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Original Research

Adherence to the Dietary Guidelines for Americans Is Associated with Psychological Resilience in Young Adults: A Cross-Sectional Study

Laura J. Lutz, MS, RD; Erin Gaffney-Stomberg, PhD, RD; Kelly W. Williams, PhD; Susan M. McGraw; Philip J. Niro; J. Philip Karl, PhD, RD; COL Sonya J. Cable, MS, RD; Thomas L. Cropper, PhD; James P. McClung, PhD

ARTICLE INFORMATION

Article history:
Submitted 2 June 2016
Accepted 19 September 2016
Available online 5 November 2016

Keywords:
Healthy Eating Index
Resilience
Diet quality
Dietary Guidelines for Americans
Nutrition

2212-2672/Published by Elsevier Inc. on behalf of the Academy of Nutrition and Dietetics.
http://dx.doi.org/10.1016/j.jand.2016.09.018

ABSTRACT

Background The 2010 Healthy Eating Index (HEI-2010), a measure of diet quality, is used to quantify adherence to the Dietary Guidelines for Americans. Better HEI scores have been associated with positive health outcomes; however, the relationship between diet quality and psychological resilience, a mental health attribute for coping with adversity, has not been assessed.

Objective The objective of the present study was to assess the relationship between diet quality and psychological resilience, and the relationship between resilience and demographics, anthropometrics, socioeconomic status, and health behavior.

Design In this cross-sectional study, HEI-2010 scores and resilience were assessed using the Block food frequency questionnaire and the Connor-Davidson Resilience Scale. Other factors that can affect the relationship between HEI-2010 scores and resilience were assessed using surveys, and height and weight were measured to calculate body mass index.

Participants/setting Male and female Army and Air Force recruits (n=834) enrolled in a randomized controlled trial and 656 (mean±standard deviation [SD] age=21±3.3 years) were included in this analysis. Data were collected before the initiation of military training at Fort Sill, OK (2012-2013) and Lackland Air Force Base, TX (2013-2014).

Statistical analysis performed Participants were split into low- and high-resilience groups based on Connor-Davidson Resilience Scale scores. Student's t test and χ^2 tests were used to determine differences between groups for continuous and categorical variables, respectively. Logistic regression was utilized to identify predictors of resilience.

Results Better diet quality was associated with resilience; higher HEI predicted an increased likelihood (odds ratio=1.02; 95% CI 1.01 to 1.04) of a participant being in the high-resilience group after including race, ethnicity, education, smoking, age, body mass index, sex, and military branch in the full model. The data indicate that with every 10-point increase in HEI score, there was a 22% increased likelihood of being in the high-resilience group.

Conclusions Registered dietitian nutritionists should continue to encourage attainable changes to improve diet; study data suggest that small improvements in diet quality can be associated with better psychological resilience.

J Acad Nutr Diet. 2017;117:396-403.

PSYCHOLOGICAL RESILIENCE IS AN IMPORTANT TRAIT for military personnel as military personnel often experience occupational stressors, such as cognitively and physically demanding operational training exercises, deployment, and separation from family.[1] Studies indicate that nutrition status affects both cognitive and physical performance in military recruits, although studies have not directly explored the potential relationship between psychological resilience and diet quality, particularly in military personnel.[2,3]

One method to assess whether an individual is consuming an optimal diet is through adherence to the Dietary Guidelines for Americans (DGA),[4] which provide nutrition recommendations for Americans over the age of 2 years. Published by the US Departments of Agriculture and Health and Human Services, the recommendations are evidence-based and updated every 5 years based on advances in the scientific literature. The intended purposes of the DGA are threefold: health promotion, disease prevention, and healthy weight maintenance.[4] Adherence to the DGA can be measured using the Healthy Eating Index (HEI).[5,6] Higher HEI-2005 scores, indicating better diet quality, have been associated with many positive health outcomes, including reduced risk of coronary heart disease, diabetes, stroke,

cancer,[7] depressive symptoms,[8] metabolic syndrome, and obesity.[9]

Previous research has detailed an association between diet quality and mental health, which can be partially attributed to factors including socioeconomic status (SES) and health-related behaviors.[10] Wang and Chen[11] observed differences in HEI scores and body mass index (BMI; calculated as kg/m^2) between adults of different races, but this effect was reduced when controlling for SES. Previous data also indicate that differences in dietary intake exist in those with different personality traits. For example, Finnish women with resilient personality profiles (measured by applying Wards hierarchical clustering to the Finnish version of the Neuroticism-Extroversion-Openness Personality Inventory) consumed healthier diets (ie, more fruits, vegetables, fish, and dietary fiber) than those who were not resilient.[12] Another report demonstrated similar findings in an elderly German population; individuals who consumed more fruits and vegetables daily were more resilient (measured by the short version of the Resilience Scale developed by Wagnild and Young).[13,14] Resilience can be defined as the ability to adapt to adverse situations and stressors.[12] While a relationship between diet and psychological resilience has been observed in women and the elderly in previous reports,[12,13] the nature and directionality of this relationship are unknown.

There is evidence suggesting the relationships among well-being, psychological resilience, and diet can be attributed to the fact that individuals with positive affect might simply make better health behavior choices.[15] However, there may be biological mediators facilitating the relationship between intake of a healthier diet and resilience. Diets rich in saturated fats, refined sugars, and animal products, and low in fruit and vegetable consumption, have been shown to affect glucocorticoid secretion, notably cortisol.[16] Likewise, O'Donnell and colleagues[17] found that adaptive coping, a resilience factor, was related to lower cortisol levels in healthy older adults. To the best of our knowledge, the relationship between diet quality, a modifiable factor, and psychological resilience, an attribute that can affect occupational performance, has not been studied in military personnel, a younger population that includes both men and women.

The HEI-2005 has been utilized previously to describe the diets of soldiers both before and after initial military training,[18] but the relationship between diet quality and health outcomes was not assessed. Since the publication of that report, a new version of the HEI has been released, the HEI-2010, which reflects the recommendations set forth in the 2010 DGA.[6] The objective of the present study was to assess the relationship between diet quality, resilience, demographics, anthropometrics, SES, and health behavior in a population of young, healthy Air Force and Army recruits starting initial military training using the HEI-2010 and the Connor-Davidson Resilience Scale (CD-RISC). We hypothesized that diet quality and resilience would be positively related.

METHODS

This study was approved by the Human Use Review Committee at the US Army Research Institute of Environmental Medicine and separate study iterations were conducted at Fort Sill, OK, and Lackland Air Force Base, TX, between June 2012 and March 2014. These trials were registered at Clinicaltrials.gov under trial number NCT01617109. The individuals participated in this study after providing their free and informed voluntary consent. Investigators adhered to US Army Regulation 70-25 and US Army Medical Research and Material Command Regulation 70-25 on the participation of participants in research. The data presented in this article were collected in conjunction with a study assessing the effects of calcium and vitamin D supplementation on bone health, which determined the sample size requirements.[3,19] Units beginning initial military training in June 2012 and February 2013 at Fort Sill, OK, and at Lackland Air Force Base, TX, in October 2013 and March 2014 were briefed on the details of study participation. Individuals were asked to participate only if they were 17 years of age or older,[20] were not pregnant, had no history of renal disease, and were not allergic to any foods provided in the study intervention.[3]

A total of 834 female and male participants (492 Army and 342 Air Force) enrolled in the study out of the approximately 1,259 who were briefed (890 Army and 369 Air Force), and data were collected before the initiation of military training and before the study intervention was initiated. More potential Army participants chose not to participate than Air Force participants (45% vs 7%). Two individuals did not report for data collection, and individuals were omitted from data analysis if they were missing age (n=1), height (n=44), weight (n=45), food frequency questionnaire (FFQ), or CD-RISC data (n=71) (some of these participants were missing more than one of these data points). Participants were also excluded if they reported implausible caloric intakes determined by FFQ (n=63) (<300 or >4,500 kcal/day for females [n=18] and <800 or >5,000 kcal/day for males [n=45]).[21] When comparing those who remained in the analysis with those excluded, there were no differences in sex (excluded males 20% and females 17%; P=0.14), age (P=0.35), race (white 22%, black/African American 24%, and other 13%; P=0.14), or ethnicity (Hispanic 19 and non-Hispanic 22%; P=0.25), however, more Army recruits (83%) were included in the analysis when compared with Air Force recruits (73%; P<0.001) and those included in the analysis had a higher BMI (mean±SD=24.3±3.1) when compared with those excluded (mean±SD=23.6±2.8; P=0.01).

Dietary Intake

Participants completed a full-length, validated FFQ that measures food and beverage consumption under the supervision of registered dietitian nutritionists to assess habitual dietary intake and HEI-2010 scores for the 3 months before the start of initial military training (Block 2005 FFQ, NutritionQuest).[22-24] The FFQ asked participants how often (ranging from never to every day) they consumed items from the list of approximately 110 foods and, on average, how much (with two to four food appropriate options) they consumed of these items. To aid in portion size estimation, pictures of various portion sizes were provided. In addition to the food list, the FFQ asks what kinds of foods were usually consumed (ie, low-fat vs regular-fat foods and low-carbohydrate vs regular-carbohydrate foods). Questionnaires were analyzed by NutritionQuest using National Health and Nutrition Examination Survey 1999-2002 dietary recall data[25] to develop the food list. HEI-2010 scores were