

Lifestyle Treatment Intervention in Obese Military Members

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Abstract

Obesity is a significant national public health crisis, affecting one-third of American adults. It is a complex and multifactorial disease that increases the risk of multiple chronic medical conditions including coronary heart disease, diabetes, and even leading to potential premature mortality. Moreover, increased health care utilization and escalating medical costs associated with obesity treatment are overwhelming an already burdened health care system. Obesity is nondiscriminatory affecting individuals from various demographic and socioeconomic backgrounds, even extending to our unique population of active duty military service members and veterans. Despite mandatory physical fitness and body composition requirements, active duty service members continue to experience an increasing prevalence of obesity. The obesity epidemic has considerable implications for military readiness, accession, and retention. Limited studies have examined weight-loss interventions including self-paced and provider-led interventions among active duty military service members with varying degrees of success. The purpose of this evidence based doctoral project was to examine the effectiveness of a twelve-week group lifestyle intervention involving education regarding healthy diet, physical activity and behavior change recommendations on weight and body mass index (BMI). The study demonstrated no significant differences in initial and post intervention weight and BMI.

Keywords: obesity, obese, overweight, military, active duty, service member, lifestyle changes, weight loss.

Lifestyle Treatment Intervention in Obese Military Members

Obesity is a significant public health threat due to its pervasiveness, association with chronic comorbidities and escalating healthcare costs. Obesity is a complex and multifactorial disease triggered by behavioral, environmental, genetic and metabolic factors leading to structural abnormalities, functional impairments and physiologic derangements (Jastreboff, Kotz, Kahan, Kelly & Heymsfield, 2019; Kyle, Dhurandhar, & Allison, 2016). Obesity increases the risk of multiple chronic health conditions including coronary heart disease, hypertension, diabetes, cerebrovascular disease, osteoarthritis, psychiatric conditions and potential premature mortality (Jastreboff, Kotz, Kahan, Kelly & Heymsfield, 2019; Rush, LeardMann, & Crum-Cianflone, 2016; West & Jeffery, 2018). Furthermore, increased health care utilization and costs associated with obesity approach \$150 billion annually (Gagnon & Stephens, 2015). Obesity has affected all facets of society including our unique population of active duty military personnel.

Description of Problem

The Centers for Disease Control and Prevention (2018) reveal 39.8% or 93.3 million American adults are obese. Obesity is nondiscriminatory traversing all sociodemographic backgrounds within the United States. The obesity epidemic has extended to active duty military service members impacting readiness and threatening national security. The Health-Related Behaviors Survey (HRBS), a survey that concentrates exclusively on active duty military personnel, isolates demographic and lifestyle characteristics in this population. This survey employs self-reported height and weight measurements to estimate BMI. The Centers for Disease Control and Prevention (CDC) (2018) calculate BMI as a person's weight in kilograms (kg) divided by the height in meters squared (m²), those with BMI between 25-29.9 kg/m² are considered overweight and those with a BMI of 30 kg/m² or greater are identified as obese. The

2015 HRBS found 51% of active duty military personnel were overweight, while 14.7% were obese (Meadows et al., 2018).

Obesity poses significant implications for military accession, retention, and readiness due to reduced eligibility of military recruits, increased absenteeism and decreased productivity resulting from obesity related injuries and disease, and early medical discharge, disability or retirement because of obesity associated comorbidities. Despite mandatory physical fitness and body composition requirements, multiple national health initiatives, numerous individual departmental programs, and clinical practice guidelines, military members continue to experience increasing incidence and prevalence of obesity.

Purpose and Rationale

All segments of American society have been impacted by the obesity crisis, including United States military personnel. The military population experiences exceptional challenges including deployments to austere locations, high operations tempo, increased occupational stress, fluctuating work schedules, and geographic instability that may alter their ability to obtain and sustain a healthy weight (Hatzfeld, Nelson, Waters, & Jennings, 2016). It is widely accepted that therapeutic lifestyle changes including regular exercise and a healthy diet are instrumental in weight loss. The purpose of this evidenced based doctoral project is to evaluate the effectiveness of a group lifestyle intervention involving education regarding healthy diet, physical activity and behavior change recommendations on weight and BMI of obese military participants.

Background and Significance

Obesity is recognized as a chronic complex multifactorial disease requiring prevention and treatment by multiple government and health agencies including the National Institutes of Health, the American Medical Association, American Association of Clinical Endocrinologist

and the Obesity Society (Jastreboff, Kotz, Kahan, Kelly & Heymsfield, 2019; Kyle, Dhurandhar, & Allison, 2016). Numerous national initiatives and policies have been developed and implemented to address the obesity epidemic. For instance, Healthy People 2020 recognizes nutrition, physical activity and obesity as a national leading health indicator. Healthy People 2020 outlines explicit diet and exercise recommendations to combat obesity, alleviate the economic burden resulting from medical costs of treatment and improve the overall health of the American population (Office of Disease Prevention and Health Promotion, 2019). In addition, the Management of Overweight and Obesity Working Group (2014) established a clinical practice guideline (CPG) to aid primary care practitioners in managing obese and overweight patients. This CPG offers a standardized clinical algorithm involving both pharmacologic and non-pharmacologic therapies starting initially with comprehensive lifestyle interventions including regular physical activity, healthy diet and behavioral modification strategies along with motivational interviewing. This CPG acts as a reference when managing these complex patients who often possess additional comorbidities. The CPG encourages regular follow up and support to reinforce sustained weight loss and healthy outcomes. Military Health System's TRICARE Prime has approximately 4.3 million beneficiaries under the age of 65 years old. It is estimated that over \$1.1 billion in medical expenditures were attributed to obesity treatment (Dall, Zhang, Arday, Sahai, Dorn & Jain, 2011).

The U.S. Surgeon General has recognized obesity as a threat to national security as it has significant effects on military readiness and recruitment. The Surgeon General has determined health and national security as a priority and aims to work with Defense officials to combat this threat. The Department of Defense determines weight and body composition standards for accession into military service (Murray, Aboul-Enin, Bernstein, & Kruk, 2017). Those currently

on active duty are responsible for maintaining a professional appearance while in uniform and meeting annual physical fitness standards. For those members who are unable to satisfy these requirements, Commanders refer to a mandatory weight loss program involving nutritional counseling and scheduled physical activity as these interventions are widely accepted methods for successful weight loss.

West and Jeffery (2018) endeavored to distinguish predictors of military obesity by examining social determinants of health and behaviors in relation to BMI. West and Jeffery (2018) discovered the majority of service members lacked adherence to Healthy People 2020 objectives for fruit, vegetable, and whole grain consumption; however, most met cardiovascular and strength training recommendations. Additionally, BMI was found to be greatest among those identifying as male, Hispanic or Black, living with significant other, and advanced education (West & Jeffery, 2018).

Reyes-Guzman, Bray, Forman-Hoffman, and Williams (2015) analyzed cross-sectional data from HRBS results completed between 1995 and 2008 to the ascertain pervasiveness of obesity among active duty service members. The study demonstrated a predominately increasing trend with an 8% rise in obesity during that period. Furthermore, the authors discovered male gender and increasing age were key correlates of overweight and obesity. Also, mental health and substance use concerns including heavy drinking and positive screening for depression were correlated with higher rates of obesity.

Rush, LeardMann, and Crum-Cianflone (2016) conducted a prospective cohort study following military members longitudinally to observe obesity and health related behaviors. While obesity rates among service members were slightly lower than the civilian population; veterans' rates of obesity were essentially indistinguishable from civilians. Advancing age and

African Americans demonstrated greater rates of obesity. The authors established obese members were considerably more likely to develop chronic medical conditions like coronary artery disease, diabetes, hypertension and sleep apnea. Moreover, obese participants were more likely to report three or more medical conditions in comparison to normal weight individuals. Furthermore, obese members were more likely to screen positive for depression and post-traumatic stress disorder when compared to their civilian counterparts.

Numerous studies have investigated individual military departmental interventions that have been created to tackle the rising rates of obesity among service members. Blaz and Peterson (2016) evaluated the Army Healthy Eating Activity Lifestyle Training Headquarters (H.E.A.L.T.H), a mobile/web-based weight loss management tool, among active duty and veteran members. The study revealed participants who engaged with the Army H.E.A.L.T.H. platform found it easily accessible and user friendly however, the tool had an insignificant impact on weight loss (Blaz & Peterson, 2016). Krukowski et al. (2018) conducted a randomized control trial (RCT) comparing a counselor led versus a self-paced Look AHEAD intensive lifestyle intervention among active duty military participants. The study found individuals engaged in the counselor led intervention has significantly greater weight loss and reduced abdominal circumference compared to self-paced participants (Krukowski et al., 2018).

McCarthy, Elshaw, Szekely, and Hobbs (2017) performed an RCT evaluating a nurse coaching versus a herbal supplementation regimen for weight reduction in obese active duty soldiers. The study demonstrated no significant differences between the groups. Lash, Smith, and Rinehart (2016) set out to determine whether the Theory of Planned Behavior would predict intention and future dietary behavior. No significant weight loss or reduction in BMI was noted with this study (Lash, Smith, & Rinehart, 2016). Prevention of Obesity in Military Community

(P.O.M.C.) identified the duration immediately following boot camp as a high-risk period for developing obesity. Obese active duty participants early in their military career received dissonance based counseling and individualized nutrition and fitness strategies (Speiker et al., 2015). Results are still pending from this study. Wardian, True, Sauerwein, Watson, and Hoover (2018) offered Group Lifestyle Balance, a 12-week diabetes prevention program, to military service members at risk for developing diabetes. The study found a significant reduction in weight and prediabetes risk factors.

Lifestyle change, individual readiness, fitness excellence, eating healthy (L.I.F.E.) is a health promotion intervention established by the Army for individuals undergoing possible discharge from military service due to their failure to meet weight and fitness standards (Murray, Aboul-Enin, Bernstein, & Kruk, 2017). This program employed a multidisciplinary approach offering nutritional education, food preparation, menu planning, fitness instruction and coping mechanisms in combination with monthly evaluations. This program showed a significant improvement in participant weights. Go for Green is a point of purchase food nutrition labeling program offered in dining facilities across military bases (Murray et al., 2017). This environmental intervention showed no significant changes in weight and BMI. The Lifestyles, low intensity Exercise, Expectations that are reasonable, Emotions that are well balanced, healthy Attitudes, and well balanced Nutrition (LE3AN) program was developed in response to military readiness concerns related to obese service members worldwide deployability. This program involves a one month intensive inpatient cognitive behavioral intervention followed by 12 months of scheduled weekly follow-ups (Murray et al., 2017). This program demonstrated significant improvements in weight loss.

Despite mandatory physical fitness and body composition requirements, numerous national health initiatives, various individual service programs, and clinical practice guidelines, military members are not immune to the obesity epidemic. As evidenced above, lack of effective standardized weight management programs, gaps in health promotion interventions and outcome evaluations, and the exceptional challenges facing military personnel impact their ability to obtain and sustain a healthy weight. This inquiry has led to the PICOT question, in obese active duty military members, how does a group lifestyle education intervention affect weight and BMI over twelve weeks.

Search Strategy

An exhaustive search of the current literature was undertaken in order to answer the PICOT question. Three electronic databases—PubMed (Appendix A), Cumulative Index to Nursing and Allied Health (CINAHL) (Appendix B), and Military and Government Collection (Appendix C)—were searched using the keywords (with Boolean connectors) military (OR) service member (OR) active duty (AND) overweight (OR) obese (OR) obesity.

Searches were restricted to peer-reviewed journals written in English and published from 2014 to 2019. After the initial yields were produced, journal abstracts were critically scrutinized to determine relevancy to the clinical problem. Studies focused on obesity among military and veteran populations were included. Exclusion criteria included those articles written in a non-English language, published before 2014 and studies focused solely on military dependents.

PubMed was the first database reviewed, yielding 2049 articles. After thorough discrimination of journal titles and abstracts, ten studies were chosen for further critical appraisal. A search in CINAHL produced 373 articles, an additional seven articles were selected. Military and Government Collection retrieved 63 articles, and three were chosen for further

review. A total of 20 articles were obtained from these database searches, and then critically analyzed to determine clinical relevancy and level of evidence. Ten final studies were chosen for critical appraisal and evidence synthesis (Appendix A, Appendix B).

Critical Appraisal and Synthesis

It is recognized that therapeutic lifestyle behaviors including a healthy diet and regular physical activity result in a reduced risk of obesity. Despite these known preventive measures, the prevalence of obesity continues to escalate, extending to our military population.

Government and health agencies acknowledge obesity as a public health crisis implementing numerous national health initiatives and policies directed at combating the obesity epidemic. Moreover, individual military departments have developed weight management programs aimed at reducing obesity among active duty service members. Multiple research studies have examined obesity among military personnel and targeted interventions and found varying degrees of success. Ten research studies were chosen for critical appraisal.

Melnyk and Fineout-Overholt's (2015) rapid critical appraisal checklists were used to assess the quality of the articles selected. The studies selected were at a level of evidence of II through VI including randomized control trials, quasi-experimental, cohort, and descriptive studies. All articles were retrieved from peer-reviewed journals. They are current, all published within the past four years. All studies readily revealed their funding source and no significant biases were identified. Eight of the ten studies were accomplished in the United States, one study completed in New Zealand and another in Iran. All studies had an adequate sample size; however, the rates of attrition were over 30% in four of the included studies. Only three of the studies explicitly noted a theoretical or conceptual framework.

A strength of the selected studies was they were specific to active duty military personnel. Nine of the ten studies investigated obesity among active service members, while one study looked specifically at military service veterans. The majority of the studies were relatively homogenous consisting of majority white males limiting the generalizability of results to women and minorities. Weight, body mass index and abdominal circumference were variables considered in the majority of the studies, however, only three research studies found significant weight reduction with the specified intervention. The interventions explored included self-paced and provider led interventions. Provider led interventions were more likely to result in better outcomes of reduced weight and improved body composition (Appendix B).

Despite current initiatives, the incidence and prevalence of obesity among military personnel continues to soar. The research studies examined web-based/mobile, self-paced and provider led interventions. Although a few of the studies revealed better outcomes with provider-initiated interventions, this was not consistently noted across all studies. In addition, the lack of heterogeneity among the sample limited generalizability of results. Further studies should be more diverse including more women and minorities. Also, higher level research studies including more randomized control trials and systemic reviews are needed to further evaluate this problem. Innovative new strategies are needed to target this unique population and make meaningful change toward more positive outcomes including weight loss, healthier diet and increased physical activity to improve readiness, retention, and recruitment.

Theoretical or Conceptual Framework

Theories provide a systematic way of examining phenomena of interest. The Health Belief Model (HBM) is one of the most widely recognized and utilized conceptual frameworks for health promotion and preventive health behaviors. It distinguishes perceptions that determine

an individual's readiness to adopt a health promoting behavior. The six constructs of the HBM are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action and self-efficacy (Glanz, K., Rimer, B. K., & Viswanath, K., 2008; Appendix C).

Perceived susceptibility of being obese is influenced by the service members' cultural view of weight, family history, genetics, personal definitions, feelings, and values regarding body weight and image. Perceived severity of being obese reflects the service members' perception regarding the seriousness of obesity, potential health impacts including chronic comorbidities, physical limitations, potential mortality, mental health, and social impacts. Next, perceived benefits and perceived barriers to adopting therapeutic lifestyle behaviors to reduce obesity are examined.

Active duty service members face unique challenges including deployments, geographic instability, variable work schedules, and high stress environments which may be perceived barriers to obtaining and sustaining a healthy weight. Cues to action for service members include military culture messaging, media, injuries, health diagnoses, tight fitting uniform, health practitioner recommendations, and commander referral. Lastly, self-efficacy refers to the military members' confidence in their ability to engage in health promoting behaviors to attain and maintain a healthy weight.

EBP Model

A fluid and reciprocal interaction exist between theory, evidence and practice, with each component informing, explaining and validating the other (Moran, Burson, & Conrad, 2017). In exploring various evidence-based practice models, the Ottawa Model of Research Use (OMRU) was found to be the best fit for this problem and organization as it is a dynamic model that allows for practice changes across multiple settings. The six-step process for developing, implementing, assessing, monitoring, and evaluating innovation and outcomes is useful for

public health initiatives that translate research into practice (Hogan, D.L., & Logan, J., 2004; Appendix D). Six key elements of this model are the practice environment, potential adopters, evidence-based innovation, transfer strategies, adoption, and outcomes. This model's three assumptions of knowledge translation specific to this model are recognizing the complexity related to the dynamic, interactive processes associated with research development and use; patients remain the central focus throughout the process and acknowledging that external societal and health care environments affect knowledge translation processes (National Collaboration Center for Methods and Tools, 2017). This model would allow for the examination of obesity among service members, identification of internal and external factors contributing to this problem, potential innovative changes and a method to implement, monitor and review practice changes.

Methods

Ethical Considerations

The protection of human subjects was ensured through appropriate training of all involved investigators through the Collaborative Institutional Training Initiative (CITI). An institutional review board (IRB) was approved through Arizona State University (ASU) that included a protocol, consent, a recruiting script, an institution approval letter, and education materials (Appendix E, Appendix F, Appendix G). Because the study was conducted in a military treatment facility, a further review was required by the Air Force Medical Readiness Agency (AFMRA) in Falls Church, VA. A Human Research Protection Official (HRPO) review was approved to allow the EBP project to be performed in a Department of Defense facility.

Setting

The setting for this doctoral project is a large outpatient military treatment facility (MTF) in the Southwest. The MTF services approximately 20,000 beneficiaries, including active duty and retired service members and their families, with approximately 5,000 members identified as obese. Within the facility, there are family practice, internal medicine, women's health, pediatric, mental health, orthopedic, physical therapy, public health, flight medicine, allergy, immunizations, and dental clinics, as well as pharmacy, laboratory, radiology, and nutritional medicine. The facility offers many resources to help reduce obesity; however, many programs are underutilized, including health promotions, nutritional medicine, behavioral health, and the fitness center.

Participants

Patients with increased risk for the development of diabetes were referred to Group Lifestyle Balance (GLB) by the primary care provider, health promotions or self-referral. Overweight and obese active duty military personnel ($n = 17$) were actively recruited on the initial training day for the GLB program. Members were invited to participate in the EBP study. Participants were asked to commit to a one-hour educational session weekly for 12 weeks. Compliance with this intervention was voluntary. To qualify for inclusion in the project, participants had to be active duty military service members, male or female, over 18 years of age, able to consent, fluent in English, overweight with BMI greater than 25 and not deploying or moving in the next three months. Exclusion criteria included pregnancy, medical conditions prohibiting aerobic activity, and orders to deploy or move in the next six months. The majority of the participants were male ($n = 15, 88\%$). Age of participants ranged from 23 to 45 years of age

with an average of 31.12 ($SD = 6.72$, $SE_M = 1.63$, $Min = 23.00$, $Max = 45.00$, $Skewness = 0.44$, $Kurtosis = -0.93$).

Intervention

Group Lifestyle Balance is an evidenced based lifestyle intervention program where participants receive comprehensive education promoting weight loss, healthy diet, regular physical activity and behavior modification in a structured group classroom setting for 22 sessions in 12 months (Diabetes Prevention Support Center, 2020). This program consists of three phases, Core, Transition and Support. This intervention focused on the initial core component of the program. The core component consists of the first twelve weekly sessions. The DNP student accomplished training through the Diabetes Prevention Support Center, University of Pittsburg to deliver the GLB curriculum. The intervention started on December 5th, 2019 and concluded on March 5th, 2020. At the beginning of the program, participants were given a Garmin watch to track their steps. The watch was to be returned upon completion of the program. No monetary compensation was provided. At each group session participants were given educational handouts and study materials.

Session 1-Welcome to GLB- involved recruitment and consent for the study, introduction to GLB, background, and rationale for the program. Session 2-Be a Calorie Detective-discussed self-monitoring, measurement of food and beverage intake, and determined calorie and fat gram goals with a nutritionist. Session 3-Health Eating-explained the U.S. Department of Agriculture MyPlate nutrition model, dietary recommendations and guidelines. Session 4-Move Those Muscles-identified benefits to an active lifestyle, types of aerobic exercise, safe stretching and recommendation for gradual progression of physical activity. Session 5-Tip the Calorie Balance-offered ways to balance calories in and calories out. Session 6-Take Charge of What's Around

You-examined common food and activity cues and how to promote positive cues and limit negative cues. Session 7-Problem Solving-outlined five steps to problem solving with practical applications. Session 8-Step up Your Physical Activity-encourage increased spontaneous activity, explored the principles of aerobic fitness and how to determine activity intensity. Session 9-Strengthen Your Physical Activity Plan- described the multiple benefits of resistance training and how to incorporate strength exercises into their weekly regimen. Session 10-Managing Slips and Self-Defeating Thoughts- identified high-risk situations and strategies for managing slips and negative self-talk. Session 11-Manage Your Stress - discussed stress and offered various coping mechanisms, humor, and adequate sleep. Session 12-Ways to Stay Motivated- considered motivation, rewards, goal setting, and planning.

Participants were expected to attend weekly classes, review educational materials, engage in intensive lifestyle modification including 150 minutes of moderate physical activity, meet calorie and fat gram goals, and self-monitor food intake and exercise activity to achieve 7% weight loss goal as outlined by the GLB program. Group educational sessions were offered on Thursdays at 11 a.m. and 3 p.m.

Data Collection and Analysis

Participants were monitored throughout the GLB program. Height, weight, and BMI were obtained at baseline, 4 weeks, 8 weeks and 12 weeks. Heights were self-reported. Weights were obtained on a calibrated scale and measured in pounds. BMIs were calculated using the standard formula. 11 of the 16 participants completed assessments for all of the listed weeks. Abdominal circumference was obtained initially for body composition evaluation. It was the intent of this project to obtain abdominal circumference at completion, however due to social distancing requirements of COVID-19, abdominal circumferences were not obtained. Demographic

information obtained included age, gender, and military status. Data acquired during the intervention were analyzed using IntellectusStatistics (2020) software.

Results

Descriptive statistics and frequencies were conducted. Participants average age was 31.12 ($SD = 6.72$, $SE_M = 1.63$, $Min = 23.00$, $Max = 45.00$, $Skewness = 0.44$, $Kurtosis = -0.93$). There was a wide range in the age of participants, ranging from 23 to 45 years of age. Majority of the participants were male ($n = 15$, 88.24%) versus female ($n = 2$, 11.76%). There were 17 participants at baseline and only 11 participants at completion (64.7%). Two-tailed paired samples *t*-test were conducted to examine mean differences between initial and completion weights and BMIs.

Assumptions

Normality. A Shapiro-Wilk test was conducted to determine whether the differences in initial weight and completion weight could have been produced by a normal distribution (Razali & Wah, 2011). The results of the Shapiro-Wilk test were significant based on an alpha value of 0.05, $W = 0.84$, $p = .031$. This result suggests the differences in initial weight and completion were unlikely to have been produced by a normal distribution, indicating the normality assumption is violated. A Shapiro-Wilk test was also conducted to determine whether the differences in initial BMI and completion BMI could have been produced by a normal distribution (Razali & Wah, 2011). The results of the Shapiro-Wilk test were not significant based on an alpha value of 0.05, $W = 0.87$, $p = .082$. This result suggests the possibility that the differences in initial BMI and completion BMI were produced by a normal distribution cannot be ruled out, indicating the normality assumption is met.

Homogeneity of Variance. Levene's test was conducted to assess whether the variances of initial weight and completion weight were significantly different. The result of Levene's test for was not significant based on an alpha value of 0.05, $F(1, 20) = 0.02, p = .889$. This result suggests it is possible that initial weight and completion weight was produced by distributions with equal variances, indicating the assumption of homogeneity of variance was met. Levene's test was also conducted to assess whether the variances of initial BMI and completion BMI were significantly different. The result of Levene's test for was not significant based on an alpha value of 0.05, $F(1, 20) = 1.07, p = .314$. This result suggests it is possible that initial BMI and completion BMI were produced by distributions with equal variances, indicating the assumption of homogeneity of variance was met.

Results

The result of the two-tailed paired samples *t*-test was not significant based on an alpha value of 0.05, $t(10) = 0.69, p = .508$. This finding suggests the difference in the mean of initial weight and completion weight was not significantly different from zero. The intervention did not impact the outcome of weight. The results are presented in Table 4. A bar plot of the means is presented in Figure 3. The result of the two-tailed paired samples *t*-test was not significant based on an alpha value of 0.05, $t(10) = 0.64, p = .538$. This finding suggests the difference in the mean of initial BMI and the mean of completion BMI was not significantly different from zero. The intervention did not impact the outcome of BMI. The results are presented in Table 5. A barplot of the means is presented in Figure 4. (Appendix H, Appendix I)

Two-Tailed Wilcoxon Signed Rank Test

A two-tailed Wilcoxon signed rank test was conducted to examine whether there was a significant difference between initial weight and completion weight. The two-tailed Wilcoxon

signed rank test is a non-parametric alternative to the paired samples *t*-test and does not share its distributional assumptions (Conover & Iman, 1981).

Results

The results of the two-tailed Wilcoxon signed rank test were not significant based on an alpha value of 0.05, $V = 38.00$, $z = -0.44$, $p = .657$. This indicates that the differences between initial weight ($Mdn = 199.50$) and completion weight ($Mdn = 195.60$) are explainable by random variation.

Clinical Implications

Project Impact

This doctoral project implemented an intensive group education intervention to promote a healthy nutritious diet, encourage regular physical activity and modify behavior in efforts toward weight loss and reduced obesity. Although the intervention did not achieve significant weight loss among participants it did inspire obese service members to pursue healthier nutrition options and advance their fitness goals. Members gained knowledge and tools to assist in weight management including menu planning, nutrition label reading, food preparation, aerobic, and strength exercise instruction, self-monitoring, problem solving and stress management. Educational sessions prompted participants to become aware of their current behaviors, recognize strengths and limitations, identify potential barriers that may limit their ability to achieve their stated goals, and develop solutions to overcome these barriers. The group setting fostered accountability, relationship building, knowledge sharing, communication collaboration, constructive conflict, and self-efficacy.

This project has also impacted the primary care clinic within the military treatment facility. Obesity is commonly encountered in the primary care setting; however, is infrequently

the chief complaint. Limited access, increased workload and reduced appointment times often leave this significant issue unaddressed. Obese individuals are seen in the clinic more often and utilize more medical resources impacting access to care (Rush, LeardMann, and Crum-Cianflone, 2016). Although obesity is not frequently the chief complaint it is often associated with or a potential cause for the chief complaint. Primary care providers are now able to refer their obese patients to Group Lifestyle Balance to receive the appropriate education to facilitate lifestyle behavior change. Increased knowledge and acquisition of weight loss strategies potentially leads to reduced obesity and associated medical conditions lessening health care expenditures and alleviating the burden on the Veterans Affairs health system.

Sustainability

Administration within the MTF was supportive of this doctoral project. Leaders understand that diminishing obesity rates leads to an overall healthier and fit force due to reduced risk of obesity associated chronic comorbidities and injuries. This improves mission readiness and deployability of military personnel allowing our nation to meet defense challenges. Health Promotions within the MTF will continue to provide GLB courses for active duty service members, retirees and military dependents with obesity, pre-diabetes, or metabolic syndrome. Health Promotions focuses on improving health related behaviors and outcomes in the military community providing evidence-based interventions that promote health and wellness and empower members to pursue healthy lifestyles.

Discussion

Obesity is a significant public health concern due to its increasing pervasiveness, association with chronic health conditions and mounting healthcare costs. Obesity among military members may be viewed as a national defense crisis as it has significant implications on

military readiness, retention, and recruitment. Several interventions have been evaluated to include web-based/mobile, provide led and self-paced methods with inconsistent results. The literature search reveals a gap in effective weight management approaches to target this unique population. Service members, medical personnel, and military and policy leaders agree that obesity among active service members is an issue that requires innovative solutions. Therapeutic lifestyle interventions are widely accepted as effective methods for weight loss. Group Lifestyle Balance is an evidenced based intervention program focused on weight management through comprehensive education regarding healthy nutrition, regular physical activity and behavior modification offered in a structured group setting.

The overarching goal of this project to reduce overweight and obesity among active duty military personnel was not achieved. The study did not demonstrate any significant changes in initial and completion weights and BMIs among obese military participants involved in the core GLB intervention. These findings are concerning as military obesity affects operational readiness. Deployability of fit and ready warfighters is critical to national defense and our ability to meet potential global challenges.

Study Limitations

The study involved a single military treatment facility with a limited number of participants ($n = 17$). A larger sample size would have provided more data to examine. The attrition rate was high measuring 35.2%. This is consistent with prior studies examining lifestyle interventions among active duty personnel. McCarthy, Elshaw, Szekely, and Hobbs (2017) found a 56% attrition rate at 12 weeks while Wardian, True, Sauerwein, Watson, and Hoover (2018) found a 44.9% attrition rate at 4 weeks among active duty military members in their studies. The reasons for attrition are complex as reported by participants. For instance, members reported

competing priorities including life stressors and family obligations, short notice deployment, change in position and schedule, medical board and quarantine. In addition, the sample was relatively homogenous consisting of mostly male participants (88%). This alters the generalizability of the study results. Furthermore, 11 (64%) participants were placed on exercise limiting profiles by their primary care providers due to musculoskeletal conditions including knee, arm, and back pain.

This study was initiated in early December coinciding with the holiday season. The timing of the EBP project affected many participants' weights resulting in weight gain during the intervention. Some participants reported frustration having initially lost weight, then to have gained weight following the holiday season above or back to baseline. The investigator emphasized the importance of continuing with health promotion strategies, stress management, encouraging positive cues and circumventing negative cues to assist in weight loss.

Lastly, the length of the project was limited to 12 weeks. The majority of weight loss interventions last one to two years requiring regular follow up to achieve successful sustainable change. The GLB program is a 12-month program; however, this doctoral project evaluated the core component or the first 12 weeks of the educational intervention. This short period of time may not have been sufficient for significant change to occur.

Recommendations for Future Research

This study is comparable to previous studies examining lifestyle interventions for weight loss among adults (McCarthy, Elshaw, Szekely, and Hobbs, 2017). Despite the lack of significant changes in weight and BMI following the intervention, participants did report improvements in their healthy eating behaviors choosing smaller portions and more nutrient dense options, reading nutrition labels, measuring food and self-monitoring. Unfortunately,

several participants reported difficulty attaining and sustaining physical activity recommendations. These findings suggest the need for further research to examine the perceived barriers to achieving exercise and step recommendations. Understanding these barriers are critical to developing effective and sustainable solutions. Members who realized GLB physical activity recommendations demonstrated significant changes in weight and BMI. Further research investigating GLB in conjunction with a mandatory exercise program is suggested. Furthermore, as this study was limited to the initial twelve weeks of the program, future studies examining outcomes following the full twelve month program are needed. In addition, body composition evaluation was limited during this study due to social distancing requirement of COVID-19. Future studies are recommended to include body composition evaluation like abdominal circumference measurements as BMI is not the most effective method for evaluating body composition.

All of the participants reported a high motivation to obtain a healthy weight; however, many described challenges in engaging and sustaining health promoting behaviors. Further study is also recommended to explore motivation, engagement, and maintenance as well as enabling and disabling factors. Also examining the influence of demographics as well as social and environmental factors on weight loss may prove beneficial. Lastly, policy considerations to address obesity and reform current practices are needed to foster a fit, agile and ready force.

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Appendix A

Table 1

Evaluation Table of Quantitative Studies

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|---|---------------------------------|---|--|---|--|---|---|--|
| Blaz et al., (2016). Weight loss outcomes associated with the use of the Army HEALTH weight management program in overweight ADSM and veterans Funding: Human Performance Lab, Uniformed Services University of the Health Sciences Bias: None identified Country: United States | Inferred Health Promotion Model | Design: Quasi-experimental: Pre and Posttest at 12 week Purpose: To provide a weight management intervention using Army HEALTH web/mobile based program and determine its impact on weight loss among overweight ADSM and veterans | N = 20 Setting: Naval Support Activity Campus (Bethesda, Maryland) Sample Demographics: Age range 23-62; Mean age of 42.4. 15 ADSM and 5 veterans. Study did not identify sex or race. Inclusion Criteria: M or F ADSM or veteran with BMI > 25; age 18-65 y/o Exclusion Criteria: BMI > 40; TDY or PCS, enrolled in weight control program or other research protocol Attrition: Initial sample of 32; however, 12 did not complete post test at 12 weeks. 37.5% attrition rate. | IV: Army HEALTH weight management program DV1: weight DV2: BMI DV3: body fat Army HEALTH is an online weight management tool that can be accessed via web or mobile technology | InBody 720 Body Composition Analyzer to assess weight, BMI and body fat percent at baseline and 12 weeks | SPSS 22.0; Descriptive statistics, paired <i>t</i> -test, | DV1: avg weight loss 3.25 lbs. (95% CI -1.09 to 7.59 lbs) Mean weight at baseline 187.4 (SD = 33.4) decreased to 184.2 lbs at 12 weeks (SD = 29.5). Results not significant (<i>p</i> = .134, paired <i>t</i> test). DV2: avg BMI decreased 0.4 point; BMI 28.6 at baseline (SD = 2.9) to 28.2 at 12 weeks (SD = 2.7), Results not significant (<i>p</i> = .148, paired <i>t</i> test) DV3: avg body fat decreased 1.23 percentage points (95% CI 0.10-2.36) at 12 weeks. (<i>p</i> < .034, statistically significant | LOE: III Strengths: Tool easily accessed via computer, tablet or mobile phone. Allows patient engagement and empowerment. Weaknesses: Small sample size. Lack of control group. High attrition rate. Study did not provide race and sex demographics of sample for comparison of results; during 12 week period participants only accessed tool an average of 6 days; however, those that accessed more frequently did not have greater weight loss. Tool had minimal impact on weight loss. Feasibility/Applicability to pt. population: This study found participants who engaged in Army HEALTH although minimal did have decreased weight, BMI and body fat percentage. This online tool is easy to access and may be a useful tool for members to access on their own, giving them more autonomy and awareness of body composition, nutrition and physical activity. |

Key: AA – African American, AC – abdominal circumference; ADSM – active duty service members; avg – average; BMD – bone mineral density; BMI - body mass index; CG- control group, CHD – coronary heart disease, CI – confidence interval; CII – counselor initiated intervention; DV -dependent variable; DXA- dual energy X-ray absorptiometry; EG – experimental group, F - female; FBS – fasting blood sugar; FFQ- Food Frequency Questionnaire; H – Hispanic, HCLF- high carbohydrate, low fat, HDL – high density lipoprotein; HEALTH- Healthy Eating Lifestyle Training Headquarters; HRB- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, IV- independent variable; LCHF – low carbohydrate, high fat; LDL – low density lipoprotein; Look AHEAD ILI – Action for Health in Diabetes Intensive Lifestyle Intervention; M- male; mos- months; N-number of participants in study; n – subset of participants; NH – Non-Hispanic, NHC – nurse health coaching; O – other, OR- odds ratio; PCS – permanent change of station; PT – physical training; PTSD – post traumatic stress disorder, RCT – randomized control trial; SAS – statistical analysis software; SD – standard deviation; SMI – self motivation inventory; SPI- self paced intervention; SPSS – Statistical Package for the Social Sciences; TChol – total cholesterol; TPB- Theory of Planned Behavior; TDY – temporary duty; Trig – triglycerides; USAF- United States Air Force; W- Caucasian; y/o – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|--|--|--|--|--|--|--|---|--|
| <p>Krukowski et al., (2018). Dissemination of the Look AHEAD intensive lifestyle intervention in the United States military: a randomized control trial</p> <p>Funding: National Institute of Diabetes and Digestive and Kidney Disease of the National Institutes of Health</p> <p>Bias: None identified</p> <p>Country: United States</p> | <p>Inferred Health Promotion Model</p> | <p>Design: RCT</p> <p>Purpose: To compare a counselor initiated behavioral lifestyle intervention for weight loss adapted from Look AHEAD ILI with a SP version of the same intervention with follow up at 4 and 12 mos.</p> | <p>N = 248</p> <p>Setting: Large MTF in San Antonio, TX</p> <p>Sample</p> <p>Demographics: Mean age 34.6. W 163 (65.7%); AA 49 (19.8%); O 36 (14.5%) M 122 (49.2%), F 126 (50.8%).</p> <p>Inclusion Criteria: M or F AD/SM at least 18 y/o with BMI > 25; reliable phone and computer access; >1 year left in service, clearance letter from PCM</p> <p>Exclusion Criteria: History of major medical or psychiatric condition, inability to engage in exercise, current or recent pregnancy, weight impacting medications, 1 or more failed PT tests in past 12 mos.</p> <p>Attrition: 30.6% attrition rate.</p> | <p>IV1: Counselor initiated intervention</p> <p>IV2: Self-paced intervention</p> <p>DV1: weight</p> <p>DV2: abdominal circumference</p> <p>CII utilized phone and email follow-ups- 16 weekly, 6 biweekly, and 4 monthly sessions over 12 mos. Participants were given an individualized exercise program, electronic scale, access to web based nutrition and exercise monitoring application and portion controlled meals/snacks during first 4 months.</p> <p>SPI received a handout listing intervention components as above that they may request individually.</p> | <p>Weight and abdominal circumference at baseline, 4 mos and 12 mos.</p> | <p>SAS 9.4; Wilcoxon-Mann Whitney test or Kruskal-Wallis test as appropriate, Spearman rank correlation, Fisher exact test or χ^2 as appropriate</p> | <p>DV1: At 4 mos. CII mean \pm SD = -3.2 ± 3.4 kg vs SPI -0.6 ± 2.9 kg; $p < 0.0001$. Those that lost $\geq 5\%$ CII 29.8% SPI 10.5%, $p < 0.001$. At 12 mos. CII mean \pm SD = -1.9 ± 4.1 kg vs SPI -0.1 ± 3.8 kg; $p < 0.001$. Those that lost $\geq 5\%$ CII 29.5% SPI 15.6%, $p < 0.001$. DV2: 4 mos. AC reduction CII mean 3.5 ± 6.0 cm vs SPI -1.2 ± 4.1 cm $p < 0.0001$. At 12 mos. AC reduction CII mean 2.7 ± 6.5 cm vs SPI -1.7 ± 8.1 cm $p < 0.05$.</p> <p>Those 40 y/o or greater, higher education, and higher ranking had significantly more weight loss.</p> | <p>LOE: II</p> <p>Strengths: randomized design, diversity of demographics, over 12 mos, large sample,</p> <p>Weaknesses: Lack of control group. High attrition rate.</p> <p>Feasibility/Applicability to pt. population: This study found those individuals enrolled in CII had significant weight loss and reduced AC when compared to SPI group. Having an individualized counselor led initiative that utilizes phone and email may be effective in weight management of unique military population and may be used as an adjunct or alternative in treating obesity.</p> |

Key: AA – African American, AC – abdominal circumference; AD/SM – active duty service members; avg – average; BMD – bone mineral density; BMI - body mass index; CG- control group, CHD – coronary heart disease, CI – confidence interval; CII – counselor initiated intervention; DV -dependent variable; DXA- dual energy X-ray absorptiometry; EG – experimental group, F - female; FBS – fasting blood sugar; FFQ- Food Frequency Questionnaire; H – Hispanic, HCLF- high carbohydrate, low fat, HDL – high density lipoprotein; HEALTH- Healthy Eating Lifestyle Training Headquarters; HRB- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, IV- independent variable; LCHF – low carbohydrate, high fat; LDL – low density lipoprotein; Look AHEAD ILI – Action for Health in Diabetes Intensive Lifestyle Intervention; M- male; mos- months; N-number of participants in study; n – subset of participants; NH – Non-Hispanic, NHC – nurse health coaching; O – other, OR- odds ratio; PCS – permanent change of station; PT – physical training; PTSD – post traumatic stress disorder, RCT – randomized control trial; SAS – statistical analysis software; SD – standard deviation; SMI – self motivation inventory; SPI- self paced intervention; SPSS – Statistical Package for the Social Sciences; TChol – total cholesterol; TPB- Theory of Planned Behavior; TDY – temporary duty; Trig – triglycerides; USAF- United States Air Force; W- Caucasian; y/o – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|--|----------------------------|--|--|--|---|---|---|--|
| Lash et al., (2016). Can the theory of planned behavior predict dietary intention and future dieting in an ethnically diverse sample of overweight and obese veterans attending medical clinics? Funding: Dr. Rinehart completed some work while supported in grants from the National Institute of Mental Health and National Institute on Drug Abuse Bias: None identified Country: United States | Theory of Planned Behavior | Design: Descriptive Purpose: To determine if TPB would predict dietary intention and future dietary behavior from baseline to 3 month follow up | N = 84 Setting: Veterans Affairs Hospital in New Mexico Sample Demographics: Mean age of 61.01 SD 10.66; Mean weight 216.12 lbs. SD 37.10, M 77 (91.7%), F 7 (8.3%); W 35 (41.7%); AA 4 (4.8); Hispanic 42(50%); Native American 1(1.2%) and Biracial 2 (2.4%); Single 9(10.7%), Married 51(60.7%), Divorced 19 (22.6%), Widowed 5 (6%). Inclusion Criteria: M or F with BMI between 25.0 and 39.9 Exclusion Criteria: Homeless; pre-existing diagnosis of schizophrenia or mental retardation Attrition: 13.7% | V1: BMI V2: FFQ fruit/veg scores V3: FFQ scores V4: Dietary Intention V5: Future Dietary Behavior | Demographic questionnaire, height, weight, BMI, Theory of Planned Behavior questionnaire- Cronbach's alpha reliability was .87; FFQ at baseline and follow up | Chi square, Paired sample <i>t</i> -tests; hierarchal linear regression | V1: $t = -.98, p = .331$ V2: $t = -.83, p = .410$ V3: $t = -2.59, p = .011$ V4: Perceived behavioral control F (3,83) = 20.28, $p < .001$ and attitude F (2,83) = 22.93, $p < .001$ significant for dietary intention V5: TPB did not add to prediction of future dietary behavior | LOE: VI Strengths: Racial and ethnic diversity within sample, specific to veteran population Weaknesses: Sample mostly male limiting generalizability of results, correlational design did not have formal intervention that might influence results Feasibility/Applicability to pt. population: Attitude and behavioral control were found to be significant when predicting intention. 87% of participants reported eating healthier on FFQ at 3 month follow up however, no associated weight loss or decreased BMI. Further research needed. |

Key: AA – African American, AC – abdominal circumference; **ADSM** – active duty service members; **avg** – average; **BMD** – bone mineral density; **BMI** - body mass index; **CG**- control group, **CHD** – coronary heart disease, **CI** – confidence interval; **CIH** – counselor initiated intervention; **DV** -dependent variable; **DXA**- dual energy X-ray absorptiometry; **EG** – experimental group, **F** - female; **FBS** – fasting blood sugar; **FFQ**- Food Frequency Questionnaire; **H** – Hispanic, **HCLF**- high carbohydrate, low fat, **HDL** – high density lipoprotein; **HEALTH**- Healthy Eating Lifestyle Training Headquarters; **HRB**- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, **IV**- independent variable; **LCHF** – low carbohydrate, high fat; **LDL** – low density lipoprotein; **Look AHEAD ILI** – Action for Health in Diabetes Intensive Lifestyle Intervention; **M**- male; **mos**- months; **N**-number of participants in study; **n** – subset of participants; **NH** – Non-Hispanic, **NHC** – nurse health coaching; **O** – other, **OR**- odds ratio; **PCS** – permanent change of station; **PT** – physical training; **PTSD** – post traumatic stress disorder, **RCT** – randomized control trial; **SAS** – statistical analysis software; **SD** – standard deviation; **SMI** – self motivation inventory; **SPI**- self paced intervention; **SPSS** – Statistical Package for the Social Sciences; **TChol** – total cholesterol; **TPB**- Theory of Planned Behavior; **TDY** – temporary duty; **Trig** – triglycerides; **USAF**- United States Air Force; **W**- Caucasian; **y/o** – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|--|------------------------------|---|---|---|---|---|--|---|
| Maclin-Akinyemi et al., (2017). Motivations for weight loss among active duty military personnel Funding: National Institute of Diabetes and Digestive and Kidney Disease of the National Institutes of Health Bias: None identified Country: United States | Inferred Health Belief Model | Design: Descriptive Purpose: To investigate and understand the motivational factors endorsed by ADSM initiating a behavioral weight loss study across various demographics | N = 248 Setting: Large MTF in San Antonio, TX Sample Demographics: Mean age 34.6 ±v7.5, <30 y/o 66 (26.6%), 30 to <40 y/o 123 (49.6%); > 40 y/o 59 (23.8%); W 163 (65.7%); AA 49 (19.8%); O 36 (14.5%); H 56(22.6%), NH 192 (77.4%).M 122 (49.2%), F 126 (50.8%). Inclusion Criteria: M or F ADSM at least 18 y/o with BMI > 25; reliable phone and computer access; clearance letter from PCM Exclusion Criteria: History of major medical or psychiatric condition, inability to engage in exercise, current or recent pregnancy, more than 1 failed PT tests in past 12 mos or undergoing fitness related discharge. | Motivators for Weight Loss V1: Interaction with friends V2: Job performance V3: Sex Life V4: Defend myself V5: Interaction with spouse/date V6: Fit in clothes V7: Confidence V8: Mood V9: Physical mobility V10: Physical strength V11: Appearance V12: Pass fitness test V13: Live long V14: Quality of life V15: Fitness V16: Physical health | Weight, height, BMI, and behavioral questionnaire | Descriptive statistics, χ^2 tests, Wilcoxon-Mann-Whitney tests | V1: (O: 41.7% vs AA: 18.4% vs W: 22.1%, p<0.05); (H: 35.7% vs NH 20.8%, p<0.01) V2: (F: 34.9% vs M: 22.1%, p<0.05) V3: (F: 34.9% vs M: 23.0%, p<0.05); (H: 39.3% vs NH: 26.0%, p<0.05) V4: (O: 50.0% vs AA: 30.6% vs W: 24.5%, p<0.01); (<30 y/o: 42.4% vs 30-40 y/o 26.0% vs >40 y/o 22.0%, p<0.05); (H: 44.6% vs NH: 25.0%, p<0.01) V5: No significant data V6: (F: 77.8% vs M: 36.1%, p<0.001) V7: (<30 y/o: 83.3% vs 30-40 y/o 61.8% vs >40 y/o 49.2%, p<0.05) V8: (F: 76.2% vs M: 52.5%, p<0.001) V9: (F: 74.6% vs M: 60.7%, p=0.05); (O: 83.3% vs AA: | LOE: VI Strengths: Diversity of demographics and examining differences in motivations between demographic variables Weaknesses: Questionnaire not military specific and had to be adapted therefore psychometric properties unknown. Did not examine actual weight loss. Feasibility/Applicability to pt. population: Understanding motivators for weight loss based on demographic criteria may help in creating and implementing individualized weight loss interventions. |

Key: AA – African American, AC – abdominal circumference; ADSM – active duty service members; avg – average; BMD – bone mineral density; BMI - body mass index; CG- control group, CHD – coronary heart disease, CI – confidence interval; CII – counselor initiated intervention; DV -dependent variable; DXA- dual energy X-ray absorptiometry; EG – experimental group, F - female; FBS – fasting blood sugar; FFQ- Food Frequency Questionnaire; H – Hispanic, HCLF- high carbohydrate, low fat, HDL – high density lipoprotein; HEALTH- Healthy Eating Lifestyle Training Headquarters; HRB- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, IV- independent variable; LCHF – low carbohydrate, high fat; LDL – low density lipoprotein; Look AHEAD ILI – Action for Health in Diabetes Intensive Lifestyle Intervention; M- male; mos- months; N-number of participants in study; n – subset of participants; NH – Non-Hispanic, NHC – nurse health coaching; O – other, OR- odds ration; PCS – permanent change of station; PT – physical training; PTSD – post traumatic stress disorder, RCT – randomized control trial; SAS – statistical analysis software; SD – standard deviation; SMI – self motivation inventory; SPI- self paced intervention; SPSS – Statistical Package for the Social Sciences; TChol – total cholesterol; TPB- Theory of Planned Behavior; TDY – temporary duty; Trig – triglycerides; USAF- United States Air Force; W- Caucasian; y/o – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|----------|----------------------|---------------|----------------|-------------------------------|-------------|----------|---|------------------|
| | | | Attrition: 0% | | | | 69.4% vs W: 63.8%, p<0.05); (H 85.7% vs NH: 62.5%, p<0.01) V10: (AA: 79.6% vs O: 77.8% vs W: 62.0%, p<0.05) V11: (F: 80.2% vs M: 58.2%, p<0.05) V12: (F: 74.6% vs M: 64.8%, p=0.05) V13: >75% of all participants found important no significant difference across demographics V14: (F: 86.5% vs M: 71.3%, p<0.01) V15: (AA: 95.9% vs O: 94.4% vs W: 83.4%, p<0.01) V16: : >75% of all participants found important no significant difference across demographics | |

Key: AA – African American, AC – abdominal circumference; **ADSM** – active duty service members; **avg** – average; **BMD** – bone mineral density; **BMI** - body mass index; **CG**- control group, **CHD** – coronary heart disease, **CI** – confidence interval; **CII** – counselor initiated intervention; **DV** -dependent variable; **DXA**- dual energy X-ray absorptiometry; **EG** – experimental group, **F** - female; **FBS** – fasting blood sugar; **FFQ**- Food Frequency Questionnaire; **H** – Hispanic, **HCLF**- high carbohydrate, low fat, **HDL** – high density lipoprotein; **HEALTH**- Healthy Eating Lifestyle Training Headquarters; **HRB**- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, **IV**- independent variable; **LCHF** – low carbohydrate, high fat; **LDL** – low density lipoprotein; **Look AHEAD ILI** – Action for Health in Diabetes Intensive Lifestyle Intervention; **M**- male; **mos**- months; **N**-number of participants in study; **n** – subset of participants; **NH** – Non-Hispanic, **NHC** – nurse health coaching; **O** – other, **OR**- odds ration; **PCS** – permanent change of station; **PT** – physical training; **PTSD** – post traumatic stress disorder, **RCT** – randomized control trial; **SAS** – statistical analysis software; **SD** – standard deviation; **SMI** – self motivation inventory; **SPI**- self paced intervention; **SPSS** – Statistical Package for the Social Sciences; **TChol** – total cholesterol; **TPB**- Theory of Planned Behavior; **TDY** – temporary duty; **Trig** – triglycerides; **USAF**- United States Air Force; **W**- Caucasian; **y/o** – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|---|-----------------------------------|---|---|---|--|---|---|--|
| <p>McCarthy et al., (2017). A randomized control trial of nurse coaching vs herbal supplementation for weight reduction in soldiers</p> <p>Funding: TriService Nursing Research Program</p> <p>Bias: None identified</p> <p>Country: United States</p> | <p>Inferred Physiologic Model</p> | <p>Design: RCT</p> <p>Purpose: To assess the impact of augmenting Army MOVE! curriculum with NHC alone or with herbal supplement vs placebo on body composition, weight, lipid profile, bone density, adherence and motivation.</p> | <p>N = 435</p> <p>Setting: Large MTF in Washington</p> <p>Sample</p> <p>Demographics: Mean age of 30 ± 8.2; M 73.4%, F 26.6%; Caucasian 305(70.1); African American 83(19); Other 47(10.8).</p> <p>Inclusion Criteria: M or F ADSM over 18 y/o, fluent in English, not deploying within 3 mos, not previously referred to Army MOVE!</p> <p>Exclusion Criteria: Breastfeeding, Women less than 6 mos postpartum, endocrine abnormality, eating disorder, medications contraindicated with Garcinia Cambogia</p> <p>Attrition: 56%</p> | <p>IV1: NHC IV2: NHC and supplement IV2: NHC and placebo</p> <p>DV1: weight DV2: BMI DV3: AC DV4: % Fat DV5: Vitamin D DV6: FBS DV7: TChol DV8: Trig DV9: HDL DV10: LDL DV11: SMI</p> | <p>Height via stadiometer, weight and body composition via InBody 230 device, abdominal circumference, fasting blood sugar, lipid panel and 25-Hydroxyvitamin D, calcaneal BMD by ultrasound, DXA scan measure lean and fat body compartments and full body BMD, Self Motivation Inventory</p> | <p>Effect Size Cohen's <i>d</i> and significance tests($p \leq 0.05$) at a FDR of 10 %</p> | <p>DV1: $d = -0.07$, $p = 0.012$ FDR = 0.061 DV2: $d = -0.10$, $p = 0.011$ FDR = 0.062 DV3: $d = -0.06$, $p = 0.118$ FDR = 0.236 DV4: $d = -0.11$, $p = 0.026$ FDR = 0.071 DV5: $d = -0.28$, $p = 0.002$ FDR = 0.032 DV6: $d = -0.32$, $p = 0.020$ FDR = 0.065 DV7: $d = -0.08$, $p = 0.426$ FDR = 0.523 DV8: $d = -0.04$, $p = 0.690$ FDR = 0.736 DV9: $d = 0.13$, $p = 0.317$ FDR = 0.423 DV10: $d = -0.11$, $p = 0.247$ FDR = 0.417 DV11: $d = -0.07$, $p = 0.539$ FDR = 0.616</p> | <p>LOE: II</p> <p>Strengths: randomized design, Randomized design, specific to active duty population, multiple variables assessed</p> <p>Weaknesses: High attrition rate. Lack of diversity in sample making results less generalizable.</p> <p>Feasibility/Applicability to pt. population: Would not apply due to no significant differences across the four randomized groups along with high attrition.</p> |

Key: AA – African American, AC – abdominal circumference; ADSM – active duty service members; avg – average; BMD – bone mineral density; BMI - body mass index; CG- control group, CHD – coronary heart disease, CI – confidence interval; CII – counselor initiated intervention; DV -dependent variable; DXA- dual energy X-ray absorptiometry; EG – experimental group, F - female; FBS – fasting blood sugar; FFQ- Food Frequency Questionnaire; H – Hispanic, HCLF- high carbohydrate, low fat, HDL – high density lipoprotein; HEALTH- Healthy Eating Lifestyle Training Headquarters; HRB- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, IV- independent variable; LCHF – low carbohydrate, high fat; LDL – low density lipoprotein; Look AHEAD ILI – Action for Health in Diabetes Intensive Lifestyle Intervention; M- male; mos- months; N-number of participants in study; n – subset of participants; NH – Non-Hispanic, NHC – nurse health coaching; O – other, OR- odds ratio; PCS – permanent change of station; PT – physical training; PTSD – post traumatic stress disorder, RCT – randomized control trial; SAS – statistical analysis software; SD – standard deviation; SMI – self motivation inventory; SPI- self paced intervention; SPSS – Statistical Package for the Social Sciences; TChol – total cholesterol; TPB- Theory of Planned Behavior; TDY – temporary duty; Trig – triglycerides; USAF- United States Air Force; W- Caucasian; y/o – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|--|-----------------------------------|---|--|--|---|---|---|--|
| <p>Reyes-Guzman et al., (2015). Overweight and obesity trends among active duty personnel: a 13 year perspective</p> <p>Funding: RTI International</p> <p>Bias: Self-reported data may lead to reporting bias of underreporting of weight</p> <p>Country: United States</p> | <p>Inferred Physiologic Model</p> | <p>Design: Descriptive</p> <p>Purpose: To assess the prevalence and trends in overweight and obesity of ADSM over a 13 year period from 1995-2008 and to identify sociodemographic characteristics, exercise, depression and substance use in overweight and obese ADSM</p> | <p>1995 N = 16, 193 1998 N = 17, 264 2002 N = 12, 756 2005 N = 16, 146 2008 N = 24, 690</p> <p>Setting: ADSM who completed HRB</p> <p>Sample Demographics: <25 y/o = 44.54%, 26-35 y/o = 34.16%, 36-45 y/o = 18.74%, ≥ 46 y/o = 2.56%; M = 85.58%, F= 14.42%; NH W- 65.88%, NH AA- 18.04%; H- 8.72%, O- 7.4%, Army- 34.04%, Navy- 26.14%, Marine- 12.56%, Air Force 27.3%; Married- 60.72%, Single- 39.28%</p> <p>Inclusion Criteria: ADSM who completed HRB in 1995, 1998, 2002, 2005, 2008</p> <p>Exclusion Criteria: Recruits, academy cadets, ADSM absent without leave, incarcerated, or in process of PCS</p> | <p>IV1: Age IV2: Gender IV3: Branch of Service IV4: Race/Ethnicity IV5: Rank IV6: Education IV7: Marital Status</p> <p>DV1: BMI</p> <p>Overweight is BMI 25.0-29.9</p> <p>Obese is BMI 30 or greater</p> | <p>Self-reported Height, Weight, BMI obtained from HRB from 1995, 1998, 2002, 2005 and 2008</p> | <p>SUDAAN Version 10, HRB sampling weights, descriptive statistics, generalized multinomial logit model</p> | <p>DV1: BMI 25-29.9 increased 2.5%, BMI 30+ increased 8%. Combined overweight and obese increased 10% from 50.6% to 60.8%. Overweight F increased from 20.8% to 34.6%. People aged 36-45 saw 12.3% increase in obesity; NH AA saw 11.3% increase in obesity, H saw 10.7% increase in obesity; Married individuals saw 9.2% increase in obesity. Moderate association between overweight and heavy drinking, and heavy smoking. Heavy drinkers more likely to be obese (OR=1.24, 95% CI=1.04, 1.46). Those needing depression evaluation more likely to be obese (OR=1.36, 95% CI=1.18, 1.55)</p> | <p>LOE: VI</p> <p>Strengths: 5 large probability samples over 13year period</p> <p>Weaknesses: Population predominately W, M, young, married limiting generalizability of results across demographics, use of self-reported measurements not as accurate, moderate response rate on survey, possible bias, cross-sectional data</p> <p>Feasibility/Applicability to pt. population: Study found older age and male gender, heavy drinking and positive depression screening as key correlates for obesity. These demographics represent possible targets for screening and when implementing interventions</p> |

Key: AA – African American, AC – abdominal circumference; ADSM – active duty service members; avg – average; BMD – bone mineral density; BMI - body mass index; CG- control group, CHD – coronary heart disease, CI – confidence interval; CII – counselor initiated intervention; DV -dependent variable; DXA- dual energy X-ray absorptiometry; EG – experimental group, F - female; FBS – fasting blood sugar; FFQ- Food Frequency Questionnaire; H – Hispanic, HCLF- high carbohydrate, low fat, HDL – high density lipoprotein; HEALTH- Healthy Eating Lifestyle Training Headquarters; HRB- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, IV- independent variable; LCHF – low carbohydrate, high fat; LDL – low density lipoprotein; Look AHEAD ILI – Action for Health in Diabetes Intensive Lifestyle Intervention; M- male; mos- months; N-number of participants in study; n – subset of participants; NH – Non-Hispanic, NHC – nurse health coaching; O – other, OR- odds ratio; PCS – permanent change of station; PT – physical training; PTSD – post traumatic stress disorder, RCT – randomized control trial; SAS – statistical analysis software; SD – standard deviation; SMI – self motivation inventory; SPI- self paced intervention; SPSS – Statistical Package for the Social Sciences; TChol – total cholesterol; TPB- Theory of Planned Behavior; TDY – temporary duty; Trig – triglycerides; USAF- United States Air Force; W- Caucasian; y/o – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|---|-----------------------------------|--|---|--|--|--|---|---|
| <p>Rush et al., (2016). Obesity and associated adverse health outcomes among US military members and veterans: Findings from the millennium cohort study</p> <p>Funding: Military Operational Research Program of the US Army Medical Research and Materiel Command</p> <p>Bias: None identified</p> <p>Country: United States</p> | <p>Inferred Physiologic Model</p> | <p>Design: Cohort Study</p> <p>Purpose: To describe the prevalence of obesity among current and former ADSM over time and assess cross-sectional associations with health outcomes</p> | <p>N = 42,200</p> <p>Setting: ADSM across all military services who were enrolled in millennium cohort study</p> <p>Sample Demographics: M 31,187 (73.9 %), F 11,013 (26.1%); ≤36 y/o 11,751(28%), 37-42 y/o 9929 (23.5%), 43-48 y/o 10,559 (25%), > 48 y/o 9961 (23.5%); NH W 30,133 (71.4%); NH AA 4,852(11.5%); H 2419 (5.8%); O 887(2.1%) Asian/Pacific Islander 3871(9.2%)</p> <p>Inclusion Criteria: M or F ADSM in any branch enrolled in millennium cohort study who completed baseline and two follow up surveys</p> <p>Exclusion Criteria: Missing weight or height data on survey</p> | <p>V1: BMI V2: Hypertension V3: Diabetes V4: Sleep Apnea V5: CHD V6: PTSD V7: Depression</p> <p>Obesity- BMI ≥ 30</p> | <p>Self-reported height and weight measures from which BMI was calculated, Millennium Cohort Survey, Patient Health Questionnaire 9, 15 and 18, Medical Outcomes Study 36 Item Short Form Health Survey, Veterans Version.</p> | <p>Descriptive statistics, χ^2 tests, utilized SAS version 9.3</p> | <p>V1: Mean BMI- 26.1 in 2001; 26.8 in 2004; 27.5 in 2007; (p<0.0001); F- with obesity increased from 8-26%; M with obesity increased from 16-35%. Mead SD body weight change of +4.1kg from 2001 to 2007. V2: overweight 15%; obese 27.4%, p<0.001 V3: overweight 1.9%; obese 4.5%, p<0.001 V4: overweight 5.4%, obese 13.8%, p<0.001 V5: overweight 1.1%, obese 1.7%, p<0.001 V6: overweight 7.2%, obese 11.8%, p<0.0001 V7: overweight 9.6%, obese 15.5%, p<0.0001</p> | <p>LOE: IV</p> <p>Strengths: Large sample size, longitudinal cohort study</p> <p>Weaknesses: use of self-reported data; BMI used as estimate of body fat- may be influenced by muscle mass</p> <p>Feasibility/Applicability to pt. population: This study found veterans has similar prevalence of obesity as the general population suggesting veterans often gain excess weight around time of discharge; this would be critical time to implement weight management and therapeutic lifestyle measures. In addition, preventing obesity will help reduce obesity associated health outcomes.</p> |

Key: AA – African American, AC – abdominal circumference; ADSM – active duty service members; avg – average; BMD – bone mineral density; BMI - body mass index; CG- control group, CHD – coronary heart disease, CI – confidence interval; CII – counselor initiated intervention; DV -dependent variable; DXA- dual energy X-ray absorptiometry; EG – experimental group, F - female; FBS – fasting blood sugar; FFQ- Food Frequency Questionnaire; H – Hispanic, HCLF- high carbohydrate, low fat, HDL – high density lipoprotein; HEALTH- Healthy Eating Lifestyle Training Headquarters; HRB- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, IV- independent variable; LCHF – low carbohydrate, high fat; LDL – low density lipoprotein; Look AHEAD ILI – Action for Health in Diabetes Intensive Lifestyle Intervention; M- male; mos- months; N-number of participants in study; n – subset of participants; NH – Non-Hispanic, NHC – nurse health coaching; O – other, OR- odds ratio; PCS – permanent change of station; PT – physical training; PTSD – post traumatic stress disorder, RCT – randomized control trial; SAS – statistical analysis software; SD – standard deviation; SMI – self motivation inventory; SPI- self paced intervention; SPSS – Statistical Package for the Social Sciences; TChol – total cholesterol; TPB- Theory of Planned Behavior; TDY – temporary duty; Trig – triglycerides; USAF- United States Air Force; W- Caucasian; y/o – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|--|-------------------------------|---|---|--|--|--|---|---|
| <p>Sanaeinasab et al., (2019). The effect of a psycho-educational intervention on weight management in obese military personnel</p> <p>Funding: Baqiyatallah University of Medical Sciences</p> <p>Bias: None identified</p> <p>Country: Iran</p> | <p>Transtheoretical Model</p> | <p>Design: Quasi-experimental</p> <p>Purpose: To evaluate the effectiveness of a Transtheoretical Model based educational intervention to reduce obesity among military personnel. Assessed at baseline, 2 mos and 4 mos after intervention</p> | <p>N= 49</p> <p>Setting: Military base located in Tehran, Iran</p> <p>Sample Demographics: Mean age 34.6 (SD=4.4); M- 49(100%); Married 49(100%); Mean BMI at baseline 32.5(SD=5.2); Mean BP 129/81.</p> <p>Inclusion Criteria: ADSM with BMI ≥ 30, able to perform physical activities, available for 6 mos</p> <p>Exclusion Criteria: Taking obesity treatment medications</p> <p>Attrition: Not noted</p> | <p>IV1: Transtheoretical Model based program</p> <p>DV1: weight DV2: AC DV3: BMI</p> <p>In addition, self-efficacy, decisional balance and cognitive and behavioral processes of change were also examined</p> | <p>Height, weight, AC, BMI, blood pressure, Transtheoretical Model Questionnaire</p> | <p>Descriptive statistics, <i>t</i>-tests, analysis of variance, Kolmogorov-Smirnov test, Leven test, Mauchly's test, Friedman test, Cochran Q test,</p> | <p>DV1: baseline: 99.8(10.43); 2 mos: 97.11(9.82); 4 mos: 92.96(9.57),F statistic 92.86, p<0.05 DV2: baseline: 105.88(14.23); 2 mos: 103.58(13.56); 4 mos: 100.21(12.96),F statistic 94.86, p<0.05 DV3: baseline: 32.53(5.22); 2 mos: 31.69(4.98); 4 mos: 30.31(4.53),F statistic 79.66, p<0.05</p> | <p>LOE: III</p> <p>Strengths: psycho-educational intervention; showed significant changes in anthropometric measures at 4 mos.</p> <p>Weaknesses: Homogeneity of sample, all male, married, Iranian lacks generalizability of results, lack of control group, BMI does not differentiate fat mass from muscle mass</p> <p>Feasibility/Applicability to pt. population: Applying Transtheoretical Model based intervention may be useful but would recommend intervention be conducted over a longer duration than this study.</p> |

Key: AA – African American, AC – abdominal circumference; **ADSM** – active duty service members; **avg** – average; **BMD** – bone mineral density; **BMI** - body mass index; **CG**- control group, **CHD** – coronary heart disease, **CI** – confidence interval; **CI** – counselor initiated intervention; **DV** -dependent variable; **DXA**- dual energy X-ray absorptiometry; **EG** – experimental group, **F** - female; **FBS** – fasting blood sugar; **FFQ**- Food Frequency Questionnaire; **H** – Hispanic, **HCLF**- high carbohydrate, low fat, **HDL** – high density lipoprotein; **HEALTH**- Healthy Eating Lifestyle Training Headquarters; **HRB**- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, **IV**- independent variable; **LCHF** – low carbohydrate, high fat; **LDL** – low density lipoprotein; **Look AHEAD ILI** – Action for Health in Diabetes Intensive Lifestyle Intervention; **M**- male; **mos**- months; **N**-number of participants in study; **n** – subset of participants; **NH** – Non-Hispanic, **NHC** – nurse health coaching; **O** – other, **OR**- odds ratio; **PCS** – permanent change of station; **PT** – physical training; **PTSD** – post traumatic stress disorder, **RCT** – randomized control trial; **SAS** – statistical analysis software; **SD** – standard deviation; **SMI** – self motivation inventory; **SPI**- self paced intervention; **SPSS** – Statistical Package for the Social Sciences; **TChol** – total cholesterol; **TPB**- Theory of Planned Behavior; **TDY** – temporary duty; **Trig** – triglycerides; **USAF**- United States Air Force; **W**- Caucasian; **y/o** – years old

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|---|-----------------------------------|--|--|---|-------------------------------------|---|--|--|
| <p>Zinn et al., (2015). A 12 week low-carbohydrate, high fat diet improves metabolic health outcomes over a control diet in a randomised controlled trial with overweight defence force personnel</p> <p>Funding: Auckland University of Technology</p> <p>Bias: None identified</p> <p>Country: New Zealand</p> | <p>Inferred Physiologic Model</p> | <p>Design: RCT</p> <p>Purpose: To compare LCHF dietary intervention to control diet of high carbohydrate, low fat diet in reducing weight and improving metabolic outcomes</p> | <p>N= 26</p> <p>Setting: Naval Base in Auckland, New Zealand</p> <p>Sample Demographics: Mean age (CG) 39.7 ± 9.6, (EG) 39.6 ± 7.8; F- 14 (34%); M- 27 (66%)</p> <p>Inclusion Criteria: New Zealand Defence Force personnel</p> <p>Exclusion Criteria: Consuming diet that contained 250g or less of carbohydrate, BMI <25</p> <p>Attrition: 36%</p> | <p>IV1: HCLF diet (CG) IV2: LCHF diet (EG)</p> <p>DV1: weight DV2: AC</p> | <p>Height, weight, AC, BMI, FFQ</p> | <p>Cohen’s scale, t-statistic, log transformation</p> | <p>DV1: between group difference mean (90% CI) - 3.6(-5.8, -1.4); between group difference, Cohens d (90% CI) -0.39(-0.64, -0.14) DV2: between group difference mean (90% CI) - 1.5(-4.1, 1.1); between group difference, Cohens d (90% CI) -0.21(-0.45, 0.04)</p> <p>In addition, study examined lipid and glycemic panels and found small likely beneficial improvement in EG.</p> | <p>LOE: II</p> <p>Strengths: small possible benefit with EG in short term</p> <p>Weaknesses: High attrition rate, small sample size, results unclear</p> <p>Feasibility/Applicability to pt. population: Would not apply this intervention to current practice as results are unclear, further study needed.</p> |

Key: AA – African American, AC – abdominal circumference; **ADSM** – active duty service members; **avg** – average; **BMD** – bone mineral density; **BMI** - body mass index; **CG**- control group, **CHD** – coronary heart disease, **CI** – confidence interval; **CII** – counselor initiated intervention; **DV** -dependent variable; **DXA**- dual energy X-ray absorptiometry; **EG** – experimental group, **F** - female; **FBS** – fasting blood sugar; **FFQ**- Food Frequency Questionnaire; **H** – Hispanic, **HCLF**- high carbohydrate, low fat, **HDL** – high density lipoprotein; **HEALTH**- Healthy Eating Lifestyle Training Headquarters; **HRB**- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, **IV**- independent variable; **LCHF** – low carbohydrate, high fat; **LDL** – low density lipoprotein; **Look AHEAD ILI** – Action for Health in Diabetes Intensive Lifestyle Intervention; **M**- male; **mos**- months; **N**-number of participants in study; **n** – subset of participants; **NH** – Non-Hispanic, **NHC** – nurse health coaching; **O** – other, **OR**- odds ratio; **PCS** – permanent change of station; **PT** – physical training; **PTSD** – post traumatic stress disorder, **RCT** – randomized control trial; **SAS** – statistical analysis software; **SD** – standard deviation; **SMI** – self motivation inventory; **SPI**- self paced intervention; **SPSS** – Statistical Package for the Social Sciences; **TChol** – total cholesterol; **TPB**- Theory of Planned Behavior; **TDY** – temporary duty; **Trig** – triglycerides; **USAF**- United States Air Force; **W**- Caucasian; **y/o** – years old

Table 2

Evaluation Table of Qualitative Studies

| Citation | Conceptual Framework | Design/Method | Sample/Setting | Major Variables & Definitions | Measurement | Analysis | Findings | Decision for Use |
|---|------------------------|---|---|---|--|--|---|---|
| Hatzfeld et al., (2016). Factors influencing health behaviors among active duty Air Force personnel Funding: TriService Nursing Research Program Bias: None identified Country: United States | Health Promotion Model | Design: Descriptive Exploratory Qualitative Study Purpose: To identify factors that influence lifestyle behaviors of USAF active duty military members | N = 24 Setting: Large MTF in Northern California Sample Demographics: 31-35 y/o- 12 (50%); > 35 y/o 12 (50%). Caucasian 7 (29%); African American 7 (29%); Other 10 (42%) M 14 (58%), F 10 (42%). Inclusion Criteria: M or F active duty member of USAF at least 21 y/o and having been assigned to more than one military base Exclusion Criteria: History of prior cardiac event; pregnant or in prisoner status | V1: Definition of health V2: USAF culture V3: Who I am V4: What works for me | Short demographic form, semi-structured face to face audio recorded interviews based on Health Promotion Model | Conventional content analysis to identify themes | V1: exercise, healthy diet, adequate sleep, spirituality, absence of smoking, excessive stress, alcohol and caffeine. Most agreed fitness test did not measure health V2: Score >90% on PT test, Stress and career implications of not meeting PT requirements; negative impact of group fitness; leading by example; transient nature of military life V3: Personal history and preferences V4: Activities and choices that matched preferences | LOE: VI Strengths: heterogenous sample with diversity of demographics, qualitative methodology Weaknesses: Small sample, only a single interview, concepts of Health Promotion Model not clearly reflected in this sample Feasibility/Applicability to pt. population: This study identified factors that influence health behaviors, understanding these factors are helpful in designing lifestyle intervention programs for ADSM. |

Key: AA – African American, AC – abdominal circumference; **ADSM** – active duty service members; **avg** – average; **BMD** – bone mineral density; **BMI** - body mass index; **CG**- control group, **CHD** – coronary heart disease, **CI** – confidence interval; **CI** – counselor initiated intervention; **DV** -dependent variable; **DXA**- dual energy X-ray absorptiometry; **EG** – experimental group, **F** - female; **FBS** – fasting blood sugar; **FFQ**- Food Frequency Questionnaire; **H** – Hispanic, **HCLF**- high carbohydrate, low fat, **HDL** – high density lipoprotein; **HEALTH**- Healthy Eating Lifestyle Training Headquarters; **HRB**- DoD Surveys of Health-Related Behaviors Among AD Military Personnel, **IV**- independent variable; **LCHF** – low carbohydrate, high fat; **LDL** – low density lipoprotein; **Look AHEAD ILI** – Action for Health in Diabetes Intensive Lifestyle Intervention; **M**- male; **mos**- months; **N**-number of participants in study; **n** – subset of participants; **NH** – Non-Hispanic, **NHC** – nurse health coaching; **O** – other, **OR**- odds ratio; **PCS** – permanent change of station; **PT** – physical training; **PTSD** – post traumatic stress disorder, **RCT** – randomized control trial; **SAS** – statistical analysis software; **SD** – standard deviation; **SMI** – self motivation inventory; **SPI**- self paced intervention; **SPSS** – Statistical Package for the Social Sciences; **TChol** – total cholesterol; **TPB**- Theory of Planned Behavior; **TDY** – temporary duty; **Trig** – triglycerides; **USAF**- United States Air Force; **W**- Caucasian; **y/o** – years old

Appendix B

Table 3

Synthesis Table

| Studies | | Blaz et al. | Hatzfeld et al. | Krukowski et al. | Lash et al. | Macklin-Akinyemi et al. | McCarthy et al. | Reyes-Guzman et al. | Rush et al. | Sanaeinasab et al. | Zinn et al. |
|----------------|-------------------|-------------|-----------------|------------------|----------------|-------------------------|-----------------|---------------------|-------------|--------------------|----------------|
| Basics | Year | 2016 | 2016 | 2018 | 2016 | 2017 | 2017 | 2015 | 2016 | 2019 | 2015 |
| | LOE | III | VI | II | VI | VI | II | VI | IV | III | II |
| | Design | QE | D E | RCT | D | D | RCT | D | CS | QE | RCT |
| | ADSM | X | X | X | | X | X | X | X | X | X |
| | Mean Age | 42.4 yrs | NR | 32.6 yrs | 61 yrs | 34.6 yrs | 30 yrs | NR | NR | 34.6yrs | 39.7yrs |
| | % Female | NR | 42% | 50.8% | 8.3% | 50.8% | 26.6 % | 14.4% | 26.1% | 0% | 34% |
| | Attrition | 37.5% | 0% | 30.6% | 13.7% | 0% | 56% | 0% | 0% | NR | 36% |
| | # of participants | 20 | 24 | 248 | 84 | 248 | 435 | 87049 | 42200 | 49 | 26 |
| | Setting | MTF | MTF | MTF | VA | MTF | MTF | N/A | N/A | MTF | MTF |
| Interventions | Measurement Tools | BCA | I | Scale, TM | S/Q, scale, ST | S/Q, scale, ST | S/Q, BCA, ST | S/Q | S/Q | S/Q, scale, ST, TM | S/Q, scale, ST |
| | SPI | X | | X | | | | | | | |
| | PLI | | | X | | | X | | | X | X |
| | NFI | | X | | X | X | | X | X | | |
| | Supplement | | | | | | X | | | | |
| Major findings | Weight | ↓, ns | | ↓* | ns | | ↓* | ↑ | | ↓* | ↓, small |
| | BMI | ↓, ns | | | | | ↓* | | ↑* | ↓* | |
| | Body fat | ↓* | | | | | ↓* | | | | |
| | AC | | | ↓* | | | ns | | | ↓* | ↓, small |
| | Health Influences | | X | | | X | | | | | |

Key: AA – African American, AC – abdominal circumference; ADSM – active duty service member, BCA – body composition analyzer, BMI – body mass index, CS – cohort study, D - descriptive, E – exploratory, I – interview, LOE – level of evidence, MTF- Military Treatment Facility., NFI – no formal intervention, NR – not reported, ns – not significant, PLI- provider led intervention, QE - quasi-experimental, RCT – randomized control trial, SPI – self paced intervention, S/Q – survey or questionnaire, ST – stadiometer, TM – tape measure, VA- Veterans Affairs Hospital, * - significant

Appendix C

Theoretical or Conceptual Framework Diagram

Figure 1. Health Belief Model

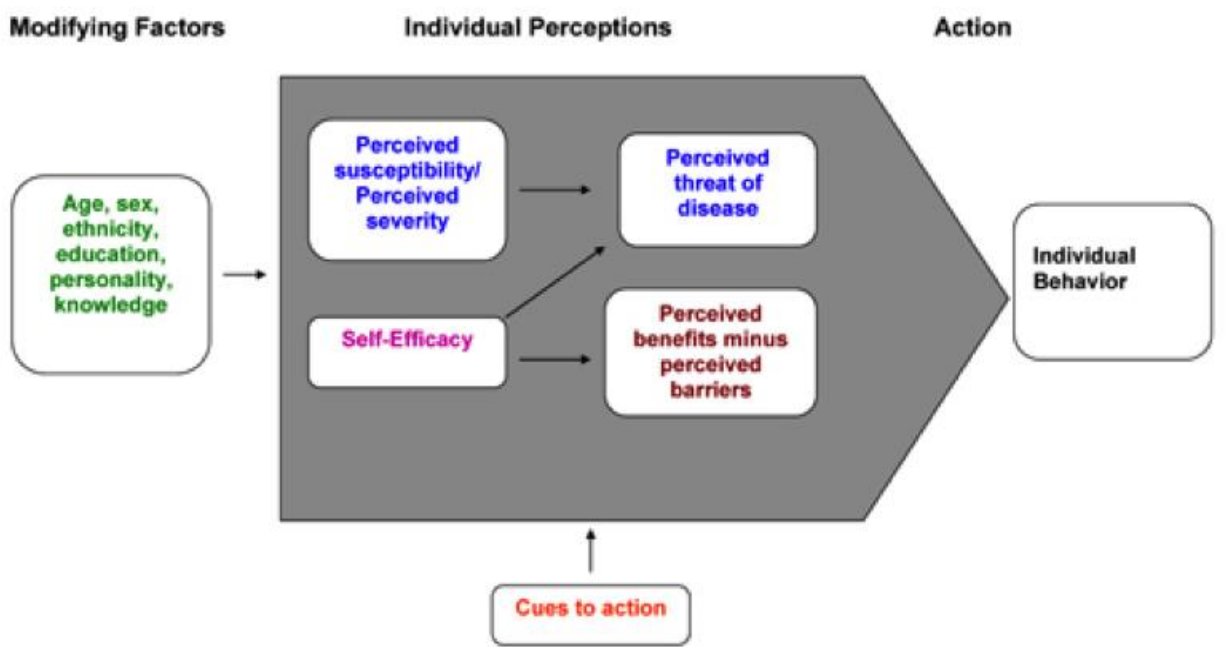


Figure 1. Health belief model denotes modifying factors, individual perceptions and action toward health promoting behavior. Reprinted from “Theory, Research, and Practice,” by University of Pennsylvania, School of Medicine, n.d., Retrieved from <https://www.med.upenn.edu/hbhe4/part2-ch3-main-constructs.shtml>.

Appendix D

Evidence Based Practice Model Diagram

Figure 2. Ottawa Model of Research Use

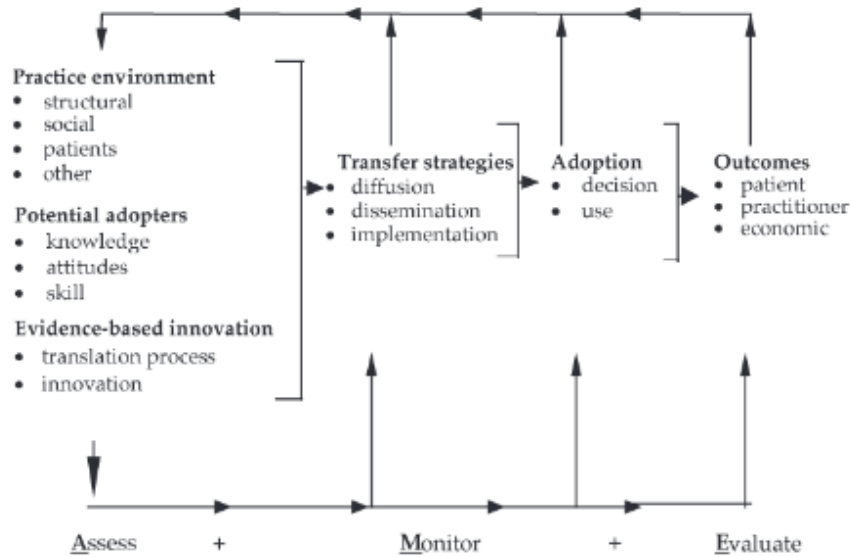


Figure 2. Ottawa Model of Research Use identifies assessing practice environment, potential adopters, and evidenced based innovation, monitoring transfer strategies, adoption and evaluating outcomes as it related to EBP innovation. Reprinted from “The Ottawa Model of Research Use: A Guide to Clinical Innovation in the NICU,” by D. L. Hogan and J. Logan, 2004, *Clinical Nurse Specialist*, 18(50), p. 257. Copyright 2004 by Lippincott Williams & Wilkins Inc.

Appendix E

Arizona State University Institutional Review Board Approval



APPROVAL: EXPEDITED REVIEW

[Lynda Root](#)
[EDSON: DNP](#)
 602/496-0810
Lynda.Root@asu.edu

Dear [Lynda Root](#):

On 10/9/2019 the ASU IRB reviewed the following protocol:

| | |
|---------------------|---|
| Type of Review: | Initial Study |
| Title: | Lifestyle Treatment Intervention in Obese Military Members |
| Investigator: | Lynda Root |
| IRB ID: | STUDY00010703 |
| Category of review: | (4) Noninvasive procedures, (7)(a) Behavioral research |
| Funding: | None |
| Grant Title: | None |
| Grant ID: | None |
| Documents Reviewed: | <ul style="list-style-type: none"> • GLB Week 10, Category: Participant materials (specific directions for them); • GLB Week 7, Category: Participant materials (specific directions for them); • Consent for Lifestyle Treatment Intervention in Obese Military Members, Category: Consent Form; • GLB Week 11, Category: Participant materials (specific directions for them); • GLB Week 3, Category: Participant materials (specific directions for them); • GLB Week 6, Category: Participant materials (specific directions for them); • Institution Letter, Category: Off-site authorizations (school permission, other IRB approvals, Tribal permission etc); • GLB Week 5, Category: Participant materials (specific directions for them); |

| | |
|--|--|
| | <ul style="list-style-type: none">• GLB Week 1, Category: Participant materials (specific directions for them);• Lifestyle Treatment Intervention in Obese Military Members, Category: IRB Protocol;• Recruiting Script.pdf, Category: Recruitment Materials;• GLB Week 2, Category: Participant materials (specific directions for them);• GLB Week 9, Category: Participant materials (specific directions for them);• Air Force HRPO Submission Cover Sheet.pdf, Category: Off-site authorizations (school permission, other IRB approvals, Tribal permission etc);• GLB Week 12, Category: Participant materials (specific directions for them);• GLB Week 8, Category: Participant materials (specific directions for them);• Guidance on Submitting a Protocol for HRPO Review 4-26-2019.pdf, Category: Off-site authorizations (school permission, other IRB approvals, Tribal permission etc);• GLB Week 4, Category: Participant materials (specific directions for them); |
|--|--|

The IRB approved the protocol from 10/9/2019 to 10/8/2020 inclusive. Three weeks before 10/8/2020 you are to submit a completed Continuing Review application and required attachments to request continuing approval or closure.

If continuing review approval is not granted before the expiration date of 10/8/2020 approval of this protocol expires on that date. When consent is appropriate, you must use final, watermarked versions available under the “Documents” tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Kimberly Monti
Kimberly Monti
Lynda Root

Appendix F

Recruiting Script

Hello everyone, my name is Kimberly Monti. I am family nurse practitioner currently in the Doctor of Nursing Practice program at the Edson College of Nursing and Health Innovation at Arizona State University. I am conducting an evidenced based project to examine the effectiveness of a weight loss intervention involving a group lifestyle education program reinforcing healthy diet and exercise practices. The program is the Group, Lifestyle, Balance program.

You are currently enrolled in Group, Lifestyle, Balance or GLB. I would like to invite you to participate in an evidenced project consisting of the initial 12 weeks of GLB. I will provide weekly educational sessions and obtain monthly height, weight, body mass index and abdominal circumference. As a part of the project team, my role as a graduate student is to provide program content, offer support, answer questions but also measure outcomes.

Your participation in this study is voluntary and you may withdraw from the study at any time without penalty. Volunteers will be asked to consent to sharing their program outcomes. This will include height, weight, BMI, and abdominal circumference. Anonymity will be provided. All information will be deidentified and reported in aggregate form. Project outcomes will be released to participants, the 56th Medical Group, Luke Air Force Base AZ, the Department of Defense, and Arizona State University. The results of this study may be used in reports, presentations, or publications but your name will not be used. There may be limits to data confidentiality due to mandatory reporting requirements of military personnel.

Potential benefits you may receive from participating in this study include contributing to information regarding the impact of the Group Lifestyle Balance program on weight loss, body mass index, abdominal circumference. Potential risks for participants engaging in a weight loss intervention include potentially feel singled out or misunderstood. Participants may also face obesity bias.

Please let me know if you would like to participate in this study. I can be contacted by e-mail at kmonti1@asu.edu.

Appendix G

Consent

I, Kimberly Monti, am a Doctor of Nursing Practice student under the direction of Professor Lynda Root, DNP, RN in the Edson College of Nursing and Health Innovation at Arizona State University. I am conducting an evidenced based project to examine the effectiveness of a weight loss intervention involving a group lifestyle education program reinforcing healthy diet and exercise practices.

You are participating in the Group, Lifestyle, Balance program that includes 1-hour weekly group sessions for 12 weeks. In addition, monthly height, weight, body mass index and abdominal circumference will be obtained. This program is being implemented through the Luke Air Force Base Health Promotions unit. As a part of the project team, my role as a doctoral student is to provide program content, offer support, answer questions and measure outcomes.

I am inviting you participate in an evidenced based study. I am seeking between 20-30 volunteers. Volunteers will be asked to consent to sharing their program outcomes. This will include height, weight, BMI, and abdominal circumference. Anonymity will be provided. All information will be deidentified and reported in aggregate form. Project outcomes will be released to participants, the 56th Medical Group, Luke Air Force Base AZ, the Department of Defense, and Arizona State University. The results of this study may be used in reports, presentations, or publications but your name will not be used. There may be limits to data confidentiality due to mandatory reporting requirements of military personnel.

Your participation in this study is voluntary and you may withdraw from the study at any time without penalty. You must be an active duty service member, at least 18 years old, have body mass index greater than 25, and not deploying or moving within the next 6 months to participate in the study.

Potential benefits participants may receive from this study include contributing to information regarding the impact of the Group Lifestyle Balance program on weight loss, body mass index, abdominal circumference. Potential risks for participants engaging in a weight loss intervention include potentially feel singled out or misunderstood. Participants may also face obesity bias.

If you have any questions concerning the research study, please contact the research team at: kmonti1@asu.edu or lynda.root@asu.edu. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know if you wish to be part of the study.

By signing below, you are agreeing to be part of the study.

Name:

Signature:

Date

Appendix H

Table 4

Two-Tailed Paired Samples t-Test for the Difference Between Initial and Completion Weights

| Initial Weight | | Completion Weight | | <i>t</i> | <i>p</i> | <i>d</i> |
|----------------|-----------|-------------------|-----------|----------|----------|----------|
| <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | | |
| 201.59 | 24.78 | 200.22 | 24.27 | 0.69 | .508 | 0.21 |

Note. N = 11. Degrees of Freedom for the *t*-statistic = 10. *d* represents Cohen's *d*.

Table 5

Two-Tailed Paired Samples t-Test for the Difference Between Initial and Completion BMI

| Initial BMI | | Completion BMI | | <i>t</i> | <i>p</i> | <i>d</i> |
|-------------|-----------|----------------|-----------|----------|----------|----------|
| <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | | |
| 31.56 | 1.66 | 31.38 | 2.04 | 0.64 | .538 | 0.19 |

Note. N = 11. Degrees of Freedom for the *t*-statistic = 10. *d* represents Cohen's *d*.

Appendix I

Figure 3

The means of Initial Weight and Completion Weight

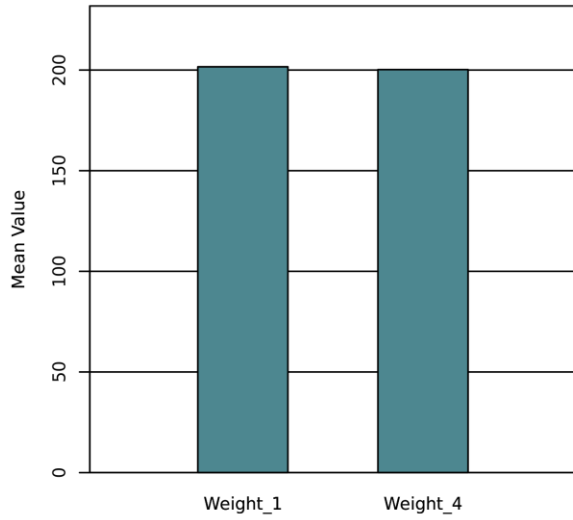


Figure 4

The means of Initial BMI and Completion BMI

