



Exercise & Nutrition for Readiness

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April NMCPHC Webinar – Physical Readiness

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Physical Resiliency, Durability & Lethality of the Sailor & Marine



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MSK Atlas Briefing, June 2019

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NOFFS

- **Current Status**
- **Body Composition Anatomy**
- **Guidance for Body Fat Reduction**
 - National Weight Control Registry
 - National Guidelines for Activity
 - ACSM Position Stand-Weight Loss (155 references)
- **NOFFS Operational Fitness and Fueling Guidance**





Physical Training for Readiness

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NASA – Kennedy Space Center



Space X's **Crew Dragon** Boeing's CST-100 **Starliner**

- | | |
|--------------------------------|-----------------------------------|
| (1) CDR Josh Cassada | (4) COL Douglas Hurley |
| (2) CAPT Chris Ferguson (Ret.) | (5) LtCol Nicole Aunapu Mann |
| (3) CDR Victor Glover | (6) CAPT Sunita ("Suni") Williams |





NOFFS

From the Battlefield to the Playing Field

2019 World Federation of Training & Therapy

- (WFATT) Conference
- **May 11 – 12**
- Tokyo, Japan

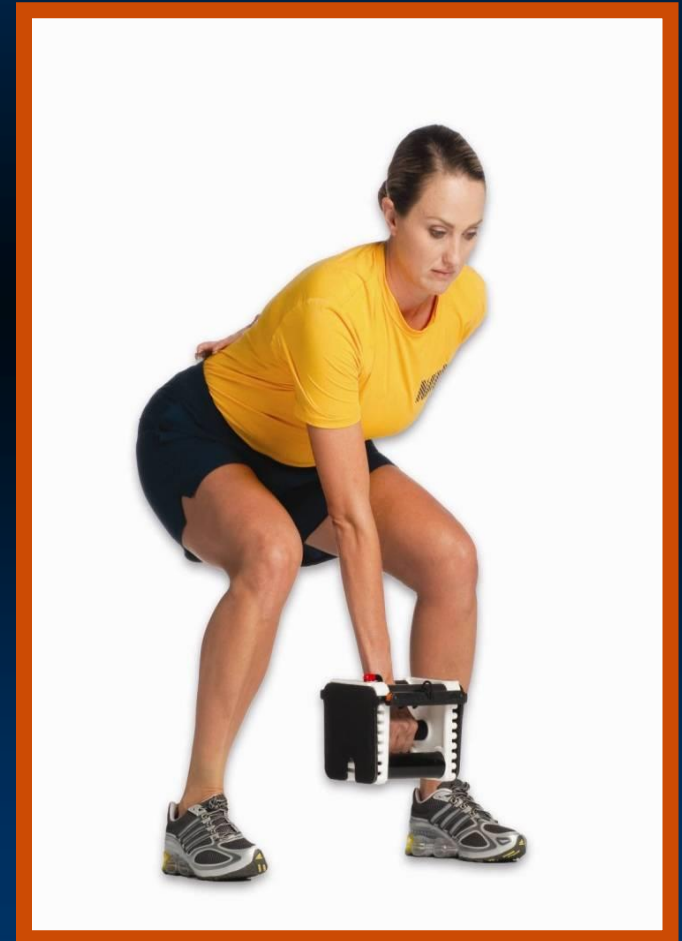
2019 National Athletic Trainers' Association

- **June 25, 26 - 28** Symposia
- Las Vegas, NV



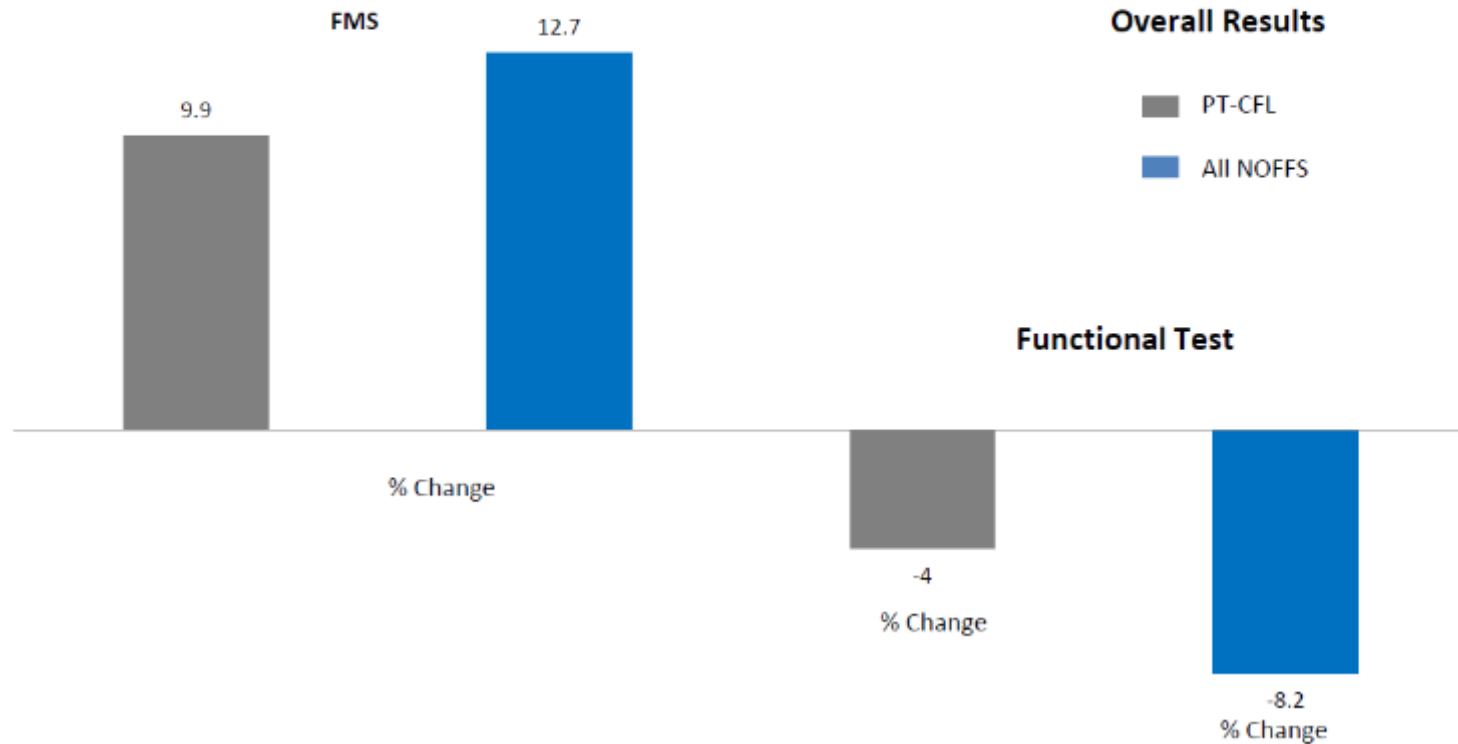
Outcomes

- Is NOFFS effective? --YES!
- 450 evidence-based references supporting the methodology
- **Analyzed:**
 - Functional movement
 - Job task simulation
 - Physical readiness – PRT
 - Work & health status



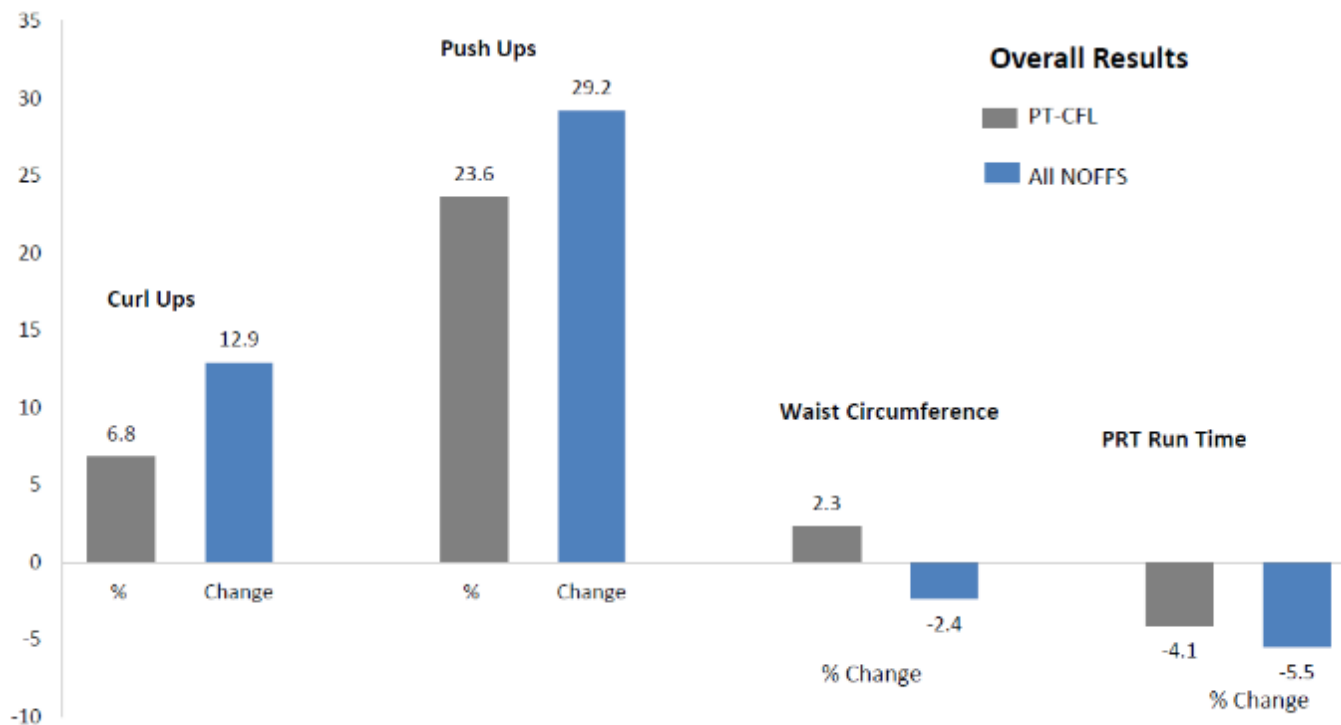
Outcomes

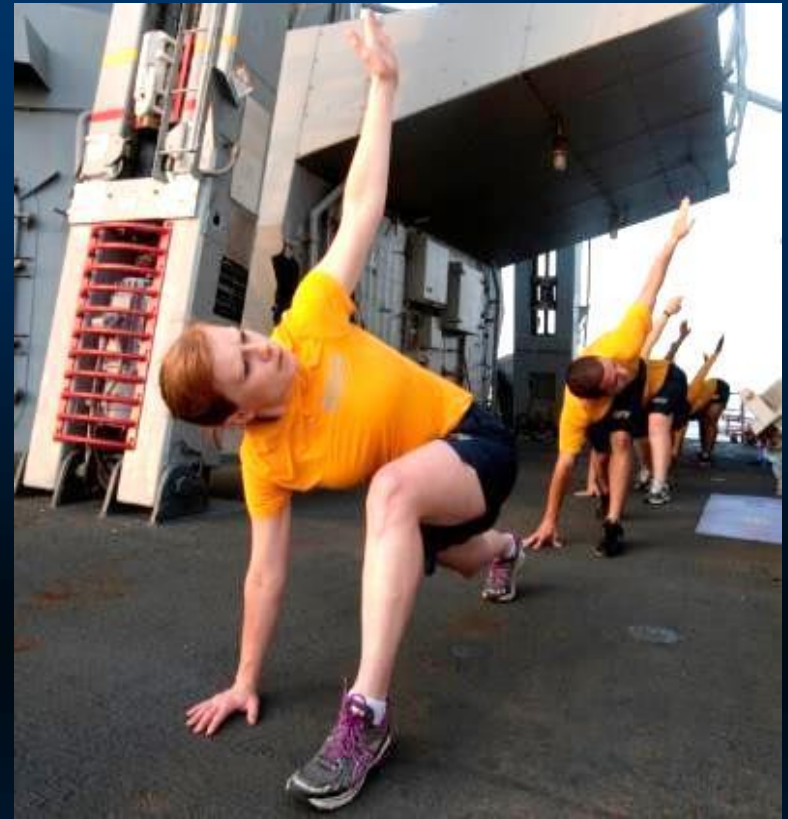
Functional Outcomes



Outcomes

PRT Related Outcomes





- 2014 German World Soccer Champions
- 1/3 of NFL Draft Pick: 2018=79, 2017=84, 838 total
- Over 1000 professional athletes









Bent Over Row w/h Dumbbells

Operational Performance

Does the workout or activity relate to the demands on the job?

SPECIFICITY:

Physical training movements that transfers to actual job related movements.



Specificity of Training - Resiliency



- Mercer, G and Strock, M. Introduction of Functional Physical Training into Special Operations Units. JOSM, Volume 5, Edition 1 / Winter 05. pp 54 – 59.
- Burton, L and Strock, M., Functional Testing of Military Athletes. JOSM. Volume 7, Edition 2 / Spring 07

Functional Movement = Improved Performance & Injury Prevention



Firefighter Performance & Injury Prevention Study

- Andrews Institute & University of Waterloo, CA
- 12 week program aimed at improving conditioning & movement patterns in order to lower injury risk
- NOFFS- related methodology
- 400 Pensacola, FL Firefighters
- **62%** reduction - time lost to injury
- **42%** reduction - total overall injuries



The background of the slide features a faded, high-angle photograph of US Marines on a beach. One Marine in the foreground is prominently shown carrying a large American flag on his back. Other Marines are visible in the background, some appearing to be in motion or engaged in an activity. The overall scene is bright and somewhat washed out, serving as a backdrop for the text.

#1 Reason for Lost Work Days in Both US Navy & US Marine Corps

Sprains & Strains.

NMCPHC Annual Injury Epidemiology Reports, USN & USMC.

NMCPHC Command Mission Video, 2017.

Exercise & Sports Injuries

Physical training and sports injuries are of particular concern. Based on the likelihood of success in decreasing injuries having the greatest impact on military readiness, the Defense Safety Oversight Council (DSOC) recommends that the greatest reduction of lost duty days due to injuries across DoD may be achieved via mitigation efforts focused specifically on **sports-and physical training related injuries.**

*DSOC, DoD Military Injury Prevention Priorities Working Group:
Leading Injuries, Causes, and Mitigation Recommendations, Feb.2006.*

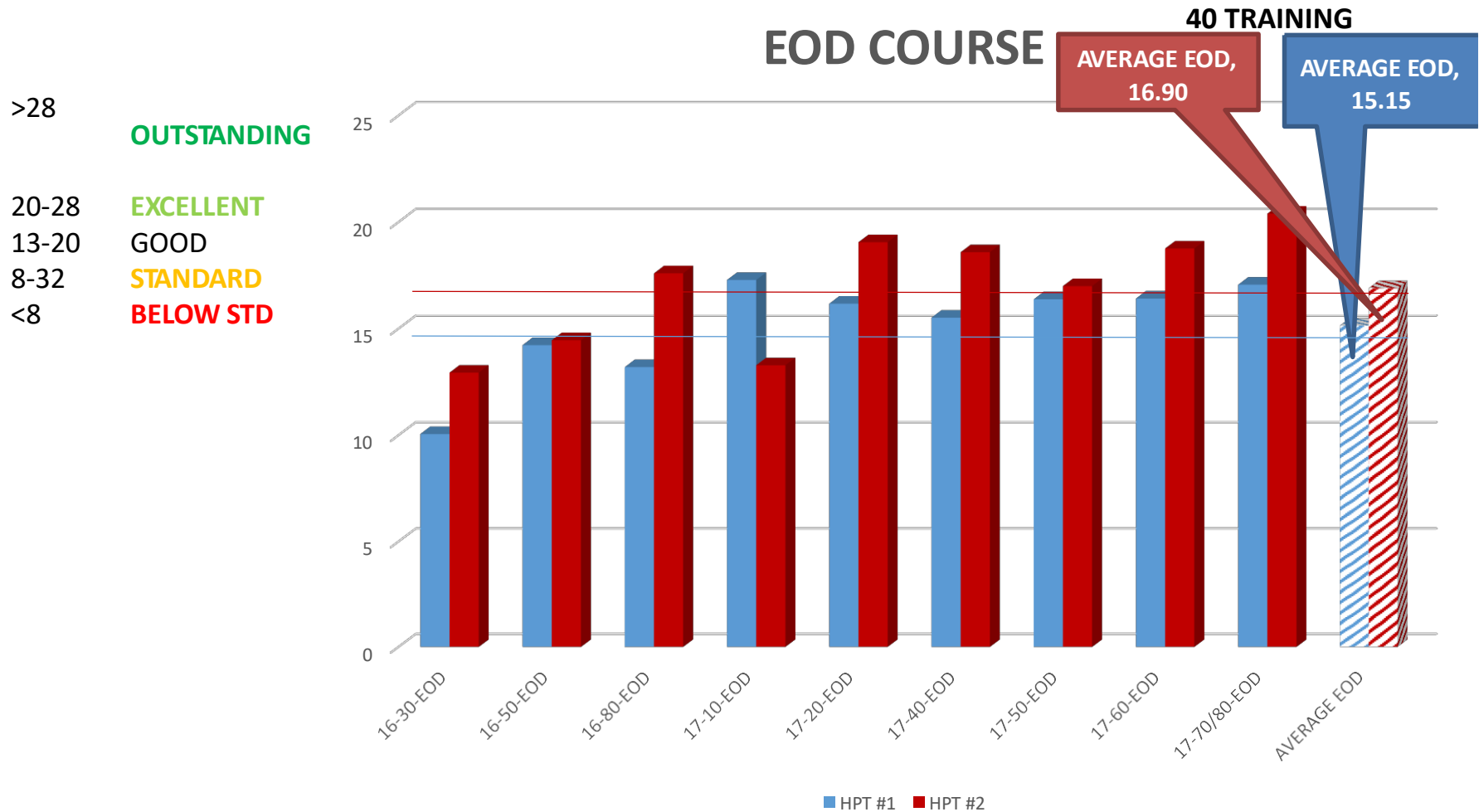


Naval Diving and Salvage Training Center (NDSTC)



Panama City Beach , FL

Performance Testing

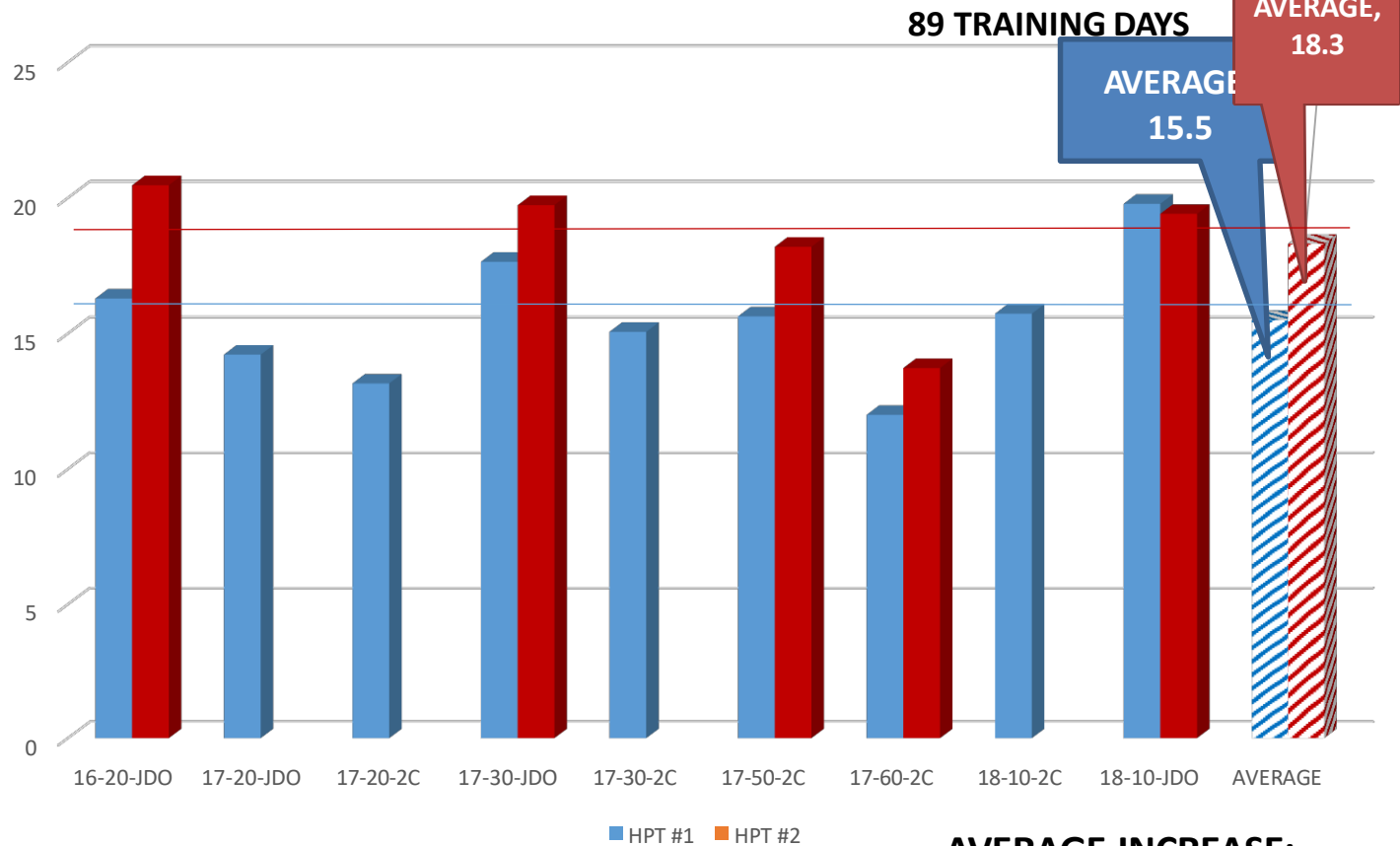


AVERAGE INCREASE: 11.57%

Performance Testing

JDO & 2C COURSES

- >28 **OUTSTANDING**
- 20-28 **EXCELLENT**
- 13-20 **GOOD**
- 8-32 **STANDARD**
- <8 **BELOW STD**



AVERAGE INCREASE: 18,10%









Lifting







Lifting

Pushing







Lifting

Pushing

Pulling







Lifting

Pushing

Pulling

Carrying



ESSN NO. UM2200
KIT, U/W TOOL, HURST
(BOX 2)
S/N 45975
GWT. 250 LBS.
L. 35" W. 23" H. 23"
CU. FT. 19.71

MOON TRO



Aerobic & Anaerobic Demands





Body
Movement
Skills

Balance
Agility
Coordination

Kinesthetic
Awareness





NOFFS ZONE NOFFS ZONE NOFFS ZONE

NOFFS ZONE NOFFS ZONE NOFFS ZONE NOFFS ZONE

NOFFS ZONE

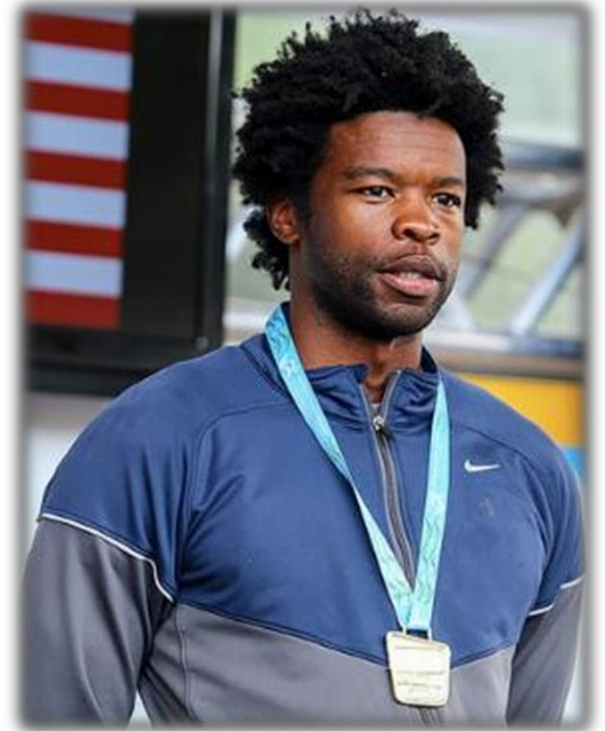
NOFFS ZONE

NOFFS ZONE



Operational Facilitators

- **Only 9 “ELITE” in the Navy – Not something for everybody**
 1. NCCA accredited certification
 2. 5 Day NOFFS Operational course
 3. 10 hour course on club connect
 4. Monthly NOFFS delivery reports
 5. Invited to SES Live NOFFS training – 1 week
 1. Be able to customize & deliver program
 6. Choose top 1 – 2% from the SES Class
 7. 24 hours total extensive on line training – EXOS in 30 days
 8. EXOS Operational Facilitator Course – on site
 9. Operational facilitators are evaluated – microphoned
They teach training & are analyzed & evaluated extensively by CNIC & EXOS
 10. Teach NOFFS Operational 1 week & evaluated
- **15 in 1st class & only 9 made it**





NOFFS

Reducing Body Fat Composition



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NOFFS

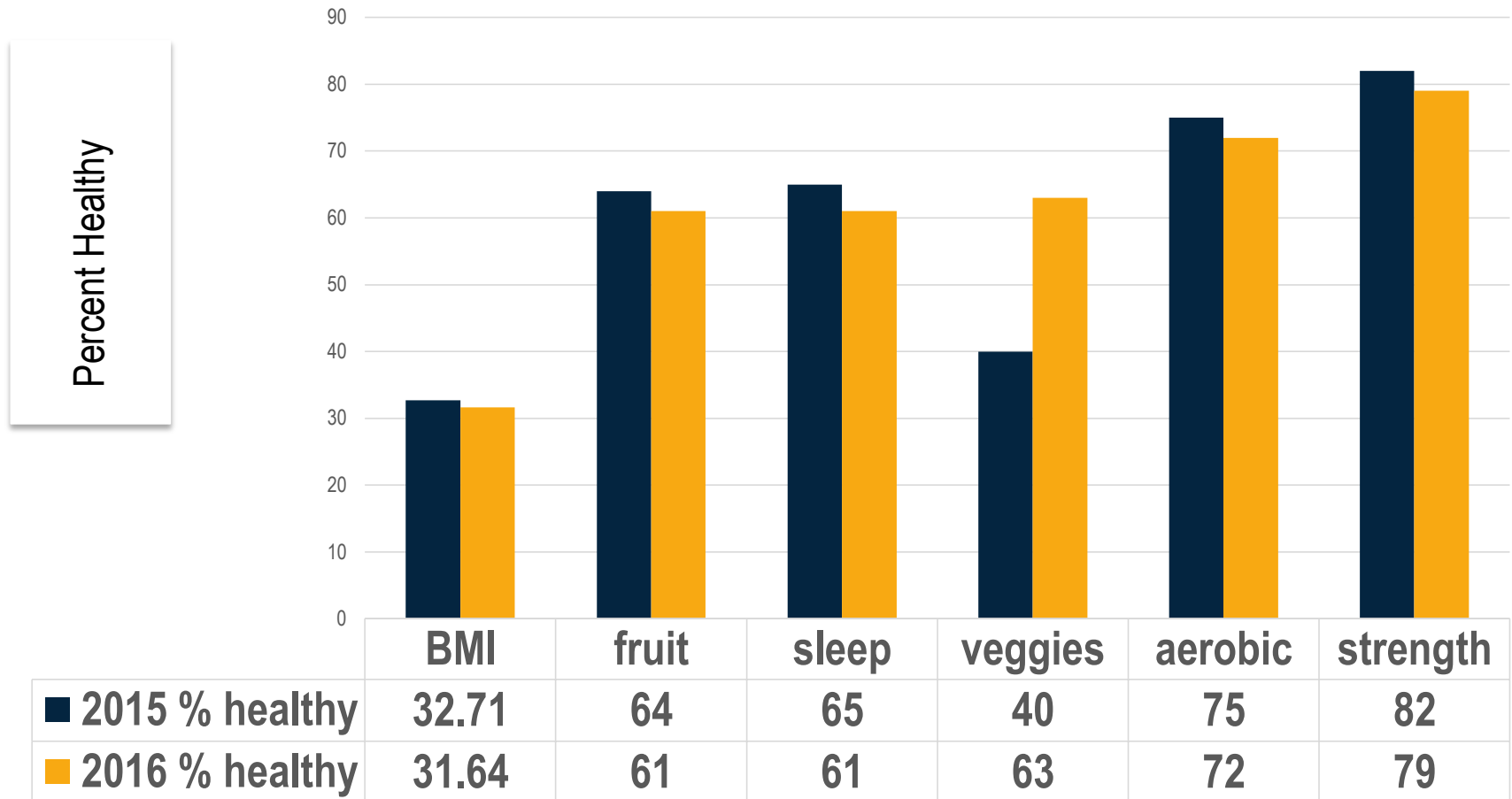
- **Current Status**
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 - National Guidelines for Activity
 - ACSM Position Stand-Weight Loss (155 references)
- **NOFFS Operational Fitness and Fueling Guidance**



Navy Current Status (HRA)

2015 and 2016 NMCPHC Workplace HRA Data

(2015 n = 114,216; 2016 n = 126,767)



Physical Readiness Current Status

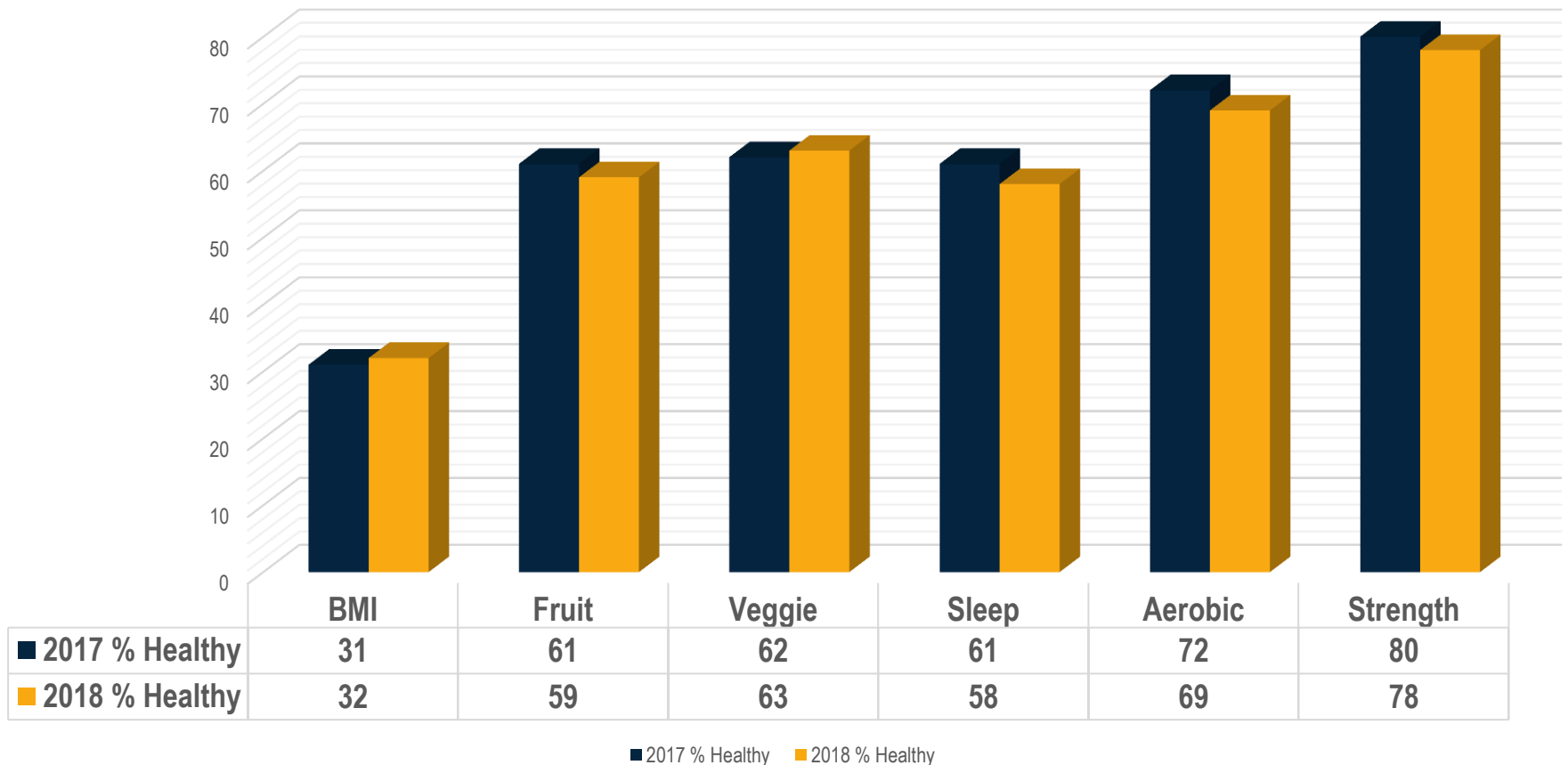
Pass rates since change of Navy Physical Readiness policy in 2016

	PFA Pass	BCA Pass	PRT Pass
Jan 2016	97.39%	99.18%	98.46%
Feb 2016	97.61%	99.13%	98.50%
Jan 2017	97.77%	99.12%	98.67%



Navy Current Status (HRA)

NMCPHC Workplace Health Risk Assessment Data
USN Navy Active Duty - 2017-2018
(2017 n = 105,207; 2018 n = 75,710)

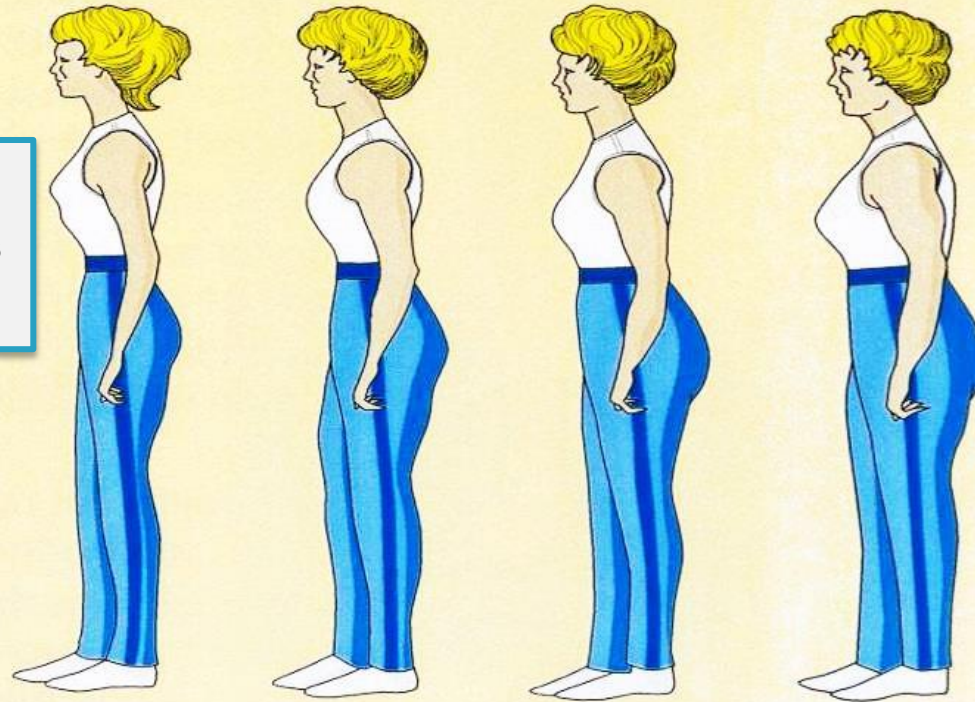


Nation Current Status

- Less than **5%** of adults participate in 30 minutes of physical activity each day 30 min 5 days a week guidelines = 150 min a week
- More than **80%** of adults do not meet the guidelines for both aerobic and muscle-strengthening activities
- Obesity is also a growing threat to national security
27% of young Americans are too overweight to serve in military. *Approx 15,000 potential recruits fail their physicals every year because they are unfit.*
- ***Est. 50%*** of nation obese by 2030.

Metabolism as We Age (Without Exercising)

Body weight & body composition changes throughout adult life.



Age:	20	30	40	50
Bodyweight (lbs.)	126	136	146	156
Muscle (lbs.)	45	40	35	30
Fat (lbs.)	29	44	59	74
Percent Fat (%)	23	32	40	47

Fat Loss Anatomy

Fat Lbs.

3500 calories = 1 lb fat.

Lean Body Mass Lbs.

- Muscle
- Bone
- Body Organ

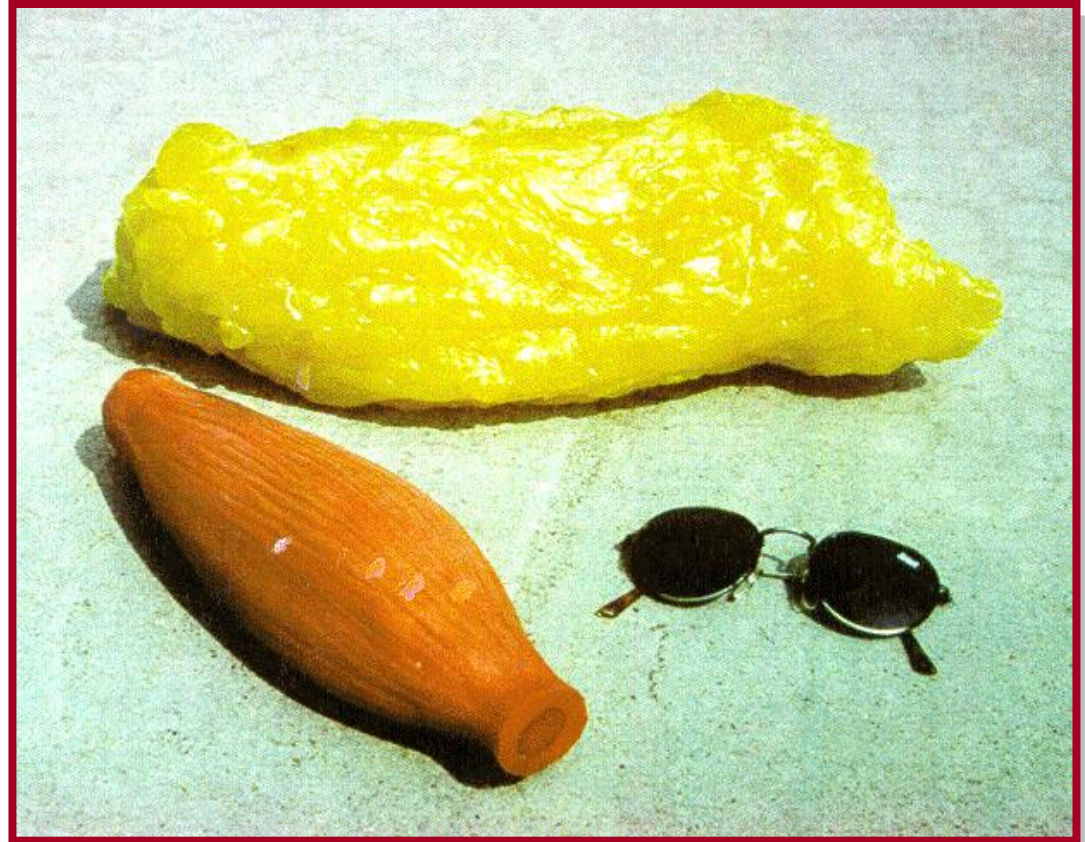
Should the focus be on fat loss or weight loss?

Example 150 lb. Person

29% body fat

43.5 pounds fat lbs.

106.5 lean body mass lbs.



National Weight Control Registry

- Over 10,000 participants - “living program”
- The largest prospective investigation of long term successful weight loss maintenance.
- Developed to identify & investigate the characteristics of individuals who have succeeded in long-term weight loss.



National Weight Control Registry

How Was Weight Loss Accomplished?

- **45%** of registry participants lost the weight on their own.
- **55%** lost weight with the help of some type of program (NOFFS).
- **98%** of Registry participants report that food intake was modified to lose weight.
- **94%** increased their physical activity
 - most frequently reported = walking.



National Weight Control Registry

How Was Weight Loss Accomplished?

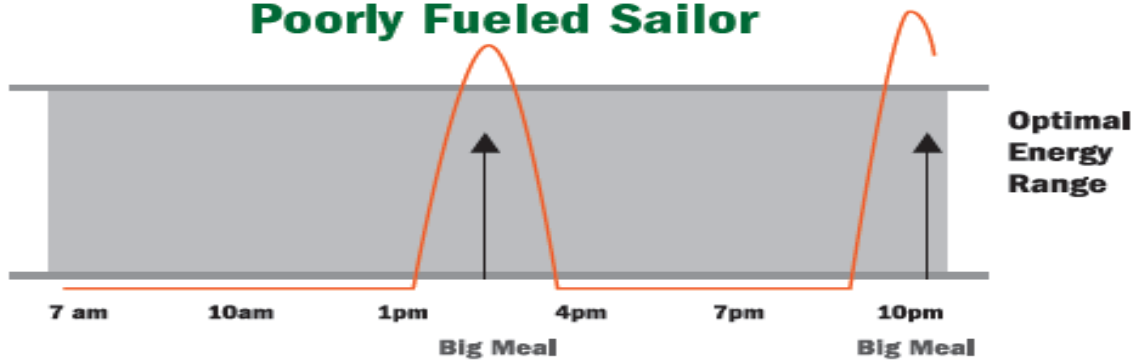
- **78%** eat breakfast every day
- **75%** weigh themselves at least once a week
- **62%** watch less than 10 hours of TV per week
- **90%** exercise, on average, about 1 hour per day

37 Published NWCR Research References

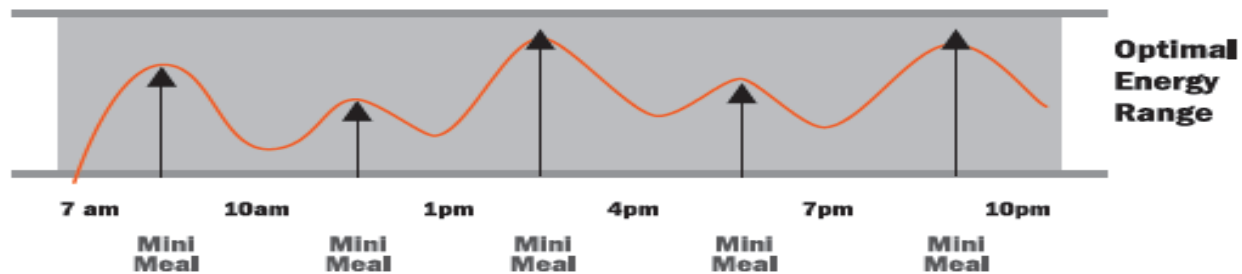


Nutrition – EAT OFTEN

Poorly Fueled Sailor



Optimally Fueled Sailor



NOFFS Operational Fueling, 2010 - present



NMCPHC Body Fat Composition Analysis (Male)

A component of the Fall 2016 Command Sponsored Exercise Program

BACKGROUND – Lange Caliper Analysis: Subcutaneous body fat can be measured using a device called a skinfold caliper. In an average person, approximately 50% of body fat can be distributed just below the skin. For this reason, body composition can be easily calculated using the right tools and formulas. Skinfold formulas are derived from calculations based on extensive research derived from hydrostatic weighing. In general, the skinfold caliper method produces a measurement that is +/- 2.0 to 3.5% of that obtained in hydrostatic weighing. Given the variability in fat distribution from site to site, it is recommended that multiple sites be analyzed. *** NOTE: The 3 site Lange Caliper analysis cannot be utilized as any part of PRT data; this analysis is not affiliated with the Navy's PRT.

NAME: _____

Age: _____

October 2016 Results:

Weight: _____
Chest: _____
Thigh _____
Abdominal _____
Total: _____

Findings:
Lean Body Mass LBS: _____
Fat LBS: _____

January 2017 Results:

Weight: _____
Chest: _____
Thigh _____
Abdominal _____
Total: _____

Findings:
Lean Body Mass LBS: _____
Fat LBS: _____

**NMCPHC
Command
Sponsored Exercise
Program**

06 October 2016



06 January 2017

Sponsored by: NMCPHC Intra Command HPW Advisory Council

Email: diana.settles@navy.mil

Importance of Exercise for Weight Loss

- Research shows that the combination of exercise and diet is more effective than diet alone or exercise alone.
- Learning from Americans successful in losing weight & keeping the weight off for more than a year:



89% success using a combination of diet and exercise

- **10%** success in dieting alone
- **1%** success in exercise alone



- Exercise helps you lose weight **AND** improves physical fitness.

American Council on Exercise, 2009

ACSM Guidelines & Weight Loss



Duration of Physical Activity required for

- 1. Losing weight**
- 2. Keeping weight off after weight loss**
 - 250 – 300+ minutes per week of moderate intensity
 - Activity = Approx. 2000kcal a week

Duration of Physical Activity required for

- 1. Preventing weight gain**
- 2. Reducing chronic disease risk factors**
 - 150 - 250 minutes per week of moderate intensity
 - Activity = 1200 – 2000kcal a week

Note: 1 min. vigorous intensity activity = 2 min. moderate intensity activity

American College of Sports Medicine, 2009



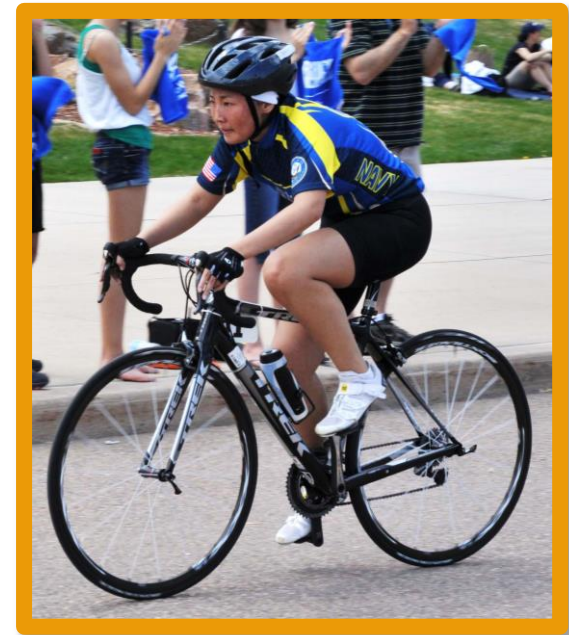
Intensity--Moderate

- You're working hard enough to raise your heart rate and break a sweat.
- Can talk, but not sing the words to your favorite song.
- Examples of activities that require moderate effort (63%-76% of predicted HR MAX):
 - Walking fast
 - Riding a bike leisurely on level ground or with few hills
 - Pushing a lawn mower, raking leaves, yardwork
 - Vacuuming / consistent house cleaning



Intensity--Vigorous

- When working at this level, you're breathing hard and fast, & your heart rate has gone up quite a bit.
- Won't be able to say more than a few words without pausing for a breath.
- Examples of activities that require vigorous effort (77%-86% of predicted HR MAX):
 - Jogging or running
 - Swimming laps
 - Cycling fast or on hills
 - Elliptical Training at a high intensity



How / When Calories are Burned

- **Resting Metabolic Rate Amount:** energy used while lying or sitting = **60 – 70%** of daily expenditure. *Muscle mass burns approx. 35 calories per pound; fat mass burns approx. 2 calories per pound* (Wayne Wescott, 2005).
- **Thermic effect of food:** energy required to process the food we eat = **10%**.
- **Physical activity associated with work, recreation, or sports = 20 – 30%** of daily expenditure.



Burning Calories Effectively During the Day

- Muscle mass (lean body mass) plays a very important role in body fat reduction.
 - Increased muscle mass INCREASES your metabolism = burning more calories throughout the entire day.
- What are key strategies to increase your lean body mass?

“Movement Breaks”



Strength Training



Interval Training



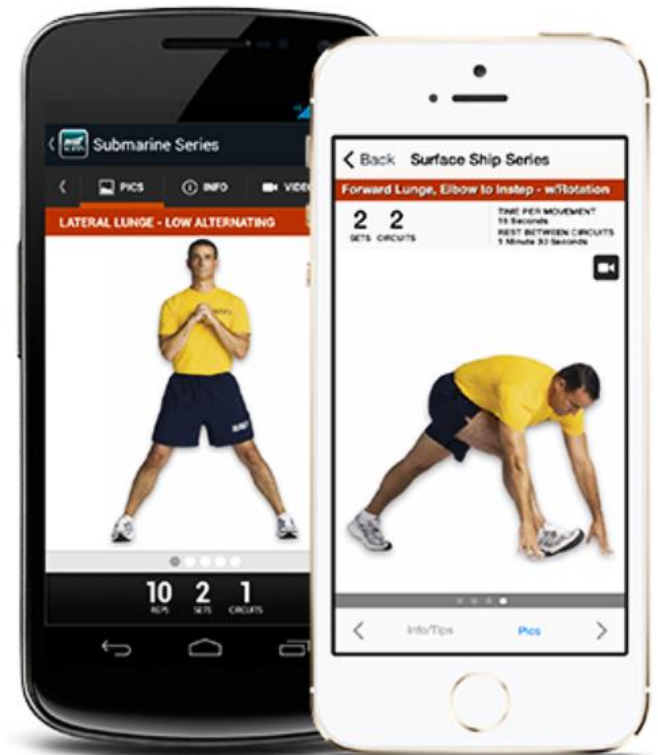
NOFFS – The Navy’s Performance Training System

NOFFS APP: AVAILABLE NOW!

NOFFS

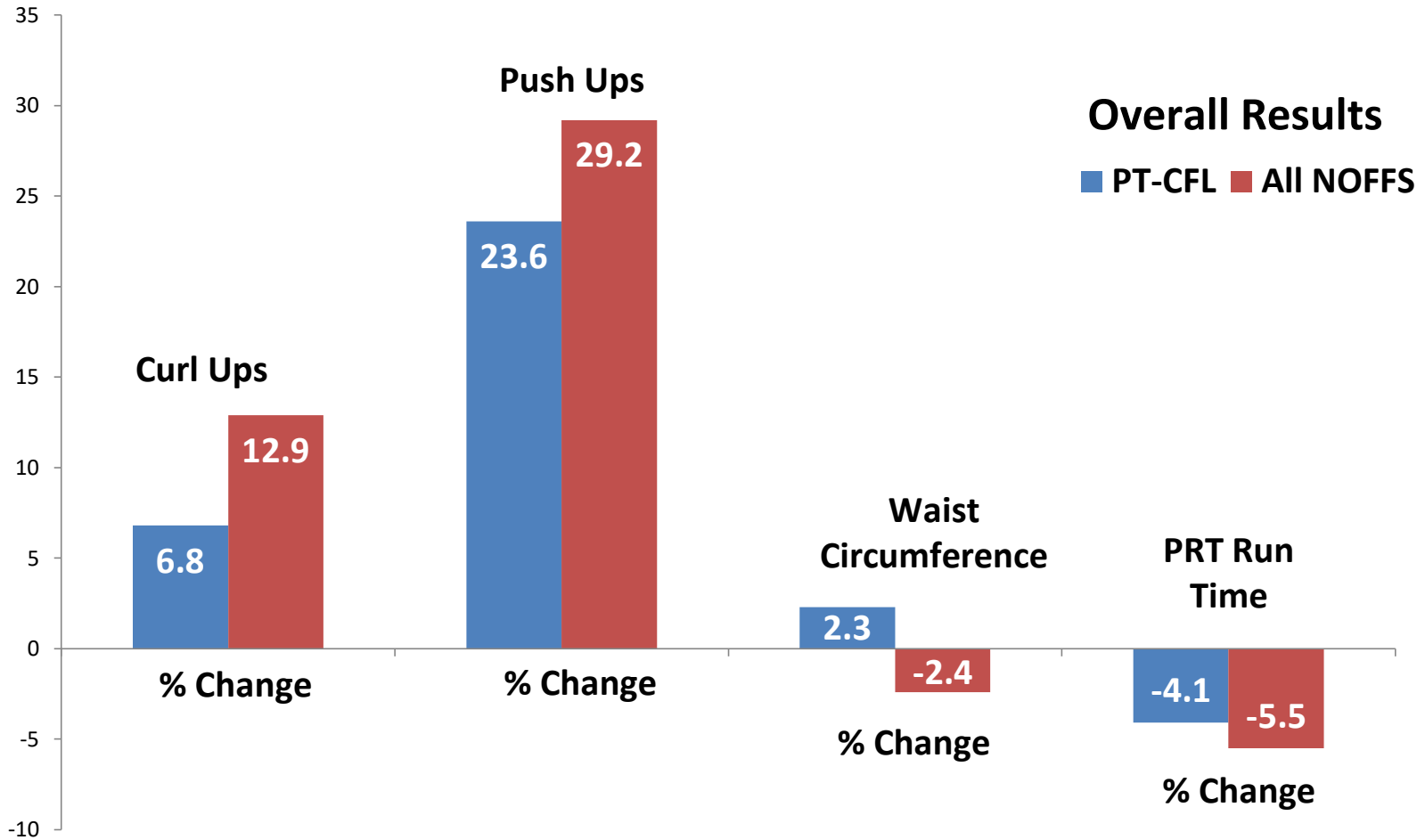
Navy Operational Fitness and Fueling System

- NOFFS website = downloadable resources.
- Take NOFFS with you - use the APP!



(Navy NOFFS Workout System, 2010 – present)

NOFFS- Effective for Body Fat Reduction



NOFFS Body Fat Loss Evaluation: 8 weeks

- Informal study conducted during the holiday season
- Husband (blue) and Wife (red)

Date	Weight	Chest Caliper	Abdominal Caliper	Thigh Caliper	Fat lbs	LBM lbs	Body Fat Comp
10 Nov.	166	17	35	16	36.5	129.5	22.2%
5 Jan.	160	15	29	10.5	28.6	131.4	17.9%

Date	Weight	Tricep Caliper	Suprailiac Caliper	Thigh Caliper	Fat lbs	LBM lbs	Body Fat Comp
10 Nov.	143	34	41	38.5	55	88	38.5%
5 Jan.	143.5	31	24	34	47.3	96.2	33.0%

NOFFS Website or Apps

<http://www.navyfitness.org/fitness/noffs/>

NOFFS: Navy Operational Fitness & Fueling Series

Surface Ship Series Duration: 30 min ● 45 min ● 60 min Equipment: Full Equipment - Dumbbell w/ Stretch Strap Cardio: Stage 6 Level: Level 2

Squat To Overhead Press - Dumbbell

Print Summary



10 REPS **1** SETS **1** CIRCUITS

Description

Starting Position:
Stand with your feet shoulder width apart, holding dumbbells at your shoulders with your elbows facing forward.

Category	Exercise	REPS
Pillar Prep	Pillar Bridge w/ Arm Lift	6
	Glute Bridge - Marching (Knee Extension)	6
	Y's Bent Over	6
Movement Prep	Mini Band - Bent Knee Lateral Walk	4
	Reverse Lunge, Elbow to Instep - In Place	4
	Lateral Squat - Low Alternating	4
	Inverted Hamstring	4
Strength A	Romanian Deadlift - 1 Leg Dumbbell	10
	Bench Press - Alternating Dumbbell	10
	Split Squat - Rear Foot Elevated Dumbbell	10
	Bent Over Row - 1 Arm 1 Leg Dumbbell	10
Strength B	Squat To Overhead Press - Dumbbell	10
	Lateral Pillar Bridge - w/ Abduction	10
	Curl - 1/2 Kneeling Dumbbell	10
	Crunches	10

(Navy NOFFS Workout System, 2010 – present)



Getting Started – Selecting a Program

1. Choose a program: Surface Ship Series

2. Choose a strength training choice:

a. Fit-Kit (resistance tubing)

b. Free Weights

3. Choose a level: There are 3 levels.

4. Choose how long do you want to work out?

● Short = 30 minutes ● Medium = 45 minutes ● Long = 60 minutes

5. **POWER UP -- Get Started!!!**

(Navy NOFFS Workout System, 2010 – present)



Getting Started – Exercising Safely

■ **Intrinsic (Internal)**

- Prior injury – asymmetries – functional movement
- Male – over 45 / Female over 55
- Tobacco / nutrition
- Aerobic (fitness level & participation)

■ **Extrinsic**

- Training surface
- Environment (temperature)
- Equipment
- Risk of activity



Key Components of an Exercise Program

“How to Do it”: NOFFS

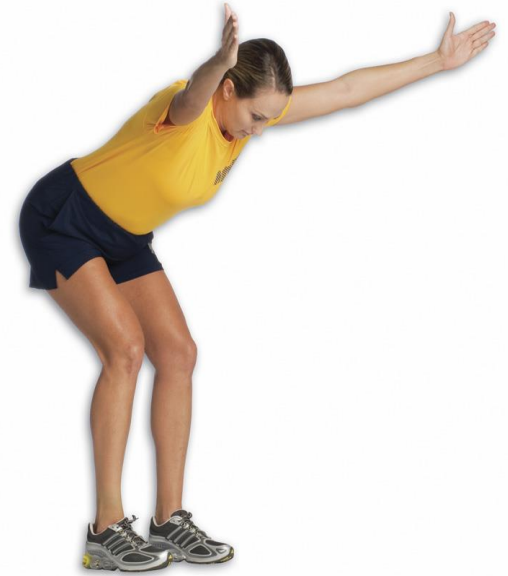
1. **Pillar Preparation**
2. **Movement Preparation**
3. **Strength**
 - *Fit Kits*
 - *Free Weights*
4. **Cardiovascular Exercise**
5. **Recovery**



(Navy NOFFS Workout System, 2010 – 2016)

1: Pillar Preparation

- Your Pillar = hips, torso, and shoulders
- The pillar represents the foundation for all your movement
- These first exercises in a workout act as a “bridge” to ensure the seamless transfer of energy throughout the body
- Helps to protect you from injury



2: Movement Preparation

- Designed to help you prepare of the specific demands of a training session.
- “Movement Prep” = a series of active & dynamic stretching involving movements that imitate those similar to the activities for which you are preparing.
- Muscles are stretched through a series of controlled, active movements, holding them only for 1-2 seconds instead of an extensive period of time.



3: Cardiovascular Fitness

- Cardiovascular Interval training is the alternative approach to long slow duration training.
- It will take you from an effort level that is easy, up to a hard effort, & then back to an easy level.
- **Benefits:**
 - Increase caloric burn
 - Increase in metabolism during your training & after
 - Motivational
 - Improve PRT run time



4: Strength

- Focus is on using multi joint movements & integrated movements that work through multiple planes of motion, not the old traditional workouts – that included only on single planes of motion.
- We train body movements instead of body parts because everything is about the body's engineering is connected.



5: Recovery

- Allowing your body to properly recover, reduces your injury potential.
- Without recovery exercises as part of your program, you could find yourself with nagging aches & pains that eventually lead to injury.
- **Benefits:**
 - Increases flexibility
 - Ensures body is balanced
 - Isolates & relieve build up



NOFFS Operational Fueling

NAVY OPERATIONAL FUELING



SURFACE SHIP SERIES - LEVEL 1



Nutrition & Injuries





Operational Fueling Key Components

- **Introduction**
 - Eat Clean
 - Eat Often
 - Hydrate
 - Recover
 - Mindset
- **Performance Nutrition Fundamentals**
- **Rules to Live By**

EatCleanEatOftenHydrateRecoverMindset

EAT THE RAINBOW OR CLEAR

Fruits and Vegetables

- Fruits and vegetables are a great source of high fiber carbohydrates.
- Fruits and vegetables provide our body with a combination of vitamins that cannot be replicated in a supplement.
- Different colors serve different roles in the body.
- Aim for at least 3 colors at every meal.
- Over the course of the day strive to eat 2 servings of fruit and 3 servings of vegetables.

COLOR CODE OF RESTORATIVE NUTRITION

The diagram shows a human silhouette with five callout boxes connected by lines to specific body parts:

- Yellow Foods:** Optimizes brain functions.
- Red Foods:** Supports heart and circulation.
- Green Foods:** Rejuvenates muscles and bone.
- White Foods:** Enhances immune system, lymph system, and cellular recovery.
- Purple Foods:** Promotes microcirculation.
- Orange Foods:** Supports skin and mucous tissues.

A collage of four small images at the bottom of the slide: a chef in a white uniform, two people in yellow shirts, a close-up of fresh vegetables, and a chef in a white uniform.

The logo of the Navy and Marine Corps Public Health Center, identical to the one in the top left corner.



Operational Fueling Key Components

- **The Big Three: Carbohydrate, Protein, Fat**
- **Eat the Rainbow**
- **Fuel Up “Three Every Three”**
- **Hydrate**
- **Recovery Nutrition: Don’t Waste Your Workout**
- **Male & Female Meal Builder**

Eat Clean Eat Often Hydrate Recover Mindset

DON'T WASTE YOUR WORKOUT

Recovery in 3's: Pre, During, and Post-Workout
Post Workout

- The sooner you get your post-workout nutrition, the quicker you recover.
- Your recovery snack or meal – such as a granola bar with at least 5g of protein or a fruit smoothie – makes up one of your 5 - 6 meals per day.

THE OPEN WINDOW OF OPPORTUNITY TO GET YOUR BODY THE NUTRIENTS IT NEEDS FOR RECOVERY.

10 minutes
30 minutes
60 minutes
90 minutes
120 minutes

• **Re-Fuel** • **Re-Build** • **Re-Hydrate**

Within 10 minutes of training:

1. Refuel with carbohydrate
The more intense the training, the more carbohydrate you need.

2. Rebuild with protein
Protein needs post workout are based on body weight.

3. Rehydrate with fluid
Drink 20-24oz of fluid for each pound lost during training.

What do you need to recover?

BODY WEIGHT (POUNDS)	GRAMS OF PROTEIN	GRAMS OF CARBOHYDRATE
120 - 150	15 - 20	30 - 60
150 - 180	20 - 25	40 - 75
181 - 215	25 - 30	50 - 90
215 - 245	30 - 35	60 - 105

Examples:

- 20oz low-fat chocolate milk + banana
- Turkey and pasta salad
- Tuna sandwich w/ baked chips
- Meal replacement bar + 20oz sports drink
- Scrambled eggs or egg whites with whole wheat toast and 6oz juice
- Turkey sandwich + yogurt
- Spaghetti and meatballs
- Fruit smoothie blended with yogurt or whey protein



NOFFS

Reducing Body Fat Composition



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NMCPHC

Body Fat Composition Analysis

A component of the Fall 2016 Command Sponsored Exercise Program

General Body-fat Percentage Categories

Classification	Women (% fat)	Men (% fat)
Essential fat	10–13%	2–5%
Athletes	14–20%	6–13%
Fitness	21–24%	14–17%
Average	25–31%	18–24%
Obese	32% and higher	25% and higher

Standard Values for Percentage Body Fat

Percentile (Men)	Age (years)				
	20–29	30–39	40–49	50–59	60+
90	7.1	11.3	13.6	15.3	15.2
80	9.4	13.9	16.3	17.9	18.4
70	11.8	15.9	18.1	19.8	20.3
60	14.1	17.5	19.6	21.3	22.0
50	15.9	19.0	21.2	22.7	23.5
40	17.4	20.5	22.5	24.1	25.0
30	19.5	22.3	24.1	25.7	26.7
20	22.4	24.2	26.1	27.5	28.5
10	25.9	27.3	28.9	29.3	31.2
Percentile (Women)	20–29	30–39	40–49	50–59	60+
90	14.5	15.5	18.5	21.6	21.1
80	17.1	18.0	21.3	25.0	25.1
70	19.0	20.0	23.5	26.6	27.5
60	20.6	21.6	24.9	28.5	29.3
50	22.1	23.1	26.4	30.1	30.9
40	23.7	24.9	28.1	31.6	32.5
30	25.4	27.0	30.1	33.5	34.3
20	27.7	29.3	32.1	35.6	36.6
10	32.1	32.8	35.0	37.9	39.3

Desired body weight = [Lean body weight / (100% – Desired % fat)] x 100

Sample Goal Weight Calculation

To determine a goal weight based on body composition, a few simple calculations are necessary.

Starting information: Female client's current weight is 168 pounds, with 28% body fat

Initial goal: To achieve 24% body fat without losing lean tissue

- *Determine fat weight in pounds:*
Body weight x body-fat percentage (BF%)
168 lb x 28% = 47 lb of fat
- *Determine lean body weight (LBW):*
Total weight – Fat weight
168 lb – 47 lb = 121 lb of lean tissue (also called lean body mass)
- *Calculate goal weight:* Divide current LBW by 76% (100% – Goal BF%)
121/0.76 = 159 lb



NMCPHC Body Fat Composition Analysis (Female)

A component of the Fall 2016 Command Sponsored Exercise Program

BACKGROUND – Lange Caliper Analysis: Subcutaneous body fat can be measured using a device called a skinfold caliper. In an average person, approximately 50% of body fat can be distributed just below the skin. For this reason, body composition can be easily calculated using the right tools and formulas. Skinfold formulas are derived from calculations based on extensive research derived from hydrostatic weighing. In general, the skinfold caliper method produces a measurement that is +/- 2.0 to 3.5% of that obtained in hydrostatic weighing. Given the variability in fat distribution from site to site, it is recommended that multiple sites be analyzed. *** NOTE: The 3 site Lange Caliper analysis cannot be utilized as any part of PRT data; this analysis is not affiliated with the Navy's PRT.

NAME: _____

Age: _____

October 2016 Results:

Weight: _____
Thigh: _____
Suprailium: _____
Tricep: _____
Total: _____

Findings:
Lean Body Mass LBS: _____
Fat LBS: _____

January 2017 Results:

Weight: _____
Thigh: _____
Suprailium: _____
Tricep: _____
Total: _____

Findings:
Lean Body Mass LBS: _____
Fat LBS: _____

**NMCPHC
Command
Sponsored Exercise
Program**

06 October 2016



06 January 2017

Sponsored by: NMCPHC Intra Command HPW Advisory Council

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