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Efficacy of the CoachMePlus Application in Improving Readiness of Future Sailors

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EXECUTIVE SUMMARY

Recruitment and retention of personnel across all US military branches continues to be a challenge. For the Navy, all non-prior service recruits enter the Delayed Entry Program (DEP), where they can interact with recruiters before starting basic training, to improve physical and behavioral readiness for Navy life. CoachMePlus (CM+), a commercial performance management application, was piloted as a DEP training communication and engagement tool in Navy Talent Acquisition Group (NTAG) Southwest at several San Diego area stations (n=111). Overall, use of the app showed improvement in content area training test scores (i.e., general military training [GMT], nutrition) and dietary improvements were reported. Recruiters also subjectively expressed increased Future Sailor (FS) engagement via the app, and the benefit of real-time training updates, which helped identify FS who needed more engagement. To validate these data, a study expansion was initiated in November 2022 to include a larger, more diverse group (goal of n=1000 FS in NTAGs Richmond and Southwest). FS were asked to complete a questionnaire (demographics and nutrition and behavioral information) and pre-knowledge checks for GMT and nutrition at baseline. Training was delivered via CM+ in three areas: physical training, GMT, and nutrition. At the end of DEP, FS were asked to complete post-knowledge checks for GMT and nutrition. FS were also asked to track and log their dietary intake (foods, beverages, supplements consumed) for 3 days per month (2 weekdays and 1 weekend day). Recruiters were asked to communicate regularly and check in weekly with FS via the CM+ messaging feature. A total of 515 FS participated in the study, with 17% identifying as Asian, 15% as Black or African American, 28% as Hispanic or Latino, 36% as White, and 4% as another race. High school was reported by most (88%) as the highest level of education obtained, and over half were students and/or currently employed. When asked about weight goals and behaviors, 18% of FS reported struggling to maintain a healthy weight, with 71% expressing a desire to change their weight status. Completion of training modules for both GMT and nutrition was low and decreased throughout the course of training. Of the 515, only 29 and 45 FS completed pre- and post-knowledge checks for GMT and nutrition content, respectively. In this subset, improvements in pre versus post scores were seen ($p<.001$). Only 6% (n=30) of FS tracked dietary intake via CM+, with most underreporting dietary intake. A performance management app such as CM+ is a simple and viable tool to deliver GMT and nutrition education and monitor progress in FS. Both recruiters and FS need to be engaged to maximize potential.

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A. INTRODUCTION

Recruitment and retention of personnel across all US military branches continues to be a challenge. Based on a Department of Defense (DoD) study, 90% of applicants are aged 17–24 years (representing the largest applicant pool) but only 23% are eligible to serve (down from 29% in 2016); the most common disqualifying factors include criminal background, mental health, and weight status.[1,2] Further, 90% of young individuals (16–24 years) in a recent DoD poll indicated that they were unlikely to consider the military as a career path (32% replied "probably not," 58% replied "definitely not").[3] Although retention of current military personnel has become more important, attrition rates have climbed, specifically dropout from Navy basic training has been trending higher (7-year average = 14.4%; unpublished data, Navy Recruiting Command), which is both costly (~$75,000 per enlistee[4]) and has a negative impact on force readiness.[5] Modifiable factors linked with higher attrition often include poor health and nutrition-related behaviors (e.g., low physical fitness,[6] overweight/obesity,[7] and smoking and alcohol use[8]). For Navy enlistment, non-prior service recruits first enter the Delayed Entry Program (DEP), which is designed to provide Future Sailors (FS) with an opportunity to improve their physical and mental readiness in preparation for basic training. Recruiters' contact and engagement with FS during DEP is likely beneficial to improve readiness.

CoachMePlus (CM+), a commercial performance management application, was piloted as a DEP training communication and engagement tool in Navy Talent Acquisition Group (NTAG) Southwest, at several San Diego area stations. FS (n=111; 13 females, 98 males) were enrolled and received CM+ facilitated delivery of scheduled training and testing in physical and general military training (GMT) based on the 2018 Standard-Transitions-Acknowledgement-Required-Training (START) guide,[9] and nutrition education and testing based on the 2019 Navy Operational Fitness and Fueling System (NOFFS).[10] FS were also asked to log dietary intake directly into the application. Overall, content area test scores improved (GMT: 51.7±1.6 to 67.9±2.9; $p<.001$; nutrition: 58.1±1.1 to 68.8±2.0; $p<.001$), and dietary improvements including reduced fat and sodium intake, and increased fiber intake were reported. Recruiters also subjectively expressed increased FS engagement via the app and the benefit of real-time training updates that helped identify FS who needed more engagement.

The pilot study provided initial proof of concept for the delivery of DEP training via a virtual app but was not sufficiently powered to determine impact on attrition (i.e., return on investment). A study expansion was initiated in November 2022 to include a larger, more diverse group (goal of n=1000 FS in NTAGs Richmond and Southwest) to validate findings.

B. METHODS

CM+ was mandated for DEP training delivery in NTAGs Richmond (Virginia) and Southwest (Southern California and Las Vegas) from November 2022 to July 2023. Participants (n=515) were asked to use the app to log physical training (PT), review and take knowledge assessments on GMT and nutrition education, and log at least 3 days per month of dietary intake. Customizations included (1) a daily PT schedule and weekly GMT and nutrition education, (2)

dashboards with real-time feedback to all users (FS, recruiters, and research staff) on training progress, and (3) a messaging platform to provide direct communication between FS, recruiters, and research staff.

B.1. Overview

The intervention consisted of training designed to be completed over a 6-week period (Figure 1). After completion of the 6-week program, FS received further training based on the NOFFS Large Deck Series. FS were asked to complete the program and continue using the app until they left for basic training (i.e., ship date). If they shipped before 6 weeks, they were asked to complete all training before shipping, to the best of their ability.
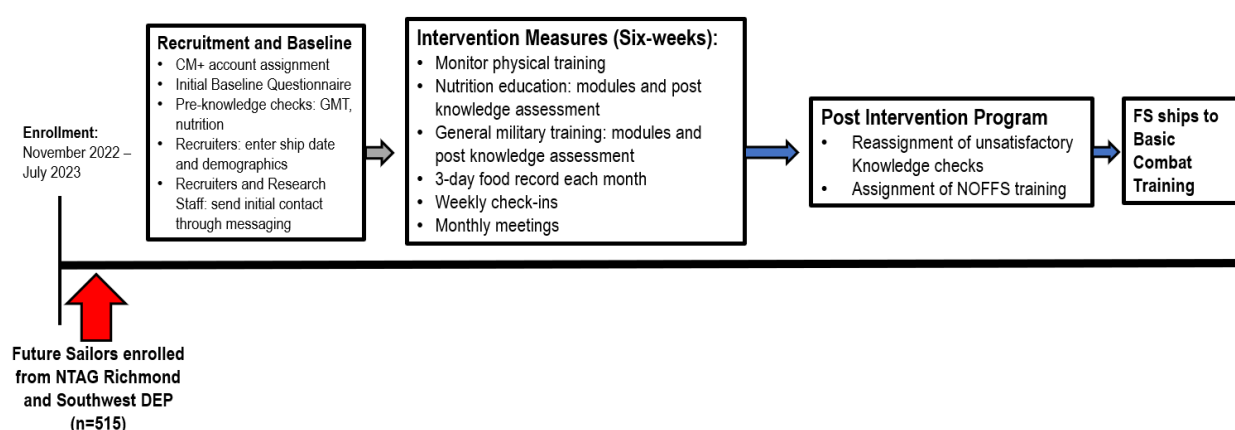

Figure 1. Study Timeline. Recruitment of Future Sailors (FS) in the Delayed Entry Program (DEP) from Navy Talent Acquisition Groups (NTAGs) Richmond and Southwest occurred from November 2022 through July 2023. FS were expected to be in DEP 1–6 months, although there was an emphasis on shipping FS as quickly as possible. CM+, CoachMePlus app; GMT, general military training; NOFFS, Navy Operational Fitness and Fueling System

B.2. Recruitment and Baseline Data

For recruitment and baseline data collection, the research team met with FS and recruiters at each station and provided an orientation and instructions on how to use the app. Upon enrollment, participants completed a virtual informed consent in the CM+ app. FS were assigned to a de-identified CM+ account, which they used to complete a baseline survey that included demographics, dietary and exercise patterns and behaviors, and health history. Researchers also met separately with recruiters and briefed them on the app tracking features and how to enroll any new FS who joined their station during the study period. This study was approved by the Naval Health Research Center Institutional Review Board (NHRC.2021.0010).

B.3. Intervention

The intervention had two phases: (1) initial 6-week program and (2) post-intervention program. Both training periods delivered content from the 2018 START guide and the 2019 NOFFS Large Deck Series.

B.3.1. Initial 6-Week Program

The initial 6-week program consisted of three 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 are typically available to all FS either as a PDF file or on the NOFFS website, making virtual content delivery via the CM+ app the only distinction from standard training practice. Participants were asked to log all PT/exercise, complete short knowledge checks for GMT and nutrition after completion of specific modules, and complete a longer post-assessment after all content training had been completed for each subject. Participants were also asked to track and log their dietary intake (foods, beverages, supplements consumed) for 3 days per month (2 weekdays and 1 weekend day). Recruiters were asked to communicate regularly and check in weekly with FS via the CM+ messaging feature.
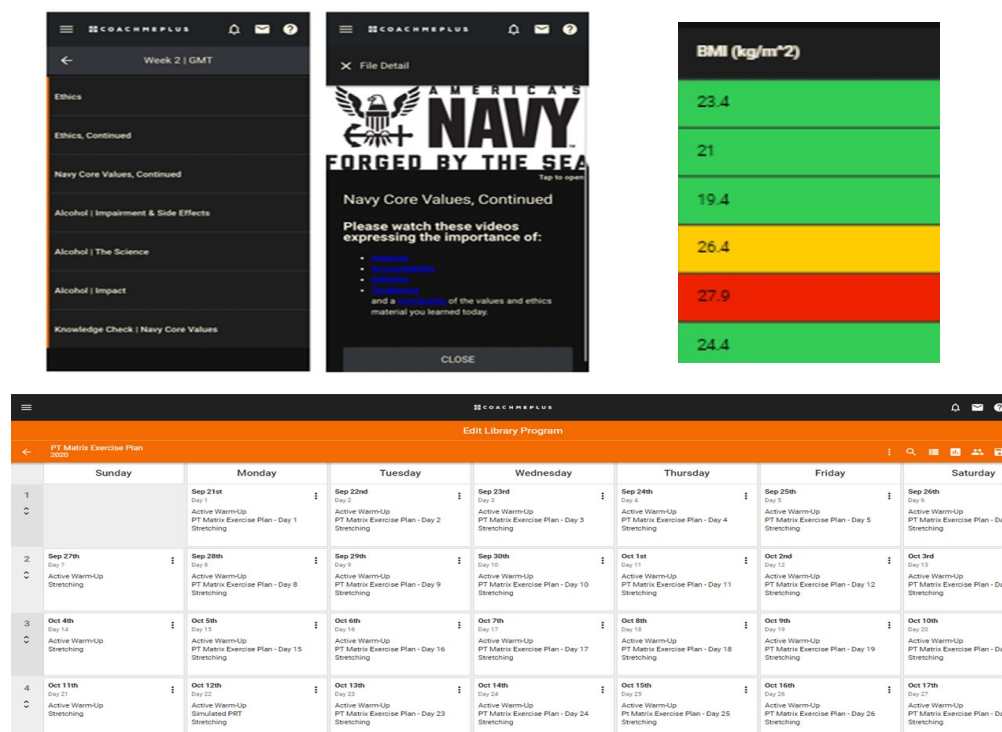

Figure 2. CM+ Applications. CoachMePlus (CM+) content was customized to deliver training specific for the Navy Delayed Entry Program (DEP), including general military training, physical training, and nutrition education. CM+ for DEP was also designed to facilitate communication between recruiters and Future Sailors.

B.3.2. Post 6-Week Program

After completing the 6-week training program, FS had the option to review any GMT or nutrition content and retake any knowledge checks for which they received an unsatisfactory score. FS were assigned to the appropriate level of the 2019 NOFFS Large Deck Series training based on their PT status.

B.4. Statistical Analysis

All data were summarized using means and standard errors or counts and frequencies, as appropriate. One-sample Student *t* tests were used to compare pre- and post-knowledge check scores, and to compare nutrient intakes with normative values. Macronutrients were compared with American College of Sports Medicine and Academy of Nutrition and Dietetics Sports Nutrition Guidelines.[13] Vitamin and mineral intakes were considered sufficient if intake was at or above the Estimated Average Requirement (level sufficient to meet 50% of the general population requirements) or Adequate Intake (established standard if lacking data to determine a Recommended Dietary Allowance for a given nutrient), as appropriate.[11,12,14-17] Significance was set at *p*<.05.

C. RESULTS

Of the FS who participated in the study (n=515), 16.9% identified as Asian, 15.0% as Black or African American, 28.2% as Hispanic, 36.3% as White, 0.8% as Hawaiian, and 0.4% as American Indian; 2.6% identified as some other race or did not respond. Most (92.0%) indicated having completed high school or its equivalent as their highest level of education, with 3.5% completing an associate degree, 4.3% a bachelor's degree, and 0.2% a master's degree. More than half (57.8%) were students or were employed, either full or part time. Almost all FS had access to a smartphone (99.6%) and the internet (97.7%). Most (75.0%) also had access to a computer, while 21.0% had access to a tablet and 27.0% had access to a wearable device.

C.1. Training Outcomes

Metrics on training module participation for both GMT and nutrition education are presented in Table 1. Of the 515 FMs, only 45 completed nutrition pre- and post-knowledge checks and 29 completed the GMT knowledge checks. In this subset, improvements in nutrition and GMT knowledge checks scores were seen (Figure 3; *p*<.001).

Table 1. Participation Metrics for General Military Training (GMT; left) and Nutrition (right) Modules (n=515).

GMT Modules Completed	
Navy Core Values	36.1%
General Orders	32.8%
Sailor's Creed	34.4%
Chain of Command	25.4%
Phonetic Alphabet	22.5%
Terminology	22.3%
Military Time	22.3%
Rank Recognition	15.7%
Aircraft Ships	13.4%
Finances	9.7%

Nutrition Modules Completed	
Fundamentals of Fueling	36.7%
Nutrition Rules to Live By	28.9%
Energy Balance	24.5%
Portion Sizes	19.6%
Eat the Rainbow	17.3%
Hydration	14.2%
Fueling for Physical Training	13.4%
Macronutrients	11.1%
Recovery Nutrition	10.1%

Completion of training modules for both GMT and nutrition was low and decreased throughout the course of training.
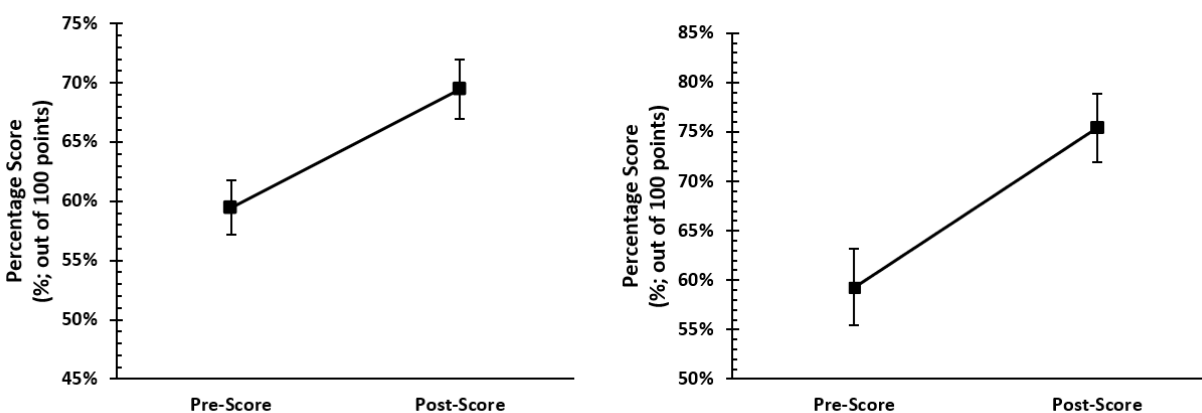

Figure 3. Nutrition Pre and Post Scores (left) and General Military Training (GMT) Pre and Post Scores (right). Score for nutrition knowledge checks (left) improved from 59.5±0.03 to 69.2±0.02 (n=45; $p<.001$), and scores for GMT knowledge checks (right) improved from 59.3±0.03 to 75.4±0.04 (n=29; $p<.001$).

C.2. Weight Status and Goals

Self-reported diet history is presented in Figure 4; the ketogenic diet was the most commonly reported diet (31/515 FS; ~6%). When reporting weight-related goals, 39.6% indicated they wanted to lose weight, 31.3% wanted to gain weight, and 29.1% wanted to maintain weight or did not have any weight-related goals.
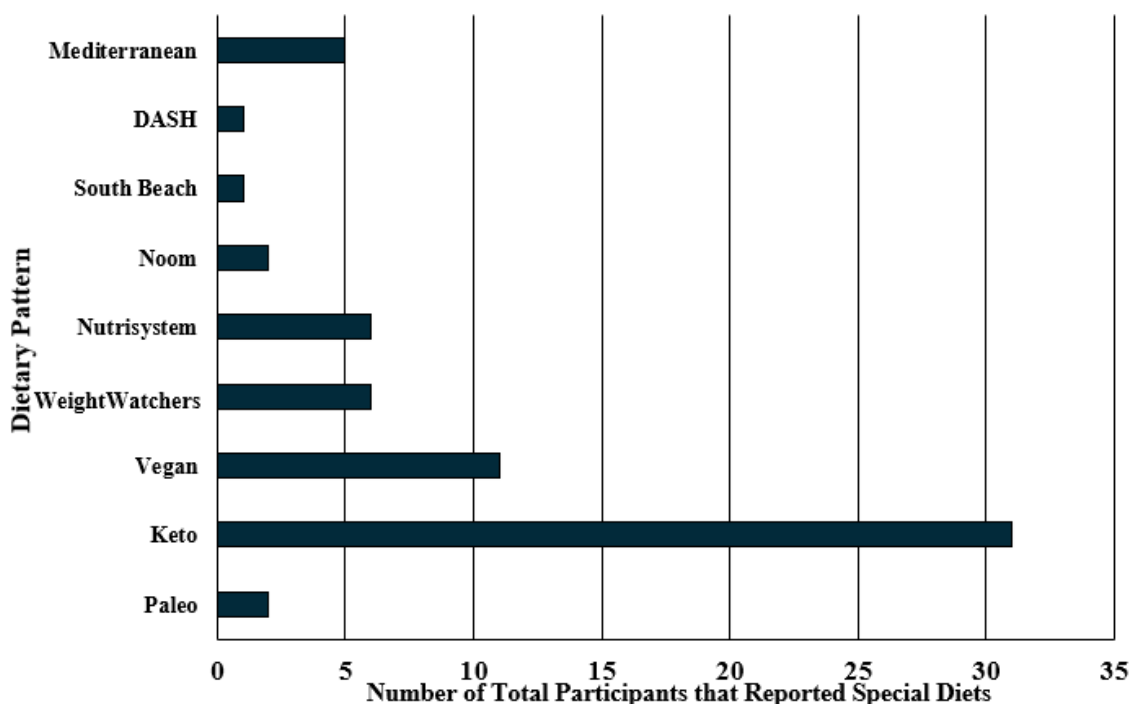

Figure 4. Self-Reported Diet History (n=515). Previous adherence to special diets was low; 12.6% of participants reported they had tried a special diet in the past. The most common dietary trend was the ketogenic diet (6.0%). DASH, Dietary Approaches to Stop Hypertension.

C.3. Energy and Nutrient Intake

In total, 951 days of food records were recorded on the CM+ app. However, caloric needs estimates were low, most likely due to underreporting, a common issue with self-reported dietary intake. Thus, analysis was completed only on food records >1000 kcal/day to account for underreporting, resulting in a total of 30 days of food records. Food records <1000 kcal for ≥1 day were completed by 24 FS (4.7%), with 3 FS (0.6%) recording dietary intake for 2 days or more. Energy and macronutrient intake are presented in Table 2. Most micronutrients emerged as deficient (Table 3), likely because of incomplete dietary records.

All FS were also asked whether they would like to receive nutrition counseling. Overall, 71 FS requested a nutrition consult; although they were all contacted, only 5 consults were completed. Of these, 3 were for general nutrition, 1 was for weight loss, and 1 was for weight gain.

Table 2. Energy and Macronutrient Intake in Future Sailors (n=30)

Expressed as mean (SE)	Future Sailors (n=30)	Recommended*
Energy intake (kcal/d)	1479.7 (218.5)	Female=1600–2800 Male=1800–3600
Carbohydrate		
g/d	144.6 (31.1)	
% Total kcal	37.8 (8.4)	45% to 65%
Protein		
g/d	69.5 (10.6)	
% Total kcal	18.8 (2.9)	10% to 35%
Fat		
g/d	72.5 (8.2)	
% Total kcal	44.1 (5.0)	20% to 35%

*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.[13]

Table 3. Dietary Intake for Selected Vitamins and Minerals in Future Sailors (n=30)

Vitamins/minerals	Mean (SE)	RDA or AI[1]	Sufficient intake (%)[2]
		Future Sailors (n=30)	
Vitamin A (ug/d)[3]	1177.2 (317.4)	700-900	36.7
Vitamin D (ug/d)	62.0 (18.3)	15	40.0
Vitamin E (mg/d)	0.7 (0.1)	15	0.0
Vitamin K (ug/d)	23.1 (5.5)	90-120	3.3
Vitamin B6 (mg/d)	0.5 (0.1)	1.3	6.7
Vitamin B12 (ug/d)	1.3 (0.2)	2.4	13.3
Folate (ug/d)	37.7 (7.8)	400	0.0
Vitamin C (mg/d)	51.1 (18.2)	75-90	10.0
Calcium (mg/d)	182.9 (35.1)	1000	0
Iron (mg/d)	5.4 (1.7)	8-18	16.7

Dietary intake was lower than Estimated Average Requirement (EAR) or Adequate Intake (AI).
[1]Dietary Reference Intakes 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 heathy individuals). AI for nutrients (e.g., vitamin K) is provided when those data are lacking to establish RDA and EAR.[11,12,14-17]
[2]Sufficient intake (percentage of total participants) was determined by comparing with EAR or AI.
[3]Vitamin A is expressed as micrograms/day of retinol activity equivalents.

C.4. Health and Nutrition-related Behaviors

FS were asked questions about health, diet behaviors and goals, and physical activity. Most (80.2%) reported participating in regular exercise, with 76.9% reporting regular cardiovascular exercise and 71.1% reporting regular strength training. The most common self-reported barriers to exercise were time (213/515) and work (188/515; Figure 5).
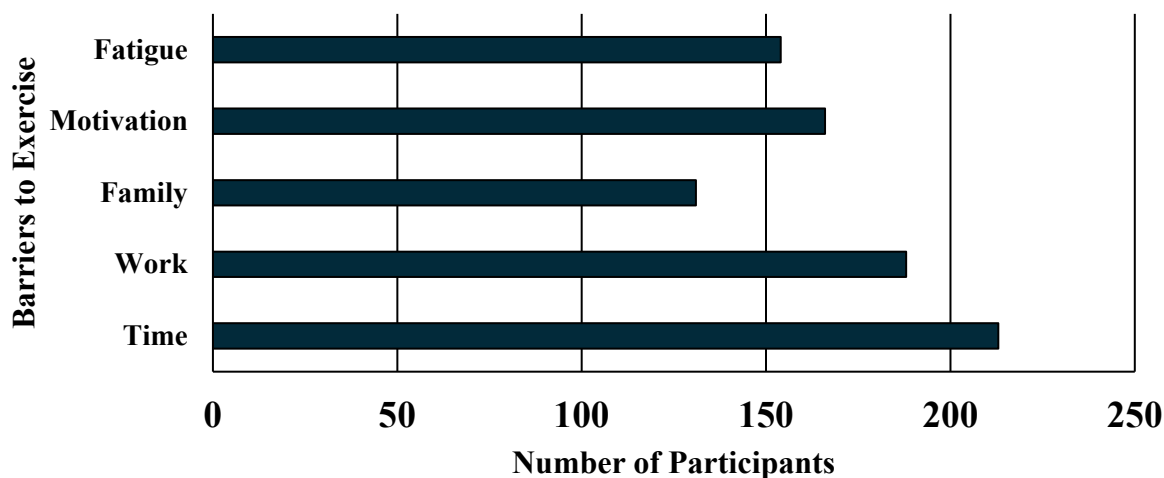
Figure 5. Self-Reported Barriers to Exercise (n=515). Work (36.5%) and time (41.4%) were the most common barriers to exercise reported by Future Sailors.

Most FS (68.5%) reported low levels of stress (i.e., rating of 1 or 2 on a scale of 1–5). Self-reported sleep duration was low (6 hours or less per night) for 36.5% of FS. When asked about the impacts of sleep/stress, 20.6% reported sleep OR stress having affected their daily activities. Self-efficacy was high for the ability to carry out exercise intentions (Figure 6), reduce drinking (Figure 7), and eat healthy food (Figure 8) despite obstacles.
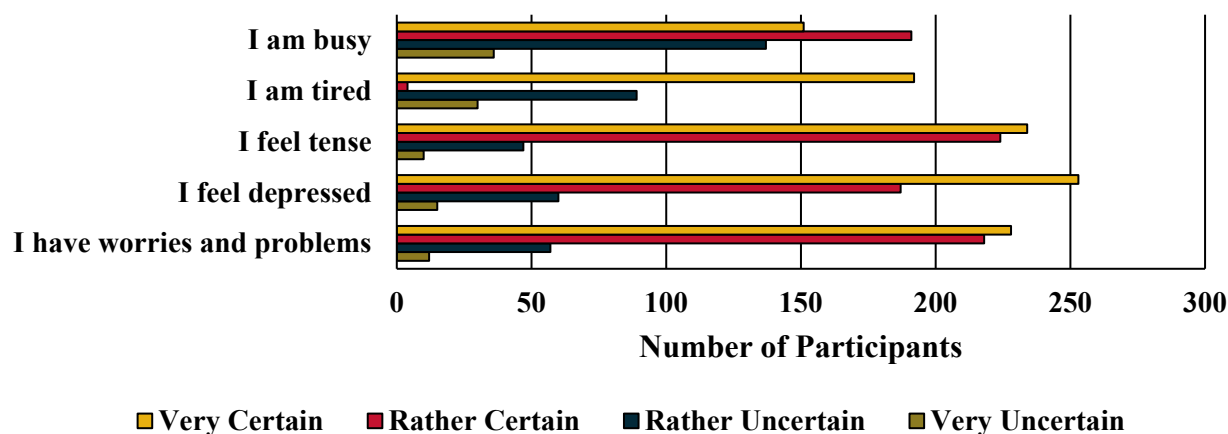

Figure 6. Self-Reported Self-Efficacy in Adhering to Exercise Intentions (n=515). Exercise self-efficacy was high, with an average of 73.1% of participants reporting they were "rather certain" or "very certain" they could carry out their exercise intentions.
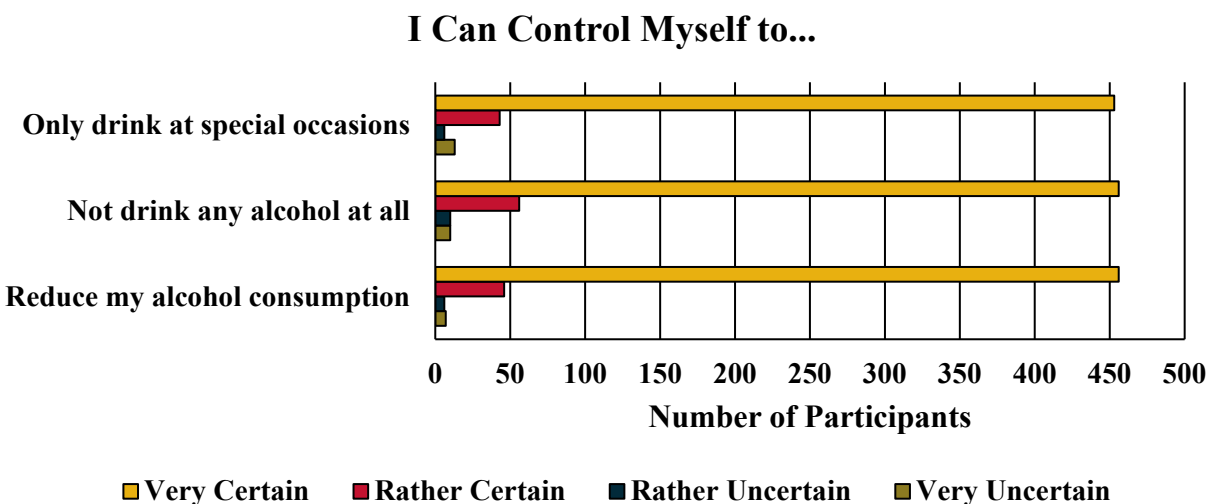
I Can Control Myself to...

Figure 7. Self-Reported Self-Efficacy in Reducing Alcohol Consumption (n=515). Most participants (average of 88.4%) reported they were "very certain" they could control their drinking.

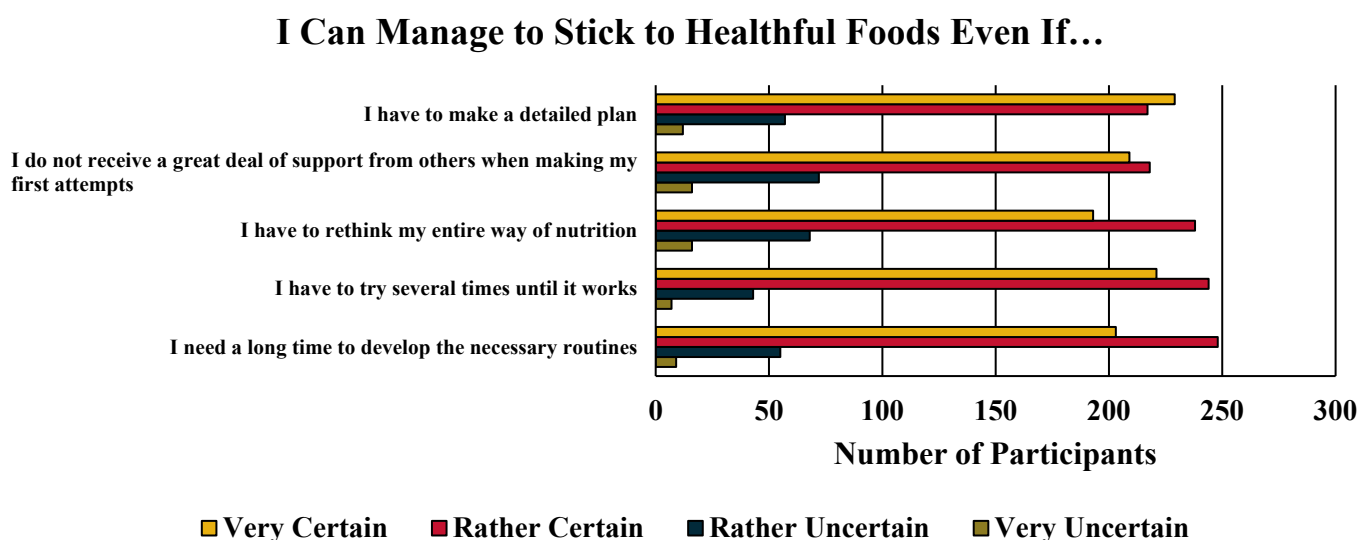## I Can Manage to Stick to Healthful Foods Even If…

Figure 8. Self-Reported Self-Efficacy in Adhering to Healthy Dietary Behaviors (n=515). Self-efficacy for nutrition was high, with an average of 45.2% reporting they were "rather certain" and 41.0% reporting they were "very certain" they could stick to healthful foods.

D. CONCLUSION

Generally, findings from the pilot expansion were not consistent with the initial study. Overall CM+ app use by FS and engagement via recruiters was low, making it difficult to conclude its utility. Completion of training module courses for both GMT and nutrition was low, with only ~36% of FS completing the first module of each course, with a precipitous drop to a ~10% completion rate for the final module of each training. The change in recruiting environment from the pilot to the second study likely contributed to the low compliance, as FS were being shipped

to basic training at much faster rates to help recruiters meet their year-end targets. Dietary intake was underreported and recording compliance was also low. In records that were analyzed, FS diets were high in fat and low in micronutrient intake, which agrees with our previous findings and highlights the need for and importance of nutrition behavior change to improve military readiness in this population.

With a limited pool of qualified candidates, a tool that can help increase engagement, readiness, and retention of enlistees is needed. A virtual platform can deliver GMT and nutrition education and can enhance readiness by increasing the visibility of DEP training compliance and allowing FS to interact with recruiters. A population such as the high school-aged FS who have a longer time in DEP may particularly benefit from this type of programming, along would those whose goal is to join special forces. Engagement and buy-in of leadership, recruiters, and FS are necessary to realize programming potential.

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 of these groups could help facilitate proper recruitment and improve overall warfighter health and performance.

E. REFERENCES

1. USAFacts.org. Military recruitment is down. Why don't young Americans want to join? November 7, 2023. Accessed February 26, 2024. https://usafacts.org/articles/military-recruitment-is-down/

2. Jurkowsky T. The military has a serious recruiting problem – Congress must fix it. *The Hill*. June 21, 2022. Accessed July 21, 2022. https://thehill.com/opinion/national-security/3527921-the-military-has-a-serious-recruiting-problem-congress-must-fix-it/

3. Joint Military Advertising, Market Research & Studies. Fall 2021 propensity update. Office of People Analytics. Updated August 21, 2023. Accessed December 13, 2023. https://jamrs.defense.gov/Portals/20/Documents/YP54Fall2022PUBLICRELEASEPropensityUpdate_20230713_v1.pdf

4. US Government Accountability Office. *Military Personnel: Improvements Needed in the Management of Enlistees' Medical Early Separation and Enlistment Information*. GAO-17-527. July 2017. Accessed July 21, 2022. https://www.gao.gov/assets/gao-17-527.pdf

5. Marrone JV. *Predicting 36-Month Attrition in the U.S. Military: A Comparison Across Service Branches*. RAND Corporation; 2020. https://www.rand.org/pubs/research_reports/RR4258.html

6. Troncoso MR, Jayne JM, Robinson DJ, Deuster PA. Targeting nutritional fitness by creating a culture of health in the military. *Mil Med*. 2021;186(3-4):83-86. doi:10.1093/milmed/usaa325

7. Legg M, Stahlman S, Chauhan A, Patel D, Hu Z, Wells N. Obesity prevalence among active component service members prior to and during the COVID-19 pandemic, January 2018-July 2021. *MSMR*. 2022;29(3):8-16. PMID: 35485798

8. Smith TJ, Dotson LE, Young AJ, et al. Eating patterns and leisure-time exercise among active duty military personnel: comparison to the Healthy People objectives. *J Acad Nutr Diet*. 2013;113(7):907-919.doi:10.1016/j.jand.2013.03.002

9. *Navy Standards-Transitions-Acknowledgement-Requirements-Training (START): A Comprehensive Guide for Future Sailors*. US Navy; 2018. Accessed July 21, 2022. https://www.staffordschools.net/site/handlers/filedownload.ashx?moduleinstanceid=57370&dataid=76826&FileName=START.pdf

10. Navy Operational Fitness and Fueling System (NOFFS). 2019. Accessed July 21, 2022. https://www.navyfitness.org/fitness/noffs-training

11. National Academies of Sciences, Engineering, and Medicine. *Dietary Reference Intakes for Sodium and Potassium*. The National Academies Press; 2019. doi:10.17226/25353

12. Institute of Medicine. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. The National Academies Press; 2005. doi:10.17226/10490

13. Thomas DT, Erdman KA, Burke LM. American College of Sports Medicine Joint Position Statement: Nutrition and Athletic Performance [published correction appears in Med Sci Sports Exerc. 2017 Jan;49(1):222]. *Med Sci Sports Exerc*. 2016;48(3):543-568. doi:10.1249/MSS.0000000000000852

14. Institute of Medicine. *Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium, and Zinc*. The National Academies Press; 2001. doi:10.17226/10026

15. Institute of Medicine. *Dietary Reference Intakes for Calcium and Vitamin D*. The National Academies Press; 2011. doi:10.17226/13050

16. Institute of Medicine. *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids*. The National Academies Press; 2000. doi:10.17226/9810

17. Institute of Medicine. *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B6, Folate, Vitamin B12, Pantothenic Acid, Biotin, and Choline*. The National Academies Press; 1998. doi:10.17226/6015