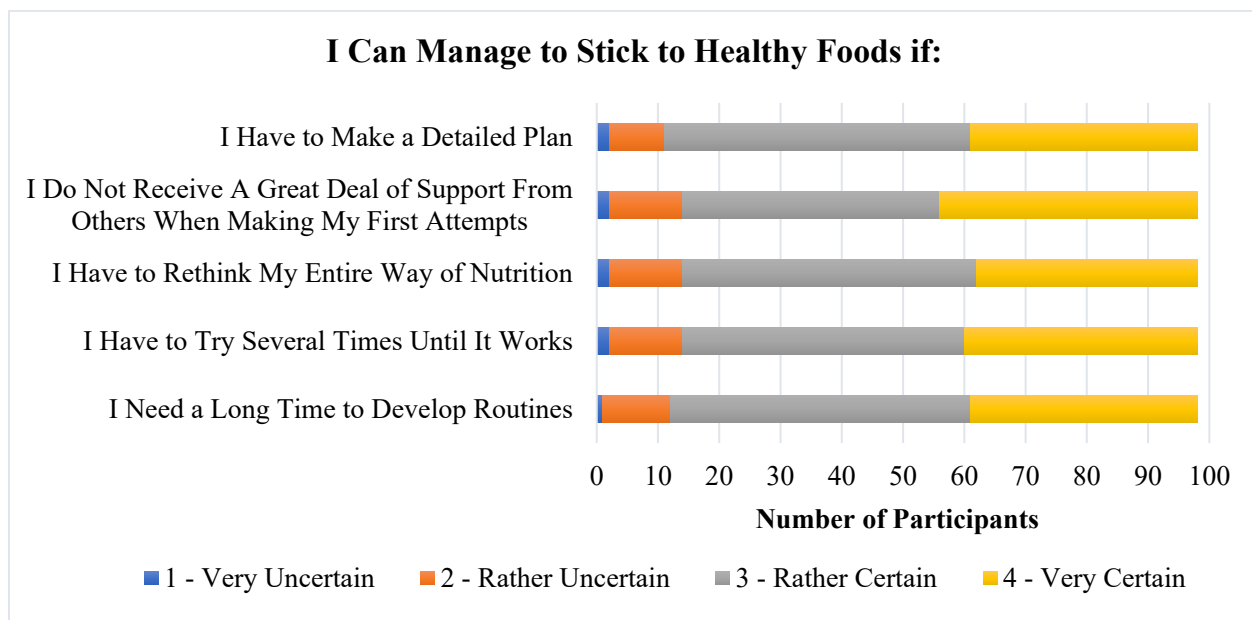
#### C.4. Health Behaviors and Goals

In the baseline questionnaire, FS were asked questions about health, diet behaviors and goals, and physical activity. Only about one-fourth of males and one-third of females reported wanting to maintain their weight (Table 5).

**Table 5. Weight Goals**

Weight goals	Male		Female		Total
	n	%	n	%	
0 – Lose	38	44.7	7	53.8	45
1 – Gain	24	28.2	2	15.4	26
2 – Maintain	22	25.9	4	30.8	26
3 – None	1	1.2	0	0.0	1
Total responses	<b>85</b>		<b>13</b>		<b>98</b>

Weight struggles were reported by 9 males and 1 female, with chronic health conditions reported by 3 FS (2 reported high blood cholesterol, and 1 reported diabetes). Most FS (n=87) reported not following a specific diet (e.g., keto, Mediterranean, paleo, or vegan). Less than half (41.8%) reported taking a dietary supplement; vitamins/minerals (n=31) and protein/creatine (n=20) were the most reported. Overall, nutrition was rated as important for performance (males=4.0±1.0, females=4.1±1.3 on a scale from 1 [*not important at all*] to 5 [*extremely important*]). Self-efficacy was reported as “rather certain” or “very certain” by 87% of FS for ability to “stick to healthy food” (Figure 4), and 81% of FS self-reported an ability to “carry out exercise intentions” despite obstacles.

**Figure 4. Self-Reported Self-Efficacy in Adhering to Healthy Dietary Behaviors (n=98).**

## C.5. Qualitative Feedback

Overall, FS logged into the CM+ app at least twice per week, with 54% and 60% completing the majority (~70%) of the modules for GMT and nutrition education, respectively. For GMT, participants reported preferring the CM+ app over the existing platform for ease of use and immediate feedback. CM+ provided recruiters and RDNs the ability to track physical activity, dietary intake, and progress on training.

Six recruiters responded to a qualitative feedback questionnaire on application use and improvement. Responses to the question, “What do you like best about the CM+ App?”, were focused on its main feature of tracking. All 6 recruiters praised the app’s ability to track FS activity, specifically mentioning the “convenience” of using one app to track PT (mentioned by 3/6 recruiters) and their progress through the study modules (mentioned by 4/6 recruiters). In addition, 4 of the 6 recruiters liked the dietary tracking feature, mentioning that it “helps us identify when they’re not maintaining, consuming too much or not enough [food] so we can help them and prevent future problems”. Overall, the recruiters liked the all-in-one tracking feature of CM+; one recruiter stated that “it [the tracking feature] lets recruiters know the progress of their FS and what they need to improve on.”

Recruiters also highlighted CM+ as a communication tool; 3 of the 6 recruiters mentioned that they liked the feature because it provided “higher accountability” and it was “fluid and easy”. When asked if communication improved using CM+, half of the recruiters said that communications improved, and half said that they did not improve. One of the non-improvement responses, however, noted that the FS had their notifications turned off and were not aware of the communications from the recruiter (a point of quality improvement for the expansion study).

## D. CONCLUSION

CM+ provides a virtual method to deliver GMT and nutrition education, increases visibility of compliance with DEP training, allows interaction with RDNs for dietary analysis and feedback, and has the potential to increase communication between FS and recruiters via messaging. Overall, DEP training engagement via the app was high (~2 logins/day), and assessment scores were indicative of improved GMT and nutrition knowledge. Despite DEP scores being lower than average, pilot participants had higher RDC Assessment rates, and AFQT scores greater than the median average of Navy recruits. Overall, FS ranked nutrition as important to performance; however, most participants followed a diet high in fat and sodium and low in fiber, which is suboptimal for both general health and operational readiness. Through dietary intake tracking, CM+ facilitated individual improvements in nutrition behaviors, including reduced consumption of dietary fat, sodium, and sugar and increased intake of foods rich in fiber. Based on qualitative feedback, the piloted version of the CM+ app was useful in improving the readiness of the DEP population. Limitations of this initial study include the small sample size and restricted location. A larger study population is also needed to determine costs versus benefits (i.e., return on investment, the ability to reduce attrition) of the app in the Navy DEP. Identified enhancements and lessons learned from this pilot are currently being implemented in a larger, geographically diverse population that will be sufficiently powered to detect impact on attrition.

With a limited pool of qualified candidates, a tool that can help increase engagement, readiness, and retention of enlistees is needed. Additional long-term goals for CM+ monitoring would be implementation in other military groups, including current Navy personnel and other service members, to deliver health behavior education and job-specific training. Monitoring, evaluating, and integrating data related to the unique physical and mental demands within these groups could help facilitate proper recruitment and improve overall warfighter health and performance.

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