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# **WEIGHT MEASUREMENTS AND STANDARDS FOR SOLDIERS**

## **PENNINGTON BIOMEDICAL RESEARCH CENTER**

**Final Addendum September 15, 2008 – November 30, 2010**

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**Abstract**  
**Weight Measurements and Standards for Soldiers**  
**(Contract # W81XWH-05-2-0082)**

**Keywords:**

Readiness, performance, weight standards, fitness standards, internet intervention

**Objective:**

The purpose of this three-year study is to: 1) implement a computerized database to track the fatness and physical performance of Reservists assigned to the 94<sup>th</sup> RRC, 2) provide the 94<sup>th</sup> RRC with an environmental/internet-based intervention to increase health risk communication and promote healthy body weight/fatness and physical performance, 3) monitor the fatness and physical performance of the Reservists for two years following a one-year baseline period to evaluate the efficacy of the intervention, and 4) evaluate consumer satisfaction with the intervention. Hypothesis: It is hypothesized that implementation of the environmental/internet-based intervention will be associated with a significant increase in the percentage of Army Reservists who meet maximal body weight/fat and minimal fitness standards. Current plans are to complete the project by December 2010. Therefore this report describes progress made during that past two years. A final report will be filed after completion of the study (December 2010).

**Study Design:**

This is a quasi-experimental study that utilizes a within-subjects and repeated measures design. Weight/fatness and physical performance data will be collected before and after the intervention is implemented.

**Military Relevance:**

The prevalence of overweight and obesity is increasing in the United States and Soldiers are not immune to this trend. At a significant cost to the military, 2705 Soldiers were discharged in FY03 for failure to meet body fat standards. Effective interventions to reduce body fat and increase physical performance among Soldiers will save the military financial and material resources and increase combat readiness.

Unlike clinic-based interventions, the proposed intervention will target an entire population of Reservists.

**Public Purpose:**

The intervention proposed in this project can serve as a pilot study and prototype for general use in the general population to reduce/prevent overweight.

## **Introduction**

The primary aim of this investigation, entitled “Weight Measurement and Standards for Soldiers” was to provide a non-clinical, environmental approach for weight gain prevention and modest weight loss for Soldiers of the 94<sup>th</sup> Regional Readiness Command in the New England Region. This program is called “Healthy Eating, Activity, Lifestyle Training Headquarters (H.E.A.L.T.H.).” It is the second of two pilot studies used to evaluate the efficacy and efficiency of a novel internet based approach to weight maintenance and weight loss. Currently, the third phase of the HEALTH program is being conducted with the Louisiana Army National Guard (LANG) in a randomized Controlled Study (RCT).

Soldiers who fail to meet Army requirements for body fat defined by AR 600-9, the Army Weight Control Program (AWCP), and fitness standards defined by FM 21-20, Physical Fitness Training, Army Physical Fitness Test (APFT) are the primary targets of the intervention. Soldiers with body weights that approach the maximal allowable weight as defined by AR 600-9 are also targets of the intervention.

This report serves as the final addenda to the final report sent September 2009. The following sections provide details about accomplishments that are directly related to the Statement of Work and research that has been accomplished since the final report.

## **Statement of Work**

### **Weight Measurements and Standards for Soldiers**

#### **Statement of Work (September, 2005)**

- Overarching scope of work: Pennington Biomedical Research Center (PBRC) will collaborate with the US Army Research Institute of Environmental Medicine (USARIEM) and the US Army Medical Research and Materiel Command (USAMRMC) to implement a computer database to record and track the body weight/fatness and physical performance of Reservists assigned to the 94<sup>th</sup> Regional Readiness Command (RRC). The research team will assist in further developing an intervention designed to help service personnel achieve compliance with military body composition and physical performance standards.
- PBRC personnel will work closely with the Executive Committee (Donald Williamson, Ph.D., COL Karl Friedl, Ph.D., COL Gaston Bathalon, Ph.D., MAJ Lori Sigrist, Ph.D., Andrew Young, Ph.D., CAPT Van Hubbard, M.D., Ph.D., and Donna Ryan, M.D.) formed to guide this project.
- In Year 1, the PBRC team will deliver the Military Services Fitness Database (MSFD) to the 94<sup>th</sup> RRC. This computer database records and stores Soldiers' height/weight (body fat) and Army Physical Fitness Test (APFT) data. It can be used for all military services and meets the mandate of Department of Defense Instruction (DoDI) 1308.3 (2002) as a standardized method of collecting and storing Soldiers' fatness and physical performance data.
- Following delivery of the MSFD, 94<sup>th</sup> RRC personnel will be trained in its use, i.e., how to enter data and obtain reports on Reservists' body weight/fatness and fitness. The MSFD provides an easy way to obtain these valuable real-time readiness data.
- During Year 1, the MSFD will be used to collect baseline data. These data will consist of height/weight (fatness) and physical performance data, including whether or not the Reservist passed or failed fatness and physical performance standards.
- In collaboration with the 94<sup>th</sup> RRC leadership and USARIEM personnel (COL Bathalon, MAJ Sigrist), the PBRC research team will evaluate the unique health risk communication, weight management, and fitness needs of the Reservists assigned to the 94<sup>th</sup> RRC. This information will be used to modify an environmental/internet-based intervention to meet the needs of the 94<sup>th</sup> RRC. The intervention is designed to help Reservists achieve and maintain body weight/fatness and physical performance standards. Its content will be regularly reviewed by the Executive Committee and the 94<sup>th</sup> RRC leadership.
- During Year 2, the environmental/internet intervention will be implemented in the 94<sup>th</sup> RRC. This will be a two-year intervention (Years 2 and 3), consisting of a website designed to promote health risk communication and healthy body weight/fatness through healthy nutrition and physical activity. The intervention will be promoted and continuously modified to meet the needs of the 94<sup>th</sup> RRC Reservists.
- During Years 2 and 3, body fat and physical performance data will be collected. These and Year 1 data will be used to test the efficacy of the intervention. It is hypothesized that

implementation of the intervention will be associated with a significant increase in the percentage of Army Reservists who meet body fat and physical performance standards.

A summary of progress toward meeting these milestones and objectives is provided in the addenda.

## **Project Deviations**

1. The Regional Level Application Software (RLAS) is an internal tracking system utilized by the Army Reserve. This system contains APFT and soldier information that would be contained in the MSFD. Therefore, the MSFD was not required and we decided to extract information from RLAS in January and July of each year.
2. Data from the website regarding utilization and self reported weight and APFT results will continue to be gathered during the approved one year No-Cost-Extension (NCE) period. Data collection will end December 31<sup>st</sup> 2010.
3. Data analysis and writing manuscripts began in July 2009 and will continue through December 31<sup>st</sup> 2010.
4. The New England study is a pilot study that is designed to provide preliminary data for planning a controlled outcome study to test the efficacy of the H.E.A.L.T.H. intervention for prevention of weight gain and reducing fatness and increasing fitness, as measured by the APFT. To accomplish this objective, a cluster (group) randomized trial has been developed and started with the Louisiana Army National Guard. The LANG project began April 2010 and is designed to run through April 2015.
5. In previous research for the Department of Defense, Dr. Williamson's research team developed the digital photography method for measuring food intake and food selections. This line of research will be continued by developing and validating a semi-automated method for quantifying data derived from digital photography. This research is known as the Remote Food Photography Method (RFPM).
6. The official study period for the New England project was extended to December 31, 2010. This extension was approved through a no-cost extension (NCE). The NCE period allowed the research team to complete the intervention and provided an observation window to evaluate the importance of the H.E.A.L.T.H. promotion program. The NCE period was also be used to analyze data and prepare manuscripts.

## Addenda

### Final Addenda (September 15, 2008 –November 30, 2010)

Our work from September 15 2008 – July 31<sup>st</sup> 2009 mainly focused on increasing utilization of the website and continuing to collect RLAS data from the 302<sup>nd</sup> and 655<sup>th</sup> units. The H.E.A.L.T.H. website promotion program (e.g. utilizing New England field managers to promote use of the website to soldiers, mass website promotion) officially ended July 31<sup>st</sup> 2009, and thereafter, we have observed website utilization.

#### Executive Advisory Committee

The Executive Committee (Donald Williamson, Ph.D., COL Karl Friedl, Ph.D., COL Gaston Bathalon, Ph.D., LTC LesLee Sanders, PhD., Andrew Young, Ph.D., ADM Van Hubbard, M.D., Ph.D., and Donna Ryan, M.D.) guides the conduct of the study. The committee has met annually for the duration of this study and intends to continue meeting annually in support of the LANG study. The previous meeting was held in Baltimore, MD (December 2009). In addition, Dr. Williamson last briefed the contract officer, Dr. Andrew Young on recent progress in July 2009.

#### Completed Travel Schedule (August, 2008-December, 2010)

Matt McGucken	Boston	11/1/08 - 11/4/08	nutrition presentation/web promotion
Shelly Duhe'	Boston	11/1/08 - 11/3/08	nutrition presentation
Alicia Sample	Boston	12/5/08 -12/8/08	nutrition presentation
Matt McGucken	Boston	12/4/08 -12/9/08	nutrition presentation/web promotion
Robert Newton	Boston	2/6/09 - 2/9/09	nutrition presentation/web promotion
Matt McGucken	Boston	2/6/09 - 2/9/09	nutrition presentation/web promotion
Laura Moran	Boston	2/6/09 - 2/9/09	nutrition presentation/web promotion
Shelly Duhe'	Manchester NH	2/27/09 - 3/1/09	nutrition presentation
Laura Moran	Boston	3/6/09 - 3/9/09	nutrition presentation
Matt McGucken	Boston	3/11/09 - 3/15/09	nutrition presentation/web promotion
Alicia Sample	Boston	3/13/09 - 3/15/09	nutrition presentation
Alicia Sample	Boston	4/3/09 - 4/6/09	nutrition presentation
Laura Moran	Providence, RI	4/17/09 - 4/19/09	nutrition presentation
Don Williamson	Baltimore, MD	5/20/09 - 5/22/09	meeting at CHPPM
Tiffany Stewart	Baltimore, MD	5/20/09 - 5/22/09	meeting at CHPPM
Don Williamson	Boston, MA	7/27/09 - 7/31/09	close out NE study
Matt McGucken	Boston, MA	7/27/09 - 7/31/09	close out NE study
Melanie Spinks	Baltimore, MD	12/3/09-12/5/2009	PBRC/ DoD Executive Committee Meeting
Don Williamson	Baltimore, MD	12/3/09-12/5/2009	PBRC/ DoD Executive Committee Meeting
Matt McGucken	Baltimore, MD	12/3/09-12/5/2009	PBRC/ DoD Executive Committee Meeting
Corby Martin	Baltimore, MD	12/3/09-12/5/2009	PBRC/ DoD Executive Committee Meeting
Robert Newton	Baltimore, MD	12/3/09-12/5/2009	PBRC/ DoD Executive Committee Meeting

**RLAS and APFT data collection:**

RLAS data from July to December of 2008 was extracted in February of 2009 (Table 1). Data were collected on a total of 573 Soldiers (498 men and 75 women) with at least one APFT record in the RLAS system in the Fall of 2008 (See Table 2). The average weight for men was about 2 lbs. above the screening table weight, while the average weight for females was equal to the weight standard. In the Fall of 2008, 227 (45.6%) men and 34 women (45.3%) failed the screening table weight at least once. In addition, 59 (11.9%) men and 16 women (21.3%) failed the body fat standard at least once. The average APFT scores for Soldiers was 208.1 and 193.2 for males and females, respectively. These scores are higher than the minimal APFT score (180). It is important to note that the screening table weights and the body fat taping standards were altered for females in 2007. This change became effective April 2, 2007 with the release of the new AR 600-9 regulations.

Table 1. 94<sup>th</sup> RRC APFT data extracted from RLAS in Fall of 2008.

<b>Sex</b>	<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>sd</b>	<b>Minimum</b>	<b>Maximum</b>
<b>Male</b>	Age	498	31.2	8.7	20.0	58.0
	Weight	498	187.4	30.6	116.0	306.0
	Weight Deviation	498	2.1	26.3	-58.0	100.0
	FatPct	217	22.7	5.5	10.0	71.0
	%Fat Deviation	217	-0.8	5.5	-14.0	49.0
	APFT Total Score	450	208.1	44.4	70.0	300.0
<b>Female</b>	Age	75	28.8	8.2	21.0	56.0
	Weight	75	147.6	25.0	103.0	205.0
	Weight Deviation	75	0.0	21.4	-33.0	45.0
	FatPct	32	35.6	5.3	28.0	49.0
	%Fat Deviation	32	2.2	4.9	-6.0	15.0
	APFT Total Score	62	193.2	57.0	70.0	300.0

Note. Age in years; Weight in pounds; Weight deviation refers to the number of pounds from the Army screening table weight; FatPct in percent body fat; % Fat Deviation from Army body fat standard is the deviation from the maximal allowable fat estimate; APFT Total Score refers to APFT score units.

RLAS data from January 1<sup>st</sup> to June 30<sup>th</sup> of 2009 was extracted (Table 2). Data were collected on a total of 523 Soldiers (464 men and 59 women) with at least one APFT record in the RLAS system (See Table 3). The average weight for men was about 2 lbs. above the screening table weight, while the average weight for females was 3lbs. above the weight standard. In the Spring of 2009, 214 (46.1%) men and 31 women (52.5%) failed the screening table weight at least once. In addition, 68 soldiers failed the body fat standard at least once. The average APFT score was 215.4 and 203.0 for male and female soldiers, respectively. These scores are higher than the minimal APFT score (180).

Table 2. 94<sup>th</sup> RRC data extracted from RLAS in Spring of 2009.

Sex Variable		N	Mean	Stddev	Minimum	Maximum
Male	Age	459	38.9 8.7		19.0 59.0	
	Weight	459	188.0 29.3		119.0 298.0	
Weight	Deviation	459	2.1	25.4	-69.0	90.0
	FatPct	206	22.5 4.2		13.0 36.0	
%Fat	Deviation	206	-1.1	4.1	-11.0	14.0
	APFT Total Score	405	215.5	43.2	60.0	300.0
Female	Age	59	27.0 8.5		18.0 53.0	
	Weight	59	152.3 24.5		109.0 217.0	
Weight	Deviation	59	2.8	20.8	-34.0	48.0
	FatPct	29	24.4 4.8		24.0 45.0	
	%Fat Deviation	29	0.8 4.6 -10.0			11.0
	APFT Total Score	46	202.8	60.0	70.0	300.0

Note. Age in years; Weight in pounds; Weight deviation refers to the number of pounds from the Army screening table weight; FatPct in percent body fat; % Fat Deviation from Army body fat standard is the deviation from the maximal allowable fat estimate; APFT Total Score refers to APFT score units.

### H.E.A.L.T.H. website.

Since the previous report, there have been no adaptations to the website for the New England population. However, there have been modifications to the H.E.A.L.T.H. website, which are reflected in the website being used for the LANG study. The concepts of the H.E.A.L.T.H. website were refined through the feedback that was received during the New England study. Items such as improve user friendliness and functionality, as well as enhanced visual appeal were key to the website's redevelopment. Illustrations of the page revisions can be seen here:

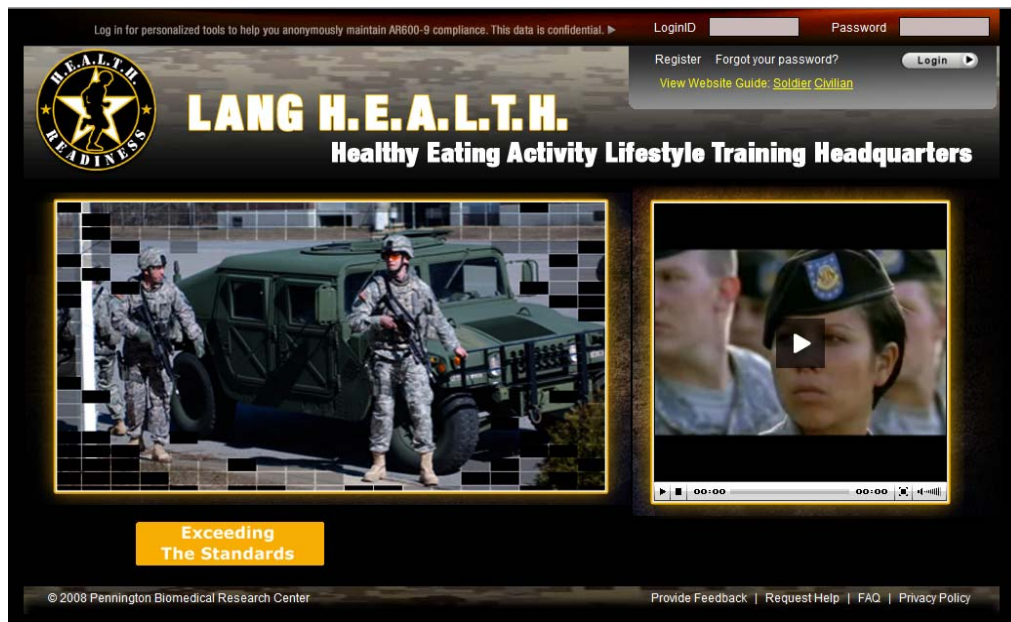


Figure 1: New H.E.A.L.T.H. Homepage



Figure 2: New My H.E.A.L.T.H. Page

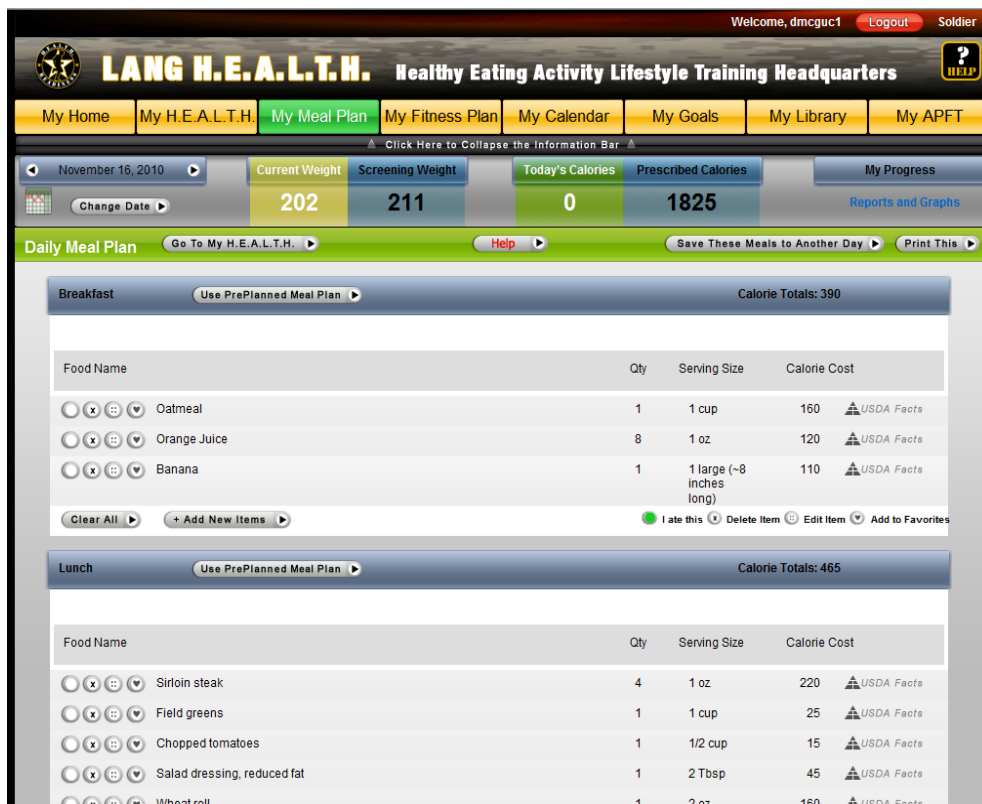


Figure 3: New My Meal Plan Page

Welcome, dmcguc1 [Logout](#) Soldier

**LANG H.E.A.L.T.H.** Healthy Eating Activity Lifestyle Training Headquarters [? HELP](#)

My Home | My H.E.A.L.T.H. | My Meal Plan | My Fitness Plan | My Calendar | My Goals | My Library | My APFT

Click Here to Collapse the Information Bar

November 16, 2010 [Change Date](#)

Current Weight: 202 | Screening Weight: 211 | Today's Calories: 0 | Prescribed Calories: 1825 | My Progress [Reports and Graphs](#)

Please enter your most current APFT scores below. You can either enter the results or the score for each test. To see acceptable results for APFT scores, click [here](#).

	Results	or Scores	
Push-ups:	(reps) 65	90	<div style="width: 90%; background-color: green;"></div> 90
Sit-ups:	(reps) 45	64	<div style="width: 64%; background-color: green;"></div> 64
2-Mile Run	(min:sec) 17 : 0	66	<div style="width: 66%; background-color: green;"></div> 66
Total Score:			<div style="width: 220%; background-color: green;"></div> 220

[Reset](#) [Save](#)

Enter the date of your next APFT and a supplemental exercise plan will be added to your regular plan in order to help you prepare. See the [instructions](#) for more information.

Last APFT Scheduled: No APFT Scheduled

[Enter Date](#)

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*Figure 4: New My APFT Page*

## **H.E.A.L.T.H. promotion program.**

The goal of the H.E.A.L.T.H. promotion program was to promote the use of the H.E.A.L.T.H. website to the Soldiers within the 94<sup>th</sup> RRC (now the 655<sup>th</sup> and 302<sup>nd</sup>). From September 15<sup>th</sup>, 2008 until June 30<sup>th</sup>, 2009, we have also utilized a promotional strategy that focused on nutritional education. This feature utilizes a Registered Dietician. Our team dieticians have made regular trips to the units of the 302<sup>nd</sup> and 655<sup>th</sup> to discuss current dietetic and nutrition events. Among the topics discussed were fad diets, sport drinks, supplements, and the myths that are associated with them. Participation by the attending soldiers was robust. This addition to the promotion program was seen as a complete benefit to the soldiers. It also provided a way to tie the use of the website to the soldiers.

In August, 2009, Mr. John Lambert and Mr. Jeff Wiggins ended their employment with PBRC and the Army H.E.A.L.T.H. research effort due to the ending of the active promotion program. Therefore, during the final year of the program, there was no promotion of the H.E.A.L.T.H. website to soldiers. Although it was planned that Mr. John Lambert would be available to collect the final 2009 New England Data (non-promotional website activity) in April-July 2010, we have been unsuccessful in obtaining any RLAS data after August, 2009.

In preparation for the randomized controlled study that is currently being executed within the Louisiana Army National Guard, our team conducted a complete review/assessment of all the promotional activities that were conducted in the past 2 years in the New England study. From this comprehensive review, the activities, promotional items, and scheduling of events have been tailored to provide the greatest impact for the randomized controlled study.

## **Website utilization**

Through September 31, 2009, 1473 Soldiers had registered on the website. That date is significant because it ended the active promotion program of the H.E.A.L.T.H. program to the New England Army Reserve Units that were participating in the H.E.A.L.T.H. study. At that time, one hundred thirty-five soldiers had made 3 or more visits to the site, and 18 had made ten or more visits. From collected website data, the majority of the soldiers using H.E.A.L.T.H. were white (1082, 73%). A significant majority of the population had a High School Degree (411, 27%), while the remainder of the population was dispersed across various categories including Grade School, 2-Year College Degree, 4-Year College Degree, Vocational Technical School, and Graduate School. During the no-promotion period (August 2009 - December 2009) and continuing through the one year NCE period (January 2010- December), an additional 39 Soldiers registered on the website.

Most soldiers who registered on the website were combat support services (478, 32%) and have more than 10 years experience in the military. About ¼ of the registered users were of the NCO rank. The majority of persons who registered were Enlisted (507, 34%), while Officers who registered made up a significantly smaller population (122, 8%). These statistics are indicative of the traditional ratio of Officer to Enlisted in today's military establishment. To date, only 128 civilians have registered on the website. The primary reason for this low number is the fact that our promotion efforts were geared more towards making contact with Soldiers rather than families.

User satisfaction ratings were favorable and may be summarized by the following: 1) "the website was easy to use" (user-friendly) =  $5.0 \pm 1.7$ , 2) "the website was personalized and provided customized feedback to me" =  $5.0 \pm 1.6$ , 3) "the website was useful and helped me in my attempts to improve my health" =  $5.1 \pm 1.7$ , and 4) "the website was visually pleasing and easy to read" =  $5.1 \pm 1.7$ .

As of November 15, 2010, 1512 soldiers have registered on the website. One hundred forty-five soldiers have made 3 or more visits to the site, and nineteen have made ten or more visits.

Over the past 13 months there were 39 new registered soldiers, 10 individuals who visited three or more times, and only one soldier who visited ten or more times. It appears that without the health promotion program, awareness and use of the site decline dramatically.

### **Manuscript preparation**

We have utilized the data that has been gathered to prepare a manuscript for submission. The data for this manuscript differs slightly from the data that has been presented above in that it only reports on the longitudinal data. Data from soldiers was included if there was one data point during the baseline period (2005-2006) as well as two of four possible data points at follow up. This resulted in a sample size of 778 soldiers. There were a total of 1473 soldiers who registered onto the H.E.A.L.T.H. website before the health promotion program ended. After the program ended, 1512 soldiers were registered onto the site. There was an average of 54 new registered soldiers per month when the health promotion program was active and 4 new registrations per month after the health promotion program ceased. Over the course of the program, both male and female soldier's average weight exceeded the screening table weight. Male soldiers under the screening table weight and at the warning weight gained significantly more weight ( $p$  values  $< .007$ ) than soldiers above the screening table weight. There were no differences in weight change between the females in the three different weight categories. Nearly 20% of the soldiers exceeding the screening table weight lost weight, whereas less than 10% of the soldiers under the screening table weight and at the warning weight soldiers did so. In addition, between 40% and 55% of soldiers in each weight category gained weight while between 36% and 43% maintained their weight, over the course of the study. APFT scores did not change over time for soldiers whose weight was under the screening table weight or at a warning weight. Scores for soldiers whose weight was above the screening table weight increased significantly ( $p = .003$ ).

The overall findings indicate that the average soldier, whether male or female, gained weight over the course of the study. Differences in weight gain were observed based on the initial weight of the soldier. Therefore, it is possible that the use of the H.E.A.L.T.H. website was associated with weight loss in soldiers exceeding the screening table weight or in the slowing of weight gain specifically in male soldiers. However, without a control group it is impossible to determine if the changes are related to weight loss. Given the overall positive user satisfaction results and user registration, there is support for conducting further internet based weight loss programs within the military. It will be especially important for future studies to include a control group, as with the Louisiana Army and National Guard study described below. It is expected that this manuscript will be submitted for publication in early December 2010.

### **Future Plans**

We are currently collaborating with the Louisiana Army National Guard and conducting a randomized controlled study within its ranks. The LANG H.E.A.L.T.H. study is a cluster (group) randomized controlled trial in which clusters of Louisiana Army National Guard (LANG) units have been randomly assigned to one of two treatment arms: 1) Intervention arm 1: Immediate access to the H.E.A.L.T.H. intervention or 2) Intervention arm 2: Delayed access to the H.E.A.L.T.H. intervention (control group). The research design includes two years of baseline data (collected retroactively), two years of the controlled comparison of the two intervention arms, followed by two years of delivery of H.E.A.L.T.H. to the intervention arm that received delayed access to H.E.A.L.T.H. Access to the H.E.A.L.T.H. intervention will be continued for one additional year for both treatment arms to evaluate utilization and efficacy after discontinuation of the H.E.A.L.T.H. promotion program. Data will be collected from two sources: 1) the Defense Integrated Military Human Resource System (DIMHRS) and 2) the H.E.A.L.T.H. website. The intervention will be delivered to the entire LANG population and all Soldiers in the LANG will be anonymous participants in the study. Data will be collected using routinely obtained annual Army Physical Fitness Tests (APFT).

We launched the H.E.A.L.T.H. website to the LANG population in April 2010 and have submitted reports outlining our efforts quarterly and annually. In support of the LANG study, members of the LANG and PBRC have created an executive committee, which convene monthly to assess the progress and status of the H.E.A.L.T.H. program within the LANG units. This group also meets/ to resolve issues that may arise during the 5 year period of the study. The cluster randomized trial began in April of 2010.

Additionally, we are also continuing our earlier DOD research related to developing reliable and valid measures of food intake and food selections of humans. We are currently focused on measuring the food intake of people while they reside in their natural environment. These methods build upon previous research that our group conducted for the DoD. Specifically, we developed the digital photography of foods method for use with Basic Combat Soldiers at Ft Jackson (1-3). Dr. Corby Martin has expanded on this technology and has developed the Remote Food Photography Method (RFPM) for use in free-living conditions. When using the RFPM, participants take photographs of their food selection and plate waste with a camera-enabled Smartphone and these images are sent to the research center for analysis in real-time. Dr. Martin recently published a paper describing the method and initial tests of its reliability and validity (4). Additionally, Dr. Martin has tested the reliability and validity of the RFPM over seven days in free-living conditions and these data are currently being prepared for publication. Lastly, the method is being used in an NIH-funded randomized controlled weight loss trail, and participants are using the method for 12 weeks to monitor their food intake.

Dr. Martin's work on the RFPM has included novel bioengineering projects to increase the efficiency and accuracy of the method. Specifically, a computer application was developed to manage Ecological Momentary Assessment (EMA) methodology. This methodology involves sending prompts to participants' Smartphones reminding them to take pictures of their food selection and plate waste. The application customizes these messages based on the participant's schedule, and it also sends daily reports to the experimenters. These reports provide a synopsis of the pictures collected to date, as well as participants' responses to the EMA messages. This methodology has resulted in exceptional data integrity and completeness. Lastly, a semi-automated computer application was developed that automatically identifies foods in pictures and estimates the amount of food represented in the pictures. The second version of this application is currently being beta tested and debugged, and it promises to increase our efficiency without compromising accuracy of food intake estimates. The final version of this application is anticipated to be online by spring 2010, and a paper describing the engineering aspects of the application is in press (5).

## **Summary**

The period covering September 15-2008 through November 30, 2010 consisted of two distinct periods: the year-long promotion of the HEALTH website, and removal of the health promotion program during the last year. It is clear that the health promotion program resulted in increased registration compared to the period of non-promotion. Unfortunately, July 31<sup>st</sup> 2009 also marked the last availability of RLAS data. With the main units (655<sup>th</sup> and 302<sup>nd</sup>) merging into exponentially larger units, and with the relocation of G6 personnel whom assisted in RLAS extraction, it was not currently been possible to extract RLAS data. However, there were many lessons learned during the NE study that were subsequently utilized in developing and conducting the LANG project. For example, improvements to functionality, user friendliness, and modification to address the needs of the Louisiana study population were made. In addition, the health promotion program utilized in NE was modified for use in LANG, including fewer soldier to field manager ratio, allowing for on-site website registration via laptop computer, and utilizing military staff to conduct the promotion program.

Additionally, continued funding of this project will continue to support the efforts of Dr. Corby Martin and his advancements with RFPM assessment of food intake. Ultimately, we plan to test the validity of this method for measuring food intake of Soldiers.

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