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ASSOCIATIONS BETWEEN PERSONALITY STYLE, PERCEPTIONS OF HEALTH
COACHING AND PERCENT OF STARTING WEIGHT IN MEAL REPLACEMENT
PROGRAM PARTICIPANTS

BY

ANNE E. SAWYER

A thesis submitted in partial fulfillment of the requirements for the

Master of Science

Major in Nutrition and Exercise Science

Specialization in Exercise Science

Certificate in Transdisciplinary Childhood Obesity Prevention

South Dakota State University

2017

ASSOCIATIONS BETWEEN PERSONALITY STYLE, PERCEPTIONS OF HEALTH
COACHING AND PERCENT OF STARTING WEIGHT IN MEAL REPLACEMENT
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ANNE E. SAWYER

This thesis is approved as a creditable and independent investigation by a candidate for the Master of Science degree in Nutrition and Exercise Science and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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ABBREVIATIONS

BMI	Body Mass Index
MR	Meal Replacement
PA	Physical Activity
RED	Reduced Energy Density
TIPI	Ten Item Personality Inventory
WAI	Working Alliance Inventory

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ABSTRACT

ASSOCIATIONS BETWEEN PERSONALITY STYLE, PERCEPTIONS OF HEALTH
COACHING AND PERCENT OF STARTING WEIGHT IN MEAL REPLACEMENT
PROGRAM PARTICIPANTS

ANNE E. SAWYER

2017

Purpose: To determine if personality style and an individual's perception of their health coaching experience impact their ability to lose weight and/or maintain weight loss.

Methods: An electronic survey was distributed to 20,000 current and past meal replacement program participants. Personality style was assessed via the Ten Item Personality Inventory, providing individual perceptions of each of the Big Five personality domains (extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience). The Working Alliance Inventory (Short Revised) was used to assess three key perceptions of health coaching: 1) agreement on the goals of coaching (goal), 2) agreement on the tasks of coaching (task), and 3) development of an effective bond (bond). Percent of starting weight was calculated from self-reported program start weight and current weight. Individuals were excluded if they had been on the program less than one month or had missing personality or health coaching data. Linear regressions were run to determine the relationship between personality style, perception of health coaching, and percent of starting weight. Statistical significance was set at $p \leq 0.05$. Age and sex were controlled for in all analyses.

Results: Of the 1,609 individuals included in final analyses, 1,560 (97%) experienced some degree of weight loss. Current weight ranged from 51% of starting weight to 152% of starting weight. Personality style was not associated with weight change in either direction. Goal, task and bond were positively associated with percent of starting weight ($p < 0.001$), such that individuals who reported a greater goal/task/bond with their health coach achieved less weight loss. While no one personality style was associated with health coach bond, extraversion was associated with goal ($p = 0.04$) and task ($p = 0.04$).

Conclusions: A positive perception of health coaching, evaluated through assessment of goal/task/bond, did not translate into increased weight loss success. Coaching techniques should be evaluated and new strategies or techniques should be explored that enhance coaching effectiveness while building upon the existing client/coach relationship.

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CHAPTER 1

LITERATURE REVIEW

Overweight and Obesity

In 2014, just over one-third of adults in the United States were classified as obese.¹ Of that one-third, 6.4% reported having a body mass index (BMI) equal to or greater than 40, placing those individuals in the class three, or extremely obese, category.¹ Although the exponential growth rate of obesity among adults observed from 2000 to 2005 in the United States had plateaued, the extremely obese BMI category continued to rise rapidly.² Since 2000, there has been a 70% increase in the number of individuals with a BMI greater than 40.² Furthermore, self-reported height and weight surveys indicate that the percentage of individuals with a BMI greater than 50 had increased by nearly 1200% since 1986.² Obesity contributes to an increased prevalence of a wide variety of chronic conditions including heart disease, numerous types of cancer, type II diabetes, osteoarthritis, and psychosocial disorders³⁻⁶ and the severity of the risks associated with these conditions increases with higher BMI levels.²

In 1998, the National Center for Health Statistics and the United States Bureau of the Census administered the National Health Interview Survey to a nationally representative population of American adults.⁷ The survey was conducted via face-to-face interviews with the purpose of determining the prevalence of attempted weight loss among U.S. adults and the specific weight loss strategies being used by participants.⁷ The study concluded that of those surveyed, 24% of men and 37% of women were attempting

to lose weight, and that the percentage of individuals pursuing weight loss increased with greater BMI levels.⁷

Among survey respondents, joining a weight loss program was a commonly mentioned weight loss strategy.⁷ Weight-loss programs, such as meal replacement (MR) programs, have become increasingly popular among American adults. MR programs emerged in 1994 and are designed to be a simple and effective reduced-calorie meal plan.^{8,9} The Academy of Nutrition and Dietetics supports the use of MR programs as an effective dietary strategy for weight management in conjunction with daily physical activity (PA).¹⁰

Meal Replacement Products and Programs

Meal replacement products are most commonly pre-packaged shakes and bars fortified with vitamins and minerals.^{9,11,12} Products are often high in protein, low in carbohydrates, and are portion-controlled in order to support a daily caloric consumption between 800 and 1600 calories.^{9,11,12} The use of MR products has become increasingly popular as a tool for both weight loss and weight loss maintenance.^{13,14} As the use of MR products has grown, MR programs have been developed to provide guidance for both weight loss and weight loss maintenance. Many MR programs separate weight loss and weight loss maintenance into two separate phases.^{14,15} During the initial weight loss phase, participants are typically instructed to replace grocery store foods with MR products except for an evening meal which is often suggested to be composed of a protein and a vegetable.⁸ The weight loss maintenance phase scales back to using one MR product per day while beginning to incorporate an increased amount of traditional, grocery store foods.¹²

Meal Replacement Programs Facilitate Weight Loss

Meal replacement programs have been recognized to be effective in promoting weight loss.^{9,14,16} Individuals participating in MR programs are reported to lose significantly more weight than their counterparts participating in a reduced-calorie, food-based diet.¹⁴ Davis et al.¹⁴ compared the effectiveness of a MR-based program versus a reduced-calorie, food-based diet formulated off of the United States Department of Agriculture food guide pyramid in obese adults. Participants in each group consumed approximately 1000 kcal/day and all participants completed a 16-week weight loss phase.¹⁴ According to the Academy of Nutrition and Dietetics, the American College of Cardiology, and the American Heart Association, a weight reduction of at least 5-10% is considered clinically significant.^{17,18} After 16 weeks of active weight loss, 75% of individuals in the MR group achieved clinically significant weight loss, compared to only 25% of participants on the food-based diet.^{14,17,18} Furthermore, individuals utilizing MRs lost a significantly greater percentage of their bodyweight (12.3%) than the individuals on the food-based diet (6.7%), deeming the MR intervention more effective at weight loss.¹⁴

A meta-analysis by Heymsfield et al.⁹ examined six different studies comparing the effectiveness of traditional grocery store, reduced-calorie diets and MR products on successful weight loss in overweight and obese individuals. In all six studies, caloric intake between individuals on the traditional reduced-calorie diet and individuals in the MR group was equivalent, yet the results showcased significantly greater weight loss among subjects randomized to the groups utilizing MRs.⁹ Among individuals who completed each study, those in the reduced-calorie group and MR group lost between

2.61-4.35kg and 6.97-7.31kg, respectively.⁹ Thus, individuals participating in the MR interventions lost nearly twice the amount of weight compared to those on the reduced-calorie diets.⁹

Coleman and colleagues¹⁶ studied a specific calorie- and portion-controlled MR program that is designed to warrant gradual and steady weight loss in overweight and obese individuals. Participants' daily food intake included four MRs, two grocery store meals based around protein and vegetables, and one healthy snack that integrated fruit, dairy, and/or whole grains totaling a daily caloric intake between 1,100 and 1,300 calories.¹⁶ Researchers compared the change in body weight of individuals who completed the weight loss phase from baseline to twelve weeks.¹⁶ After twelve weeks on the MR plan, nearly 70% of participants who had successfully completed the weight loss phase achieved clinically significant (5-10% of bodyweight) weight loss.¹⁶⁻¹⁸ Eighty-five percent of participants who successfully completed the weight loss phase lost at least 5% of their bodyweight, while just over 50% of individuals who completed the weight loss phase lost at least 10% of their baseline weight.¹⁶ Additionally, within the first four weeks of the program, average blood pressure, heart rate, and BMI improved among participants.¹⁶

Together, these data showcase that use of portion-controlled, MR products enhances weight loss and improves risk factors associated with overweight and obesity.^{9,14,16} Studies indicate that MR programs are effective because of the simplicity of using the products and the participant education on appropriate eating habits and portion control as part of a sustainable, comprehensive lifestyle change.^{9,12,13}

Weight Regain After Successful Weight Loss

Weight regain is common in MR program participants.^{16,19} As previously discussed, MR programs are often phased into weight loss and weight loss maintenance with the overall goal of incorporating nutrition education and PA into a healthful behavior change to improve weight loss maintenance.^{14,15} In order to achieve a healthful behavior change, MR programs generally utilize one of two weight loss maintenance strategies after participants reach their goal weight in the weight loss phase.^{14,19} One strategy immediately places participants back on a traditional grocery store, reduced-calorie diet,¹⁹ while the other continues the use of MR products and gradually transitions clients to integrating more grocery store foods into their diet regimen.^{14,19} Current studies comparing the two strategies elicit some potential benefits to both, but showcase overall that MR program participants gain back lost weight, regardless of the weight loss maintenance strategy used.^{14,19,20}

Davis and colleagues¹⁴ randomly assigned 90 overweight and obese individuals to a weight loss intervention involving either a MR program or a reduced-calorie, food-based intervention. Those individuals randomized to the MR program were allowed five MR products and one self-prepared, grocery store meal per day, while those utilizing the food-based diet followed the United States Department of Agriculture Food Guide Pyramid. After the 16-week weight loss phase, all participants who experienced successful weight loss in both the MR group and the food-based, grocery store diet subsequently entered a 24-week weight loss maintenance phase.¹⁴ During the weight loss maintenance phase, both groups gradually increased caloric intake and individuals initially randomized to the MR group continued use of MR products during the weight

loss maintenance phase.¹⁴ After 24 weeks of weight loss maintenance, individuals continuing to use MR products gained 4.8 ± 5.8 kg of weight while those individuals randomized to the food-based diet gained 0.8 ± 4.8 kg of weight.¹⁴ Although individuals in the MR group lost more weight during the 16-week weight loss phase, they gained more weight back in the subsequent 24-week weight loss maintenance phase compared to individuals on the food-based, grocery store diet. Thus, at 40 weeks, after completion of the weight loss maintenance phase, no significant difference in absolute weight loss was found between the two groups.¹⁴

Lowe and colleagues¹⁹ compared the crossover of two differing weight loss maintenance strategies after successful weight loss on a MR program. The use of MRs and reduced energy density (RED) eating with traditional, grocery store foods were crossed to create four different weight loss maintenance intervention groups. The control group used neither MRs nor the RED program, while the intervention groups used either MRs, the RED program, or the MRs and the RED program together.¹⁹ Researchers assessed participants at twelve, 24 and 36 months post-successful weight loss and found that individuals randomized to the RED program group gained just over 0.5 kg at the 36-month assessment.¹⁹ Conversely, individuals utilizing the MRs and the RED program together, and those individuals randomized to the control group gained nearly 5.0 kg after 36 months of weight maintenance.¹⁹ At study commencement, individuals randomized to the RED program were provided with supplementary material containing informative modules on how to maintain lost weight while transitioning from using MRs to grocery store foods. Researchers speculate that the supplementary materials provided to the RED program participants reinforced their learning about and adaptation to new behaviors

which translated to less weight gain from 12 to 36 months than was experienced by the other groups.¹⁹

Regardless of the weight loss maintenance protocol used, the majority of MR program participants are gaining weight back.^{14,19} Therefore, although commercial MR programs are successfully helping clients lose weight, there is room for improvement in the weight loss maintenance phase.^{14,19}

Need for Behavior Change

Behavior modification is complex, as it involves restructuring an individual's environment to eliminate the specific barriers that prevent successful weight loss.^{13,21} Therefore, behavior modification should be a central component of weight loss strategies.¹³ Current studies discussing weight loss strategies illustrate that weight loss is improved through behavioral modification training with a health professional that focuses on long-term behavior changes through energy restriction and regular PA.²² To improve weight loss, numerous commercial MR programs have begun fostering behavior change through applying health coaching components or tenants of health coaching into their weight loss programs.

Health Coaching

Meal replacement programs have started incorporating health coaching or tenants of health coaching to support behavior change and weight loss. Health coaches are wellness mentors who assist individuals with lifestyle modifications and reinforce commitments to a behavior change.^{23,24} The formation of health coaching was a transdisciplinary effort between professionals in the fields of behavioral psychology,

cognitive psychology and social sciences.²⁵ Roles of health coaches are intermittently paralleled to health education specialists and health mentors being that a responsibility of all three professions involves educating individuals on health-related topics.^{26,27}

However, Ammentorp et al. notes that an additional and necessary component of coaching is to assist individuals in constructing a goal-oriented process that will foster the achievement of each person's ambitions through a behavior change.²⁵

Health coaching has been shown to improve program adherence and self-management,²⁸ and decrease the magnitude of weight regain after initial weight loss.^{12,29} To determine the effectiveness of health coaching on behavior change, Wolever and colleagues²⁸ randomized patients with type II diabetes to either a health coaching intervention or a control group which received no health coaching. Individuals in the intervention group participated in fourteen, 30-minute phone conversations with a health coach over a six month time period and were guided to create goals that were self-chosen and aligned with personal values.²⁸ Compared to individuals who received no health coaching, after six months of individualized health coaching, researchers noted improved medication adherence, enhanced confidence and self-management, and improved emotional and physical outcomes.²⁸

Perri and colleagues²⁹ randomly assigned obese individuals to one of six study designs in a 3x2 factorial design. Three pre-treatment weight loss conditions (including non-behavioral therapy, behavioral therapy, and behavioral therapy plus relapse prevention training) were crossed with two post-treatment weight loss maintenance conditions involving either client-health therapist contact or no post-treatment contact.²⁹ Researchers found that the two groups that maintained weight loss successfully were

those who received either non-behavioral pre-treatment therapy or behavioral therapy plus relapse prevention followed by client-health therapist follow-up.²⁹ Participants interacting with a professional during the weight loss maintenance phase were educated on self-monitoring and received assistance on how to alter weight loss maintenance strategies in order to sustain behavior change.²⁹ Researchers speculate that individuals randomized to the pre-treatment non-behavioral group learned self-monitoring through health therapist contact while those who had initially received relapse prevention training were already trained and prepared to cope with post-treatment weight loss maintenance and received supervised practice in applying those learned techniques.²⁹

A study by Ames and colleagues used a group of 30 individuals who had successfully completed a 21-28 week MR program and entered them into a 52-week weight loss maintenance program based around making small, self-selected changes to maintain weight loss.¹² The weight loss maintenance protocol included 20 sessions offered biweekly for the first 26 weeks of the program and monthly for the remainder of the 52-week intervention.¹² All offered sessions were face-to-face and group-based.¹² During the sessions, individuals were offered no pre-determined lifestyle modifications for weight loss maintenance, all participants self-selected their own goals based around the maintenance behaviors of self-weighing, use of food diaries, use of MRs, and PA.¹² After the 52-week small changes maintenance group intervention, individuals were matched and compared to a historical control group who had received no weight loss maintenance counseling after successful weight loss.¹² At the 52-week assessment, individuals in the weight loss maintenance intervention gained an average of 14% of

bodyweight back, while individuals in the historical control gained just over 50% of weight back.¹²

To assist individuals with weight loss, MR programs have started utilizing health coaches to assist and encourage individuals to pursue a long-term behavior change.^{23,24} The support of health coaches improves program adherence, enhances physical outcomes, and enhances weight loss success.^{12,28}

Personality Style

The big five model provides a comprehensive framework for measuring personality through the big five personality dimensions: neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience.³⁰⁻³² Neuroticism, sometimes referred to in the reverse term “emotional stability,” is the tendency of an individual to experience distress.³² Neurotic individuals experience distress through tension, depression, and self-consciousness,^{30,32} while emotionally stable individuals are calm, even-tempered, and relaxed.³² Extraversion is defined as a cheerful dominance with welcoming, and sociable traits,^{30,32} while agreeableness describes an individual who is emotionally supportive, caring, and nurturing.^{30,32} Conscientiousness refers to achievement-oriented individuals who are diligent and organized,^{30,32} and individuals categorized in openness to experience have broad scopes of interests, are artistic, curious, and original.^{30,32}

Personality style has been shown to be associated with health behavior.^{30,33,34} Previous research evaluating the relationship between two of the five personality styles found evidence that neuroticism is indicative of negative health behaviors such as

frequent substance use, while extraversion has been associated with preventative health behaviors, such as steady exercise habits and notable dietary control.³⁴ Recent research has studied one or two of the big five personality domains in relation to specific health behaviors,³⁰ therefore, expanding up on the concept, Booth-Kewley and Vickers³⁰ conducted two studies that examined personality as a determinant of health behaviors using all five of the big five personality domains.

During the first study, a 181-item personality questionnaire was distributed to male U.S. Navy personnel undergoing basic military training.³⁰ The personality questionnaire was based on a 5-point likert scale ranging from disagree strongly to agree strongly, and covered four health behavior factors including: wellness behaviors, accident control, traffic risk taking, and substance risk taking.³⁰ The wellness behaviors included PA and dietary control. Results showcased that extraverted, conscientious, and agreeable individuals reported engaging in more wellness behaviors, while neurotic individuals reported fewer wellness behaviors.³⁰ Openness to experiences was not significantly associated with any health behavior.³⁰

The second study distributed a 60-item personality inventory based on a 5-point likert scale to 76 U.S. Marine Corps.³⁰ Results of this study found that conscientiousness and extraversion were related to wellness behaviors.³⁰ Researchers then pooled weighted average correlations from both studies and revealed that conscientiousness was the best predictor of wellness behavior engagement.³⁰ These data suggest that personality style had an impact on health behavior and warrants consideration when attempting to elicit and provide support to maintain a health behavior change.

A review by Ammentorp and colleagues²⁵ discussed the impact of coaching on health outcomes. Researchers found that individuals who lacked resilience to maintaining physical well-being, such as low self-efficacy and low optimism, showed significant improvement in medication adherence, goal attainment, and perceived health status through the use of coaching.²⁵ Due to findings, researchers speculate that individuals who lack self-efficacy may benefit from health coaching more than self-sufficient individuals, based on the idea that the foundation of health coaching uses enhanced self-efficacy as a vehicle to elicit a behavior change.²⁵

Although we have evidence to support that personality style is associated with wellness related health behaviors such as PA and dietary control³⁰ and that health coaching may be more impactful for individuals with certain qualities,²⁵ it is currently unknown how personality style effects weight loss and the perception of health coaching in MR program participants. Therefore, the purpose of the present study is to better understand if certain personality styles are more likely to experience weight loss on a MR program and/or have a favorable perception of their health coaching experience.

CHAPTER 2 - MANUSCRIPT

INTRODUCTION

Data from 2011-2014 suggests that 69% of adults age 20 and above were classified as either overweight or obese while 36% of the population was solely classified as obese.^{1,35} Since 2000, the number of individuals with a body mass index (BMI) greater than 40 has increased by 70%.² Furthermore, since 1986, the percentage of individuals with a BMI greater than 50 has increased by 1200%.² The leading cause of death in the United States is heart disease, which is largely due to the continuous rise in obesity rates.³ Additionally, obesity leads to other disorders such cancer, type II diabetes, osteoarthritis, and psychosocial disorders.⁴⁻⁶ The risk of overweight and obese individuals developing preventable health ailments can be reduced with weight loss.⁵ In 2004, just over half of Americans were trying to lose weight.³⁶ As the negative impacts of overweight and obesity have become more prominent, numerous comprehensive lifestyle programs to reduce weight have emerged, such as meal replacement (MR) programs.⁴ The Academy of Nutrition and Dietetics supports the use of MR programs as an effective dietary strategy in conjunction with daily physical activity (PA).¹⁰

Meal replacement programs provide structured weight loss plans for participants by replacing one to two daily meals with reduced-calorie products in the form of bars and shakes fortified with vitamins and minerals.¹¹ A meta-analysis by Heymsfield and colleagues⁹ concluded that after a 1-year intervention, individuals participating in a MR program lost more weight than individuals on a reduced-calorie diet. Although MR programs provide a safe and efficient way to lose weight initially, long-term weight

maintenance is low.^{9,11} Multiple studies looking at the use of MR products have found that individuals who successfully reached their goal weight gained 40-50% percent of the weight back within one year.^{12,37}

Maintaining weight loss after participation in a MR program involves learning and adapting to new behaviors.¹² Behavior change focuses on eliminating barriers that prevent successful weight loss.^{13,21} To assist participants with behavior change, many MR programs have begun implementing a health coaching component. A health coach assists individuals through a lifestyle modification and reinforces individuals commitments to a behavior change.²³ Studies show that interacting with a health coach improves weight loss success.^{12,28,29} However, although health coaching has been shown to improve weight loss, individuals are still experiencing weight re-gain after successful weight loss.¹²

Data from Booth-Kewley and Vickers³⁰ suggests that an individual's personality style may impact their health-related behaviors, such as regular PA participation and healthy eating.³¹ Their studies concluded that individuals who categorized themselves as extraverted, conscientious, and agreeable reported engaging in health-related behaviors more often than those individuals who characterized themselves as neurotic and open to experiences.³⁰

Together, previous literature appears to suggest that personality style may influence health behaviors, and health coaching may positively impact an individual's ability to lose weight. Therefore, personality style and perception of health coaching merit attention when attempting to elicit positive behavior changes among MR program participants. Therefore, the purpose of this study is to determine if personality style and

perception of health coaching effect the ability to lose weight on a MR program, and to determine if personality style is associated with the perception of health coaching.

METHODS

Participants

Study participants were currently or previously enrolled in a proprietary MR program that utilized MR products and health coaching to facilitate weight loss. Participants were excluded from the study if they were under 18 years of age, pregnant, or if they had been enrolled in the MR program for less than one month.

The proprietary MR program in which the participants were enrolled consists of three phases: weight loss, transition, and weight loss maintenance. Participants in the weight loss phase are directed to replace two meals each day with a high protein, low carbohydrate MR product provided by the MR program. During the transition phase, participants gradually decrease their use of MR products and incorporate increased amounts of grocery store foods into their diet. MR program participants receive information on how to select healthy grocery-store foods, and how to prepare healthy meals at home. Individuals enrolled in the weight loss maintenance phase are encouraged to consume mostly grocery store foods.

Each phase of the MR program involves education and support from health coaches to aid in adjusting to and transitioning between each phase of the MR program. Health coaches must have a minimum of a bachelor's degree, and prior experience with wellness, fitness, or nutrition. The proprietary MR program trains the health coaches to provide education to MR program members about program guidelines and health-related topics such as nutrition, activity, and lifestyle. Specific education lessons include: how to read nutrition labels, incorporating the different food groups into meal planning, exercise

basics, altering eating behaviors, and personal responsibility. In the weight loss phase, participants meet with a health coach once per week and health coaching sessions typically last between 15 and 30 minutes. As MR program members progress through the subsequent phases, the health coaching sessions become less frequent, but typically remain between 15 and 30 minutes in length.

Protocol

A recruitment email was sent to 20,000 MR program participants inviting them to complete an electronic questionnaire to assess factors that serve as barriers and facilitators to weight loss. The questionnaire was self-administered via QuestionPro, and was composed of validated questionnaires pertaining to the following content areas: demographics, personality style, MR program education, MR program success, health coaching, the health coaching sessions, cooking and grocery shopping, social support, weight-related behavior, PA frequency and duration, PA stages of change, exercise self-efficacy, benefits and barriers to PA, and household-related questions.

The questionnaire took an average of 32.3 minutes to complete. Participants that completed the questionnaire were given the option to provide their contact information to be entered in a drawing for a chance to win one of 20 \$200 Amazon gift cards. This study was approved by the Institutional Review Board at South Dakota State University.

Measures

The specific aims of the present study focused on the three primary variables: personality style,³⁸ the perception of health coaching,^{39,40} and weight loss. Personality style was assessed via the Ten Item Personality Inventory (TIPI).³¹ This inventory

includes ten questions based on a 7-point likert scale ranging from disagree strongly to agree strongly.³¹ The TIPI is a concise measure of the big five personality domains: extraversion, agreeableness, conscientiousness, emotional stability/neuroticism, and openness to experience.³¹ Each personality domain is scored on a scale of 1-7, and raw scores in each category are used as a continuous variable to quantify how strongly an individual perceives his or her personality in each of the big five domains.^{31,38}

Perception of health coaching was assessed via the Working Alliance Inventory (WAI).⁴¹ The WAI⁴¹ is composed of twelve, 5-point likert scale questions ranging from seldom to always. Outputs include three sections scores evaluating goal, task, and bond with scores ranging from 1-20 in each section.^{41,42} The goal section score indicates how well the health coaches assisted with goal setting, the task section score indicates the degree to which the health coach supported each participant with staying on task to reach set goals, and the bond section score indicates how much of a connection each participant felt with their health coach.⁴²

Weight loss was assessed by calculating percent of starting weight for each participant. Respondents self-reported their initial weight when beginning the MR program and their current weight at the time they participated in the study. Percent of starting weight was calculated using the following formula: $(\text{current weight}/\text{initial weight}) \times 100$. Thus, a percent of starting weight of 50% would indicate that a participant lost half of their original weight, while a percent of starting weight of 150% would indicate that they gained half of their original weight.

Data Management & Statistical Analysis

Questionnaire data was processed using Stata SE; Version 14 (StataCorp LP, College Station, Texas). Multiple linear regressions were used to determine if any subject characteristics (age, gender, race, education, employment status, hours worked per week, and marital status) were related to percent of starting weight. Additionally, multiple linear regressions were used to determine the relationship between personality style, perception of health coaching, and percent of starting weight while controlling for covariates. One-way ANOVA was used to determine if there was a difference among the mean score for each personality style as well as the perception of health coaching in the areas of goal, task and bond. Statistical significance was set at $p \leq 0.05$ and data is presented as means \pm standard error.

RESULTS

Of the 20,000 MR program participants receiving the questionnaire, 1,751 individuals completed the questionnaire in its entirety. Participants that had completed <1 month on the MR program were excluded from data analyses (n=112). Furthermore, variables associated with the outcome but with sample sizes too small to allow for comparison among groups were excluded (n=30). Therefore, 1,609 MR program participants were included in the final analyses. Eighty-six percent of participants were female with an average age among questionnaire completers being 47.6 ± 0.31 years old. Seventy-six percent of participants were married, while the remaining 24% were single, separated, divorced, or living with a partner. Fifty-six percent of the participants' highest degree earned was a high school diploma, while 41% of participants had a bachelor's degree, 2% had a master's, professional, or doctoral degree, and 1% did not complete high school. Eighty-eight percent of participants were employed and among those respondents, 56% reported working between 30 and 40 hours each week. Just under 39% reported working over 40 hours per week, and 5% of respondents reported working less than 30 hours per week.

The initial weight of participants when beginning the MR program ranged from 126 to 460 lbs, with an average initial weight of 226.1 ± 53.22 lbs. Although the current weight of participants ranged from 51% to 152% of initial weight ($85.6\% \pm 8.30\%$), 1,561 (97%) of individuals experienced weight loss. Sex was significantly associated with percent of starting weight ($p=0.003$) and impacted percent of starting weight in such a way that female participants were more likely to present with weight gain. Although not significantly associated with percent of starting weight, age was also controlled for due to

the vast range among participants (19-83). Therefore, age and sex were controlled for in subsequent analyses of relationships between the study variables.

There was no significant difference in mean personality style scores. MR program participants averaged the highest personality score in extraversion (7.4 ± 3.04), followed by emotional stability (6.8 ± 2.80), agreeableness (6.1 ± 2.45), openness to experience (6.0 ± 2.57), and conscientiousness (5.5 ± 1.97). The personality styles of extraversion ($p=0.32$), agreeableness ($p=0.69$), conscientiousness ($p=0.27$), emotional stability ($p=0.84$), and openness to experience ($p=0.98$) were not significantly associated with percent of starting weight.

No significant differences were seen in mean scores of goal, task and bond. Program participants perceived the agreement of goals and the agreement of tasks as the strongest aspect of the health coaching relationship (11.3 ± 4.94 and 11.2 ± 5.00 , respectively), followed by bond development (10.1 ± 5.42). Each of the three health coaching experiences were found to have a significant, positive association with percent of starting weight. Participants who reported having a greater agreement of goals ($p<0.001$), agreement of coaching tasks ($p=0.001$), and development of an effective bond ($p<0.001$) with their health coach achieved less weight loss (**Figures 1, 2, and 3**).

The association between personality style and perception of health coaching varied between goal, task, and bond scores. Extraverted individuals perceived greater agreement of goals ($p=0.04$) with their health coach (**Figure 4**), while no other personality style was significantly associated with goal agreement. Similarly, extraverted individuals experienced significant agreement of coaching tasks ($p=0.04$) (**Figure 5**), while no other personality style was significantly associated with task agreement. None

of the five personality styles were significantly associated with the development of an effective bond with the health coach.

DISCUSSION

The purpose of this study was to determine if an individual's personality style and the perception of their health coaching experience is related to the magnitude of weight loss resulting from participation in a proprietary MR program. Previous work from Booth-Kewley and Vickers³⁰ examined personality style as a determinant of health behaviors in individuals enlisted in the U.S Navy and the U.S Marine Corps and found that individuals who were extraverted, conscientious, and agreeable reported engaging in positive wellness behaviors, such as exercising and consuming healthy foods, more often than individuals whose personalities were less extraverted, conscientious, and agreeable, and were more emotionally stable and open to experiences.³⁰ However, there was no relationship between personality style and degree of weight loss identified in the present study in MR program participants. While one could speculate that this difference may be due to Booth-Kewley and Vickers³⁰ assessing established health behaviors, and the present study assessing weight loss as an indicator of successful diet and/or PA behavior change, others suggest that it is more appropriate to assess personality traits as an indicator of health behavior rather than personality style.^{34,43}

According to the integrated theory of behavior change,⁴³ personality traits, which form the basis of each personality style, are what predict inherent wellness behaviors, not the personality styles. Mechanic and Cleary³⁴ suggested that positive wellness behaviors are not an outcome of certain personality styles, but are more specifically an outcome of select psychological personality traits that are associated with and help to define each personality style. Personality traits of individuals who are extraverted include being outgoing, positive, and maintaining good spirits, which are all traits that have been

associated with positive wellness behaviors.³⁴ Conscientious individuals are thought to be resilient and in need of achievement and commitment which are personality traits that are also linked to positive wellness behaviors.⁴⁴ Defining personality traits of agreeable individuals include tolerance and acceptance which have been related to positive exercise habits and enhanced dietary control.³⁰ These data suggest that specific personality traits associated with individual personality styles are related to positive health behaviors.^{30,34,44}

Thus, it is plausible to suggest that the lack of relationship between personality style and weight loss found in the present study could be the result of assessing personality style rather than specific personality traits in MR program participants. Furthermore, the lack of a relationship between personality style and weight loss identified in the present study could also be attributed to weight loss being an indirect assessment of participant's ability to change their diet and physical activity behaviors. Previous literature linking personality style and/or personality traits to health behaviors looked at currently practiced health behaviors, not one's ability to change an unhealthy behavior to a healthier practice. Although there is evidence to suggest that personality style and/or personality traits may be related to health behaviors, these behaviors may be inherent health practices and there may not be a relationship between personality style and/or traits and an individual's ability to change their behavior, which is critical to successful weight loss and weight loss maintenance.

MR programs have begun to utilize health coaches as a vehicle to support long-term behavior change.^{23,24} Previous research suggests that individuals experience greater weight loss success when interacting with a health coach.^{12,28,29} Our findings suggest that MR program participants who reported greater agreement of goals, greater agreement of

tasks, and greater bond development with their health coach experienced less weight loss success than those individuals who reported less of a connection with their health coach.

The definition of health coaching is well-established in the literature, consistently including the following terms: patient-centered, goal achievement, and support.^{27,45,46} Although the definition of health coaching is concrete, a universal framework to apply these terms to health coaching sessions has not been established.^{27,45} Because the term health coaching is often used interchangeably with professional relationships like health mentoring, there is confusion about the differences between the concepts and how they are implemented in client sessions.²⁷

In an ideal health coaching relationship, health coaches facilitate growth, accountability, and goal attainment by encouraging and supporting clients to build upon their existing strengths and resources.^{27,47} Health coaching sessions are designed around an interpersonal, client-centered relationship in which the client determines the goals and monitors their own behaviors while the coach uses behavior change theory to assist in developing intrinsic motivation and a behavior change.^{27,45-47} Hayes and Kalmakis²⁷ noted that although health coaching may be one facet of health mentoring, health coaching focuses on who the individual is whereas health mentoring focuses on the individual's actions and performance. The mentor-mentee relationship is fixated on the mentor teaching and advising the mentee throughout a long-term relationship that often morphs into a deep friendship.²⁷

The proprietary MR program that we studied utilizes a mass-produced health coaching model that incorporates learning modules as a foundation for the health coaching sessions. Although multiple articles state that education has a place in health

coaching, the core of health coaching is the health coach listening to the client's needs and desires and assisting them with setting self-selected goals.^{27,46} In contrast, because the foundation of health mentoring is a mentor passing along expert knowledge to a mentee,²⁷ we speculate that the support provided by the proprietary MR program utilized within the present study better aligns with health mentoring as opposed to health coaching. We infer that the cause of the positive association between the perception of health coaching and weight loss is due to individuals forming a friendship with their health coach.

Parry and colleagues⁴⁸ looked at the use of health coaches to help transition chronically ill patients through the healthcare system. Patients noted that accessibility and support from the coach built rapport and led clients to perceive a caring relationship, which was noted as an important piece of the patients' experience in the intervention.⁴⁸ Additionally, patients noted that the program made them feel more comfortable during transitions within the healthcare system.⁴⁸ In regards to our study, we speculate that friendships formed in the coaching relationship may have allowed individuals to feel more in-tune to the agreement of goals and tasks, and the development of a bond with their health coach. But, this friendship may have also led to individuals feeling less accountable to the tasks associated with achieving their weight loss goals.

In the present study, we found that individuals who categorized themselves as extraverted were more likely to report enhanced agreement of goals and agreement of tasks pertaining to health coaching. Individuals who are extraverted tend to be positive, optimistic, outgoing, and sociable.^{30,32} An article looking at the influences of personality on health behaviors and health outcomes states that individuals who are optimistic tend to

spend more time learning about health risks, and learning about how to evaluate their surroundings to minimize those health risks.³³ We speculate that extroverted individuals were more likely to perceive a greater agreement of goals and tasks with their health coach because their personality would be more apt to communicate to the health coach topics that they wanted to discuss during each health coaching session. Similarly, one could also speculate that extraverted individuals would be more likely to ask questions to clarify any confusion they may have related to the tasks they have been charged with to elicit goal-attainment.

Health coaching should consist of the health coach providing clients with the tools necessary to overcome barriers to weight loss, which would subsequently elicit a positive behavior change.^{27,45-48} This is facilitated by the health coach assessing personal strengths, identifying resources and support that clients can draw from to avoid barriers and reinforce facilitators, and most importantly brainstorming small action steps that the client can take to move forward toward the overall goal.²⁷ As seen in the present study, extraverted individuals have a tendency to perceive a strong agreement of goals and tasks with their health coach. Thus, personality style may affect an individual's perception of their health coach, but if no plan exists to identify barriers and brainstorm actions to overcome those barriers, then personality style will have no association with successful weight loss and weight loss maintenance.

Implications and Future Directions

Although understanding an individual's personality style may be beneficial in understanding how to effectively coach a client to yield positive perceptions of health coaching, it does not appear that personality style is related to the degree of weight loss in

MR program participants. Further research needs to be done to explore the potential impact of personality traits on weight loss in MR program participants, as personality traits may be more closely related to one's ability to change behaviors, such as dietary intake and PA participation. Furthermore, separating MR program participants by MR program phase may be helpful, as it would allow one to distinguish between individuals who are following a strict diet and PA protocol and individuals who are practicing more independent diet and PA behaviors. Ultimately, understanding more detail about the potential relationship between personality style/traits, perception of health coaching and weight loss could have a positive impact on the efficacy of MR programs to assist participants with losing weight and maintaining weight loss by allowing programs to fine tune their health coaching protocol to match participants' needs.

Limitations

The limitation of this study was that although we could calculate percent of starting weight as an indicator of weight loss since beginning participation in the MR program, we were not able to determine if participants were still losing weight, were at their goal weight, or had gained back lost weight but were still below their initial weight. Future research should attempt to separate participants by phase, looking at the presented relationships in participants enrolled in the early weight loss phase and participants enrolled in the later weight loss maintenance phase independently.

APPENDIX

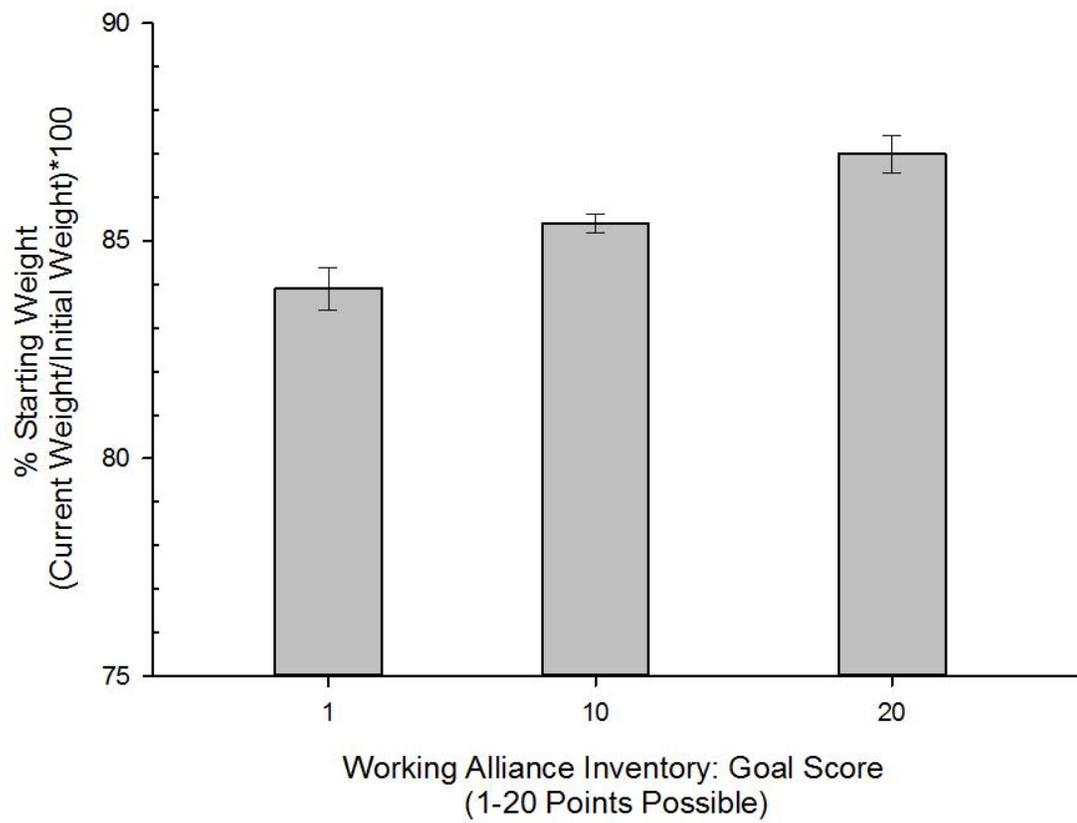


Figure 1. Relationship between WAI goal score and percent of starting weight. Values are means \pm standard error.

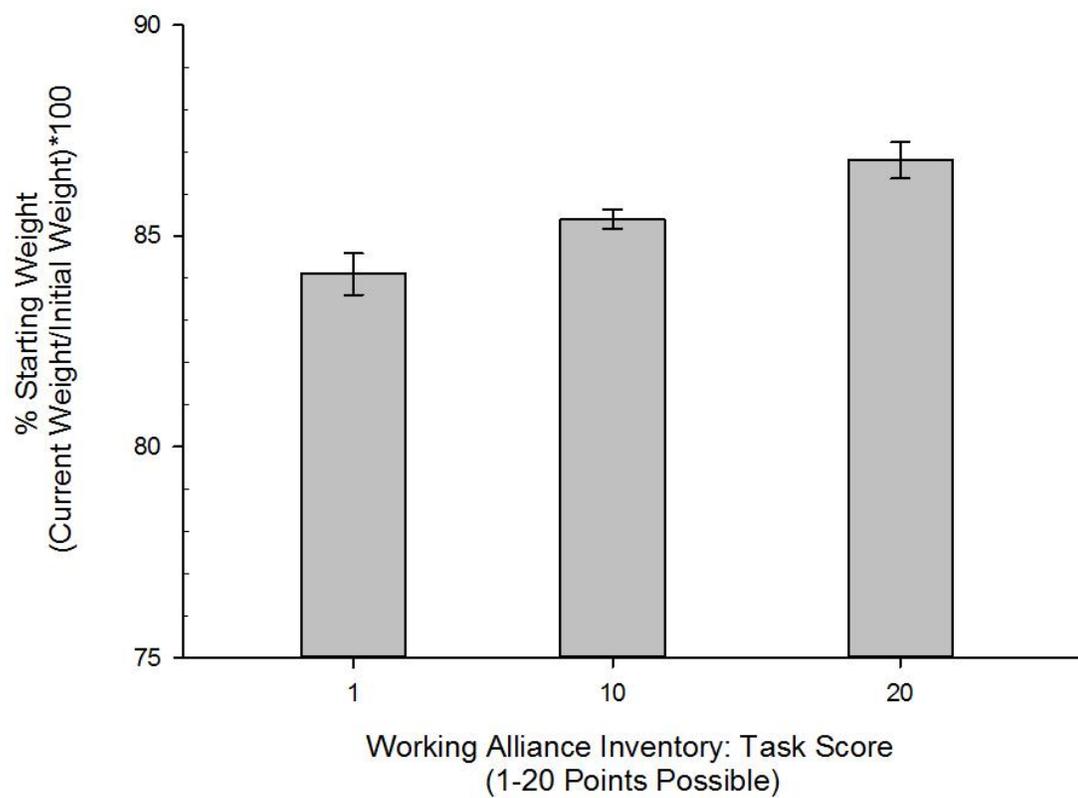


Figure 2. Relationship between WAI task score and percent of starting weight. Values are means \pm standard error.

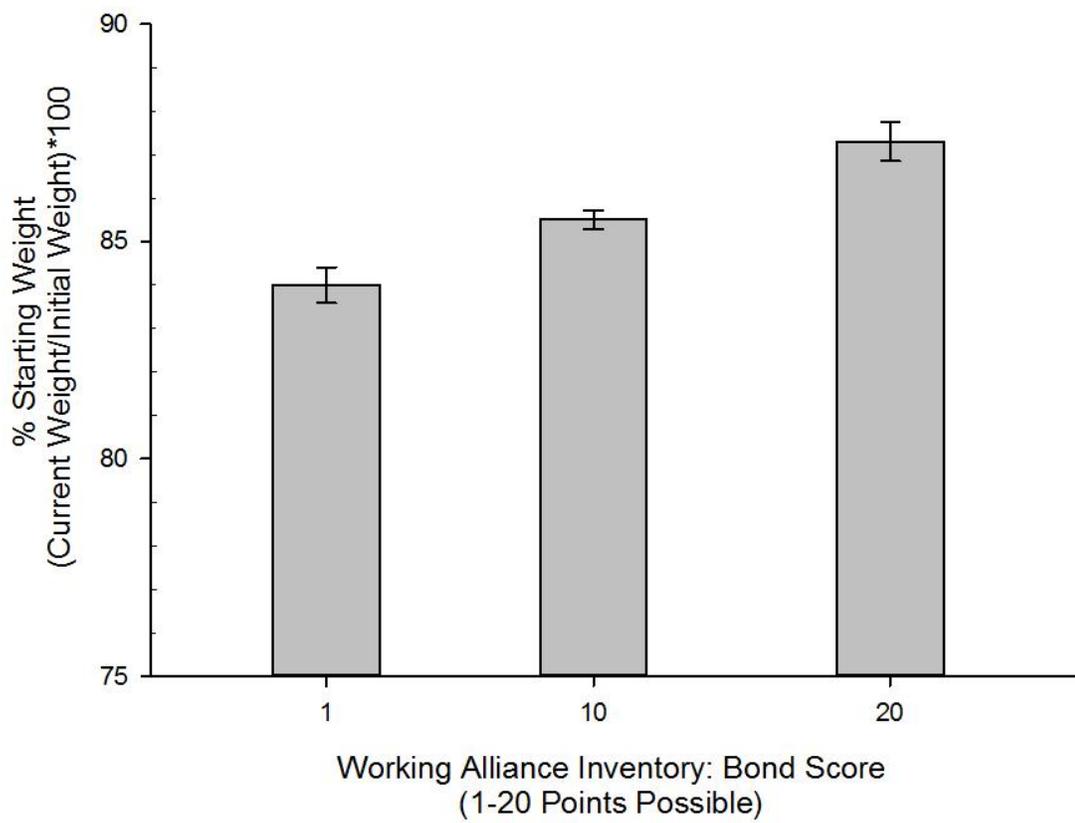


Figure 3. Relationship between WAI bond score and percent of starting weight. Values are means \pm standard error.

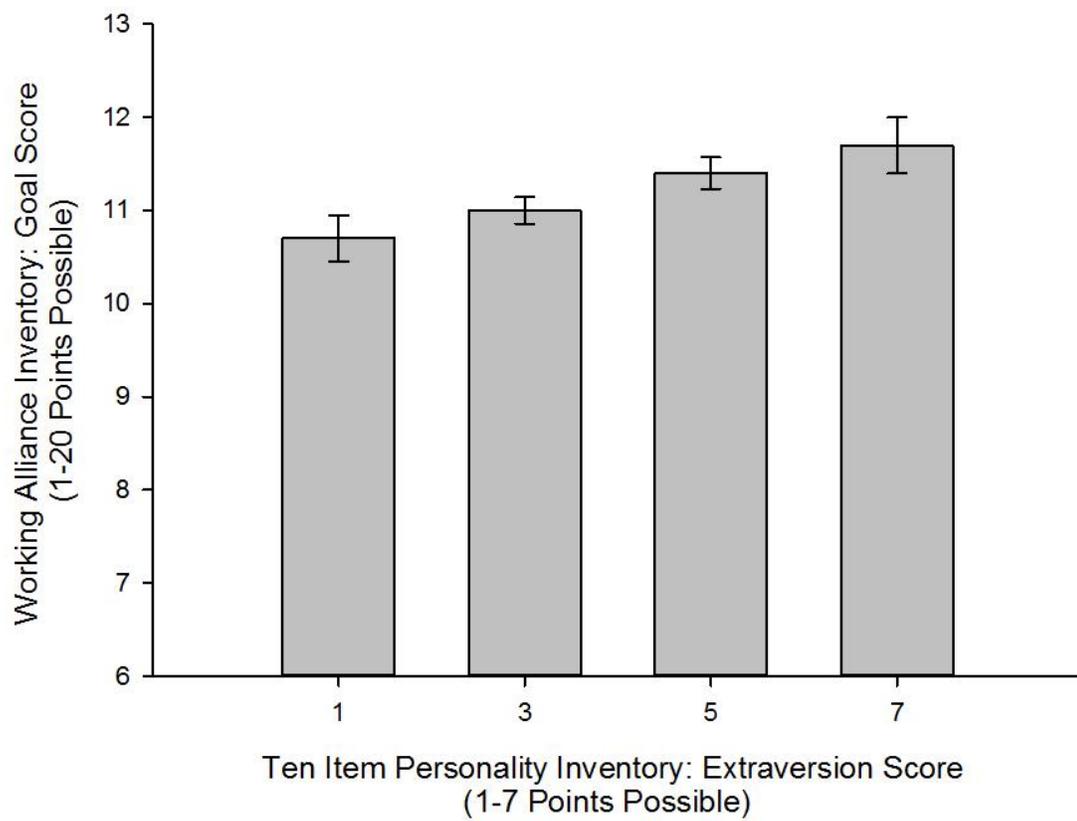


Figure 4. Relationship between TIPI extraversion score and WAI mean goal score. Values are means \pm standard error.

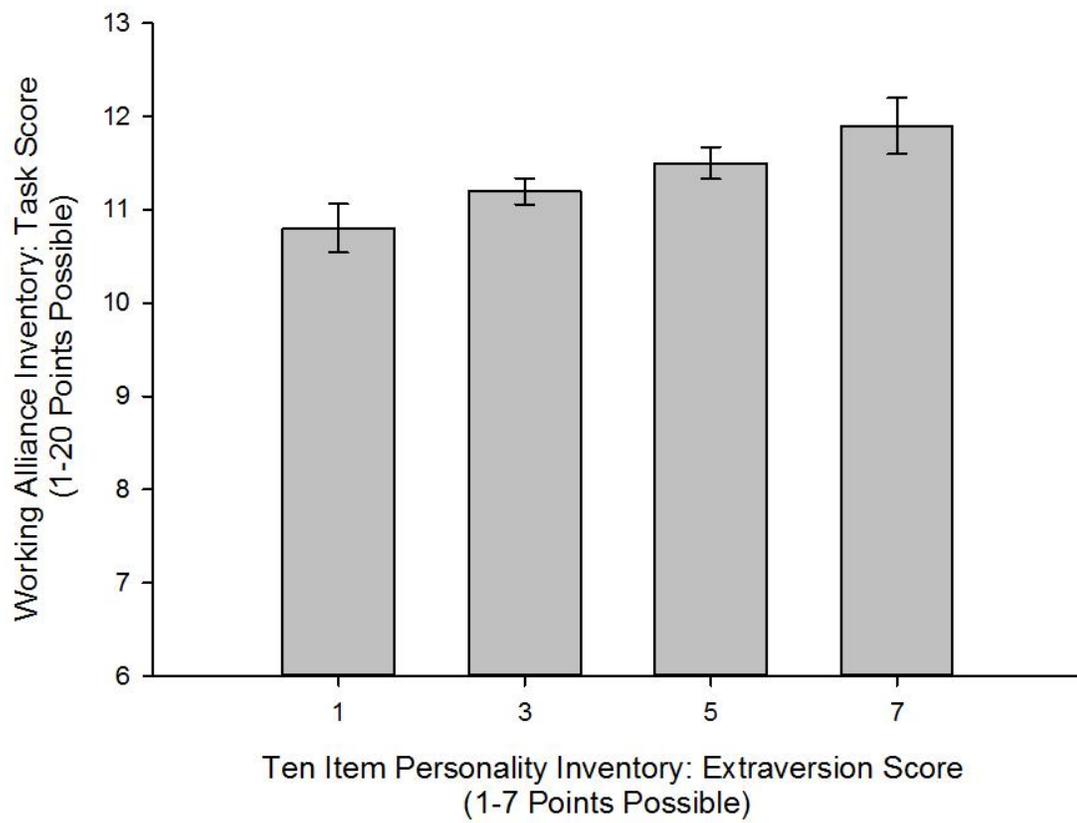


Figure 5. Relationship between TIPI extraversion score and WAI mean task score. Values are means \pm standard error.

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