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Perceptions of Health Coaching and its Associations with Personality Style and Weight Loss in Meal Replacement Program Participants

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PERCEPTIONS OF HEALTH COACHING AND ITS ASSOCIATIONS WITH PERSONALITY STYLE AND WEIGHT LOSS IN MEAL REPLACEMENT PROGRAM PARTICIPANTS

BY

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This thesis is approved as a creditable and independent investigation by a candidate for the Master of Science in Exercise and Nutritional Sciences degree 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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CONTENTS

ABBREVIATIONS

BMI	Body Mass Index
CEMI	Client Evaluation of Motivational Interviewing
MI	Motivational Interviewing
MR	Meal Replacement
NHANES	National Health and Nutrition Examination Survey
TIPI	Ten Item Personality Inventory

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ABSTRACT

PERCEPTIONS OF HEALTH COACHING AND ITS ASSOCIATIONS WITH PERSONALITY STYLE AND WEIGHT LOSS IN MEAL REPLACEMENT PROGRAM PARTICIPANTS

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Purpose: To determine if personality style is related to perceptions of health coaching and if there is a relationship between perceptions of health coaching and the ability to lose weight. *Methods*: Data was gathered from approximately 2,000 MR program participants via an electronic survey. The Client Evaluation of Motivational Interviewing scale was used to determine if perceptions of health coaching affect the ability to lose weight. The Ten Item Personality Inventory was used to determine if personality style is associated with the perception of health coaching. Self-reported start weight and current weight were used to calculate percent of starting weight. Linear regression was used to determine the specific aims. Statistical analysis was controlled for age and sex. *Results*: Participants who reported a greater satisfaction with their health coaches' knowledge, ability, time, support, and relationship displayed a greater weight loss than those who were not satisfied. Satisfaction with the relationship/connection with health coach was associated with extraversion (p=.039). Satisfaction with support of the health coach was associated with emotional stability (p=.061). *Conclusion*: Positive perceptions of health coaching influence weight loss in MR program participants. Some personality styles indicated

satisfaction with specific aspects of health coaching. However, it can be assumed that personality is not the sole determining factor for health coaching perceptions.

Chapter 1: INTRODUCTION

A great number of individuals struggle to maintain a healthy body weight. Data from recent years reports approximately two-thirds of adults 20 years and older are considered to be clinically obese or overweight. To aid in the obesity epidemic, meal replacement programs were designed. Such programs are considered to be an effective dietary approach to weight loss by the Academy of Nutrition & Dietetics. However, most individuals who have participated in a meal replacement program tend to regain the weight lost within one year of program completion. In order to maintain weight loss, behavior change must occur. Health coaching has been added to various MR programs to reinforce behavior change by improving participants' self- efficacy and accountability.

Research has suggested that personality style of an individual can impact behavior change, thus influencing health related behaviors that can affect weight loss. Specific personality characteristics are associated with the ability to improve health related behaviors. To better understand behavior change and sustainable weight loss among MR program participants, personality style and the perceptions of health coaching should be analyzed

Chapter 2: LITERATURE REVIEW TABLES

PURPOSE: The purpose of this study is to determine if personality style is related to perceptions of health coaching and if there is a relationship between perceptions of health coaching and the ability to lose weight.

TABLE 1 Adult Obesity

Author, Year and Study Title	Sample Size	Study Characteristics and Purpose	Methods	Major Findings
Flegal et al.[1] Published: 2016 Trends in obesity among adults in the United States, 2005 to 2014.	n= 5455 US Adults	Cross-sectional study assessing adults from 20 to 60 years and older, with height and weight measurements from the NHANES of 2013 to 2014 conducted by the CDC.	At home interview and mobile unit measurements of height and weight Weight status defined by BMI. (Obese: BMI ≥ 30 and Class 3 Obese: BMI ≥ 40)	The overall crude prevalence of obesity was 37.9% (males= 35.2% and females= 40.5%)
Ogden et al.[2] Published: 2015 Prevalence of obesity among adults and youth: US, 2011–2014.	n= not given, data collected from 3 NHANES	Report monitoring US obesity prevalence by sex, age, and race. Data from the NHANES between 2011 and 2014 conducted by the CDC.	Compiled and compared data collected by the NHANES from 1999 to 2014. Generated a report to show changes in adult and child obesity rates within the US over time.	2011-2014 data shows childhood obesity rates at 17% with no difference reported between sex. This rate remains unchanged from 2003-2004 to 2013-2014.
Strum et al.[3] Published: 2013 Morbid obesity rates continue to rise rapidly in the United States	n= not given, data collected from BRFSS	Cross-sectional study assessing individuals with height and weight measurements from the Behavioral Risk Factor Surveillance System (BRFSS) of 1986 to 2010.	Telephone survey of noninstitutionalized adults administered to gather height and weight measurements. Weight status defined by BMI. (Class 3 Obese: BMI ≥ 40 and BMI ≥ 50)	Percentage of population with BMI ≥50 has increased more than 10-fold since 1986. Individuals with a BMI≥40 has increased over 70%.

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TABLE 2 Obesity and Obesity Intervention Reports

Author, Year and Article Title	Purpose	Conclusions
Center for Disease[4] Control and Prevention Published: 2016 Leading Causes of Death.	Data from the National Center for Health Statistics to report the leading causes of death for the United States.	The leading causes of death are: heart disease, cancer, chronic lower respiratory diseases, accidents, stroke, Alzheimer's disease, diabetes, influenza and pneumonia, nephritis, and intentional self-harm.
Khaodhiar et al[5] Published: 1999 Obesity and its comorbid conditions.	Addresses the health concerns and conditions that can result from obesity.	Individuals considered to be obese have a higher risk of medical issues such as type 2 diabetes, cardiovascular disease, hypertension, stroke, osteoarthritis, cancer and many other physical concerns. Excess body weight can also result in psychological problems such as depression and eating disorders.
Jebb.[6] Published: 1998 Efficacy of very low-energy diets and meal replacements in the treatment of obesity.	Analyzes evidence concerning the efficacy of both commercial and milk-based total liquid diets, which provide a maximum of 800 kcal/day.	Subjects on very low energy liquid diets (VLEDs) reported 8-10 kg of weight loss in 4-8 weeks. In some individuals, meal replacements can aid in short-term weight loss and long-term weight maintenance.
Raynor et al.[7] Published: 2016 Position of the Academy of Nutrition and Dietetics: Interventions	Presentation of current data and recommendations for the treatment of overweight and obese individuals from the Academy of Nutrition and	Interventions that promote implementation and maintenance of lifestyle behaviors such as physical activity and dietary intake can be successful in the treatment of overweight and obese individuals. A multidisciplinary team is necessary to carry out interventions that address serveral factors at varying levels of the socio-ecological model.

for the Treatment of Overweight and Obesity in Adults.	Deitetics' Evidence Analysis Process and Evidence Library.	
Berkel et al[8] Published: 2005 Behavioral interventions for obesity.	Review of less traditional methods of behavior modification in relation to the treatment of obesity.	Approaches such as internet interventions, meal replacements, telephone interventions, and other less traditions applications of behavior modifications in the obesity treatment can be effective in stimulus control and self-monitoring for obese individuals.
Kruger et al[9] Published: 2004 Attempting to lose weight: specific practices among U.S. adults.	Examines the prevalence of weight-loss practices among adults in the United States attempting to lose weight. Data analyzed was taken from the 1998 National Health Interview Survey.	24% of men and 38% of women are attempting to lose weight. The most common approaches to weight loss were eating fewer calories, eating less fat, increasing exercise, skipping meals, joining a weight loss program, fasting for 24 hours or more, and taking food supplements, diet pills, or diuretics. Increased efforts are necessary in the promotion of effective approaches to weight loss such as utilizing calorie reduction and increasing physical activity.

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TABLE 3 Meal Replacement Programs

Author, Year and Study Title	Sample Size	Study Characteristics and Purpose	Methods	Major Findings
Vander Wal et al.[10] Published: 2006 Effect of a post-dinner snack and partial meal replacement program on weight loss.	n= 60 adults	Randomized control trial examining whether providing a structured post-dinner snack to adults, ages 18 to 65 with a BMI ≥30, would increase weight loss among obese night snackers in a partial meal replacement (PMR) program.	29 adults randomized to 'post-dinner snack' group and 32 adults randomized to 'no snack' group in an 8-week program.	Both groups displayed improvement in BMI, body fat, waist circumference, and HDL cholesterol. The PMR program displayed beneficial weight loss changes for obese night snackers.
Heymsfield et al.[11] Published: 2003 Weight management using a meal replacement strategy: meta and pooling analysis from six studies.	N/A	Meta-analysis of the safety and effectiveness of a partial meal replacement plan using one or two vitamin or mineral fortified meal replacements, as well as regular foods, for long-term weight management.	Randomized, controlled PMR interventions of at least 3 months duration, with participants ages 18 or older and a BMI≥25, were analyzed. 30 studies were compiled from Medline, Embase, and the Cochrane Clinical Trials Register from 1960 to January 2001.	Participants of PMR or RCD plans displayed significant amounts of weight loss at 3 months and 1 year evaluations. Such programs can be utilized as safe and effective approaches to significant sustainable weight loss and improve weight-related risk factors.
Anderson et al[12] Published: 1994 Food-containing hypocaloric diets are as effective as liquid-supplement diets for obese individuals with NIDDM.	n=40	Randomized control trial to determine how hypocaloric diets compare to liquid supplement diets in effectiveness of weight loss of non-insulin dependent diabetic obese individuals.	For 12 weeks, non-insulin-dependent diabetes mellitus (NIDDM) individuals consumed an 800-kcal diet. Subjects were randomized to receive a liquid supplement only or a supplement plus an evening meal. Both groups participated in an intensive behavioral education program.	Supplement diets and food-containing diets providing 800kcal per day are effective approaches to weight loss for NIDDM individuals.
Ames et al[13] Published: 2014	n=30	Prospective cohort study to assess to the feasibility,	Subjects participated in a SCM for 52 weeks in which they met	SCM may be effective in promoting sustainable behavior

Improving maintenance of lost weight following a commercial liquid meal replacement program: A preliminary study.		acceptability and effectiveness of a small changes maintenance intervention (SCM) after completion of a liquid meal replacement (LMR) program (800 kcal/day).	with a registered dietitian, licensed psychologist, and LMR staff. The session promoted self-selected changes in physical activity and diet/caloric intake.	changes and may be a reasonable alternative to traditional weight maintenance or no follow-up care in clinic setting.
Koohkan et al[14] Published: 2014 The impact of a weight reduction program with and without meal-replacement on health-related quality of life in middle-aged obese females.	n=390	Non-randomized, control trial to evaluate the impact of two 12-month weight loss interventions on changes in lower health-related quality of life (HRQOL) between two age and weight-matched subgroups of Caucasian females.	Subjects having a BMI between 30 and 40 kg/mg^2 and had one or more obesity related comorbidity. One group (n=190) participated in a 12-month weight-reduction lifestyle program without a meal replacement (LS) and the other group (n=190) participated in the same lifestyle program but was also provided with a soy-based meal replacement product (LSMR).	Both groups displayed reduction in body weight. However, more weight loss was observed in the LSMR group. HRQOL can be improved through a lifestyle weight loss program and may be enhanced by consuming a soy-based meal replacement product for middle-age obese females.
Heber et al[15] Published: 1994 Clinical evaluation of a minimal intervention meal replacement regimen for weight reduction.	n=273	Non-randomized control intervention to determine the effectiveness of a meal replacement program that utilized a product and its package insert information (Ultra Slim-Fast) for weight loss.	Participants had weekly follow-ups with a non-physician personnel for weight measurement, product distribution, and questionnaire completion for 12 weeks. No dietary counseling was provided.	Observed weight loss of subjects (~10% body weight) is considered significant. Such weight loss can improve health conditions such as hypertension and non-insulin dependent diabetes in overweight and obese individuals. Other benefits of meal replacements include low cost to consumer and minimal professional intervention.
Davis et al[16] Published: 2010 Efficacy of a meal replacement diet plan compared to a food-based diet plan after a	n=90	Randomized control trial to analyze the effect of Medifast's meal replacement program (MD) on body composition, body weight, and biomarkers of inflammation and oxidative	Adults aged 18-65 years with BMI between 30 and 50 kg/m^2 were randomly assigned to a Medifast program utilizing portion-controlled meal replacements or an isocaloric FB	MD group lost twice as much weight and had significant improvements in body composition at the end of 16 weeks in comparison to the FB group. Significant improvements in

period of weight loss and weight maintenance: a randomized controlled trial.		stress among obese individuals after weight loss and weight in comparison to isocaloric food-based diet (FB).	plan based on USDA Food Guide Pyramid. Each diet provided approximately 1000 kcal/day. Weight loss phase was 16 weeks and weight maintenance was 24 weeks.	diastolic blood pressure, oxidative stress, and waist circumference were observed in the MD group. Meal replacement plans are an effective approach for robust initial weight loss and for improving many health parameters.
Kreider et al[17] Published: 2011 A structured diet and exercise program promotes favorable changes in weight loss, body composition, and weight maintenance.	n=90	Randomized comparative effectiveness trial to assess if compliance to a meal-replacement-based diet program (MRP) along with encouragement to increase physical activity is effective in comparison to a structure meal-plan-based diet and supervised exercise program (SDE) in women considered to be sedentary and obese.	Subjects were matched and randomized to an SDE or MRP program. The weight loss trial lasted 10 weeks and the weight maintenance phase lasted 24 weeks.	For the SDE group, moderate and vigorous physical activity levels were significantly higher with no observed variances between groups daily energy intake. A greater amount of weight loss was observed in the SDE group. SDE subjects maintained physical activity levels, fat loss, weight loss, and improved maximal aerobic capacity to greater extent than the MRP group. SDE-based program is more effective in promoting weight loss and improving health makers in sedentary obese women.
Coleman et al[18] Published: 2015 Effectiveness of a Medifast meal replacement program on weight, body composition and cardiometabolic risk factors in overweight and obese adults: a multicenter systematic	n=310	Systematic retrospective chart review of overweight and obese clients to evaluate the effectiveness of the Medifast 4 & 2 & 1 Plan on body composition, cardiometabolic risk factors and clients' ability to lose weight.	Data recorded electronically was statistically analyzed to examine changes in characteristics from baseline to the end of the 12-week meal plan and to the end of the 24-week maintenance period.	All clients had significant reductions in weight and preserved lean mass and significant improvements in waist-to-hip ratio, blood pressure, and pulse. The Medifast 4 & 2 & 1 Plan is effective at reducing weight, preserving lean mass, and improving cardiometabolic risk factors.

retrospective chart
review study.

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TABLE 4 Health Coaching

Author, Year and Study Title	Sample Size	Study Characteristics and Purpose	Methods	Major Findings
Wolever et al[19] Published: 2010 Integrative health coaching for patients	n=56	Randomized control trial to evaluate the effectiveness of integrative health (IH) coaching on behavior change, pyschosocial	Subjects were randomized to 6 months of usual care or IH coaching. Measurements of medication adherence, exercise frequency,	Reduced A1C levels, stress, increased exericise frequency, perceived health status and social support were observed in the IH

with type 2 diabetes: a randomized clinical trial		factors, and glycemic control in individuals with type 2 diabetes.	patient engagement, pychosocial variables, and A1C were assessed pre and post intervention.	coaching group. Incorporating a coaching intervention into traditional diabetes educational programs may improve patient accountability, self efficacy, and clinical outcomes.
Ammentorp et al[20] Published: 2013 Patient Satisfaction and Perceived Success with a Telephonic Health Coaching Program: The Natural Experiments for Translation in Diabetes (NEXT-D) Study, Northern California, 2011.	n=232	Cross-sectional study to determine the associations of patient characteristics with satisfaction and perceived success after completion of a telephonic health coaching program.	Participants of a telephonic health coaching program were sent a survey about health coaching satisfaction and percieved success of reaching goals. Statistical analyses of survey results were taken and correlated to patient demographics and Patient Activation Measure 6 (PAM-6).	Levels of perceived success and satisfaction levels were positively correlated with the number of sessions completed and patient activation in individuals after completing a telephonic health coaching program.
Perri et al[21] Published: 1984 Maintenance strategies for the treatment of obesity: an evaluation of relapse prevention training and posttreatment contact by mail and telephone.	n=129	Cross-sectional study to determine the effectiveness of posttreatment contact in preventing relapse of weight gain in individuals considered to be moderately obese individuals after receiving weight loss therapy.	Subjects were randomly assigned to 1 of 6 experimental condition in a 3x2 factorial design (3 treatment conditions: nonbehavioral therapy, behavior therapy, or behavior therapy plus relapse prevention training; 2 posttreatment conditions; client-therapist contact by telephone and mail or no contact). Subjects assigned to be contacted were contacted via telephone or mail 12 months after intervention.	Posttreatment contact significantly enhanced weight loss maintanence for groups that received nonbehavioral therapy or behavior therapy plus relapse prevention training.
Madson et al[22] Published: 2016 Evaluating the validity of the Client Evaluation of Motivational	n=137	Cross-sectional study evaluation the validity of the Client Evaluation of Motivational Interviewing scale (CEMI) for assessing client perceptions of	College students completed the CEMI after participating in a short motivational intervention for alcohol harm reduction. The CEMI two factor structure was confirmed because of	Scores that were higher for CEMI technical subscale predicted higher scores on bond, tasks, and goals subscales of the Working Alliance

Interviewing scale in a brief motivational intervention for college student drinkers.		motivational interviewing (MI) utilized by clinicians.	previous findings of relational and technical subscales.	Inventory. Revision and evaulation of the CEMI is recommended.
Madson et al[23] Published: 2015 Measuring client experiences of motivational interviewing during a lifestyle intervention. Measurement and Evaluation in Counseling and Development.	n=269	Cross-sectional study to evaluate the factorial validity of the CEMI in African American females, with an average age of 43.84, who participated in an intervention to lower blood pressure through lifestyle changes which included MI.	Subjects completed the CEMI after participating in a lifestyle intervention in which clincians used MI.	CEMI can provide client perceptions of MI and has the potential to function with individuals with varying backgrounds in differents settings. Further refinements of the tool is needed to understand how it might contribute to MI research and training.

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TABLE 5 Measures of Personality

Author, Year and Article Title	Tool & Measurements	Conclusions
Booth-Kewley et al[24] Published: 1994 Associations between Major Domains of Personality and Health Behavior.	Examine associations between four major health behavior dimensions and five major personality dimensions	Personality is a reliable predictor of health behavior patterns. The domains of conscientiousness and agreeableness can be personality predictors for health behaviors.
Gosling et al[25] Published: 2013 Ten Item Personality Measure (TIPI). Measurement Instrument Database for the Social Science.	TIPI: 10-item measurements of the Big-Five dimensions. Measures individual's self-reports of extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience.	When time is constrained for researchers or personality is not the main topic of interist, the TIPI reaches adequate levels in terms of: convergence with widely used Big Five measures in self, observer, and peer reports; test-retest reliability; patterns of predicted external correlates; and convergence between self and observer rating.
Gosling et al[26] Published: 2003 A very brief measure of the Big-Five personality domains.	TIPI: 10-item measurements of the Big-Five dimensions. Measures individual's self-reports of extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience.	The TIPI is a sensible and reasonable option for researchers to utilize when analyzing the pyschometrics of subjects' personaity.

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Chapter 3: MANUSCRIPT

Introduction

In a national survey administered to examine obesity prevalence in 2013-2014, the National Health and Nutrition Examination Survey (NHANES) found that 35% of men and 40.4% of women in the United States are considered obese.[1] Other data gathered over the years 2011-2014 indicate that approximately two-thirds of adults 20 years and older are clinically obese or overweight.[2] Along with this, the percentage of people with a body mass index (BMI) greater than 40 has increased by 70% since the year 2000.[3] These rising rates of obesity contribute to many of the leading causes of preventable death in the United States including heart disease.[4] Other conditions linked to obesity are type 2 diabetes, certain types of cancer, and osteoarthritis.[5] With a reduction in weight, the risk of individuals developing preventable chronic illnesses associated with excess body fat can be greatly reduced.[4]

To combat obesity, lifestyle programs such as meal replacement (MR) programs have been created.[6] Through meal replacement programs, individuals are given weight loss plans that recommend replacing one to two daily meals with products that are reduced in calorie such as shakes and bars.[7] According to a meta-analysis,[8] participants of a MR program displayed a greater amount of weight loss after one year than those participating in a diet that simply reduced their caloric intake. Although the Academy of Nutrition & Dietetics supports MR programs as an effective dietary approach to weight loss, participants' abilities to maintain weight loss is low.[9] Many studies analyzing the effectiveness of MR programs found that individuals regained approximately 40-50% of the weight back within one year of achieving their goal weight.[10, 11]

In order to maintain weight loss, MR program participants must be able to modify and acclimate to new lifestyle behaviors.[12] To reinforce behavior change into individuals, a health coaching component has been added to many MR programs.[13] Weight loss has been proven to be more successful when interacting with a health coach.[14, 15] A health coach aids the client in developing the necessary motivation to initiate and maintain change through providing various perspectives and acknowledging the many contributing factors to accomplishing goals.[14] Even though health coaches are effective for improving individuals' accountability and self-efficacy, participants still gain weight back after conclusion of the program.[11] Other data has shown that the personality style of an individual can influence behavior change, thus impacting healthy eating and regular participation in physical activity.[16, 17] Personality is a reliable predictor of health behavior patterns. Individuals possessing the personality characteristics of conscientiousness and agreeableness display a greater positive association with ability to change health behaviors.[16]

Overall, literature indicates that personality style may affect health related behaviors, and weight loss may be positively influenced with utilization of health coaching. Thus, an individual's perception of health coaching and personality style should be further analyzed to understand their relation to progressive behavior changes among participants of MR programs. Therefore, the purpose of this study is to determine if personality style is related to perceptions of health coaching and if there is a relationship between perceptions of health coaching and the ability to lose weight.

Methods

Study Design and Participants

Data were gathered from individuals participating in a proprietary MR program that includes health coaching. An electronic questionnaire was emailed to 20,000 participants in order to assess factors that are considered facilitators and barriers of weight loss. Respondents self-reported their initial weight when beginning the MR program and their current weight at the time they participated in the study. Each participant's weight loss was determined by calculating current percent of starting weight. Approximately, 2,000 participants responded, therefore this will be the sample size used in assessment of each specific aim.

Aims and Assessment Tools

The primary variables that are the foundation for the specific aims of this study are personality style, perception of health coaching, and percent of starting weight. The first specific aim is to determine if perceptions of health coaching affect the ability to lose weight. The hypothesis for this is aim is: people with positive perceptions of health coaching will have a percent of starting weight lesser than those with negative perceptions. The basis for this hypothesis is previous studies that report finding individuals engaging with a counselor or coach to aid in behavior change as a positive experience.[13, 14, 15] To test this, data from the survey pertaining to perception of health coaching will be assessed with the Client Evaluation of Motivational Interviewing scale (CEMI). The CEMI includes 11 questions on a Likert scale ranging from not at all

satisfied to always.[17] The outputs evaluate how well the health coaches utilized motivational interviewing (MI) based on the perceptions of the client.

The second specific aim is to determine if personality style is associated with the perceptions of health coaching. The hypothesis for this aim is: people with certain personalities (extraverted, conscientious, and agreeable) will report mostly positive perceptions of health coaching. Personality style will be assessed via the Ten Item Personality Inventory (TIPI). The TIPI is composed of ten questions based on a Likert scale ranging from disagree strongly to agree strongly.[18] This inventory is a concise measure of the big five personality domains: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience.[19] Each domain is scored 1-7, and 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. The hypothesis for this aim was formulated based on data from Booth-Kewley and Vickers[16] which found that individuals with scores highest in the domains extraversion, conscientiousness, and agreeableness adapted better to behavior change than those with lower scores in those domains.

Statistical Analyses

All analyses were conducted using Stata SE, Version 14.2.[20] Linear regression was used to determine if percent starting weight (dependent variable) was associated with health coaching perceptions (independent variable) while controlling for age and sex. Linear regression was also used to determine if coaching perceptions (dependent variable) were associated with personality (independent variable) while controlling for

age and sex. Approximately 2,000 of the 20,000 MR program participants completed the questionnaire. Individuals were excluded from analyses if they had been participating in the MR program for less than one month (n=121) or if they were no longer a program member (n=22). Additionally, variables associated with the outcome but with sample sizes too small to allow for comparison among groups were excluded (n=44). The final sample included 1,807 participants.

Results

The mean age of questionnaire completers was 47.7±12.4 with a minimum age of 19 and a maximum age of 83. Most individuals (86%) identified themselves as female. The association between percent of starting weight and health coaching perceptions is displayed in Table 1. Individuals who reported being satisfied with the knowledge, ability, time, support, relationship with their health coach reported a lower percent starting weight compared to those who were not satisfied with their health coach. Coach type preferences were not related to any of the personality domains (see Table 2). No relationship was found between personality and how many times coaches were seen (see Table 3). Satisfaction with the relationship/connection with health coach was associated with extraversion (see Table 4). Emotional stability was associated with satisfaction of the support given by health coach (see Table 4). No other associations were found among personality domains and client satisfaction.

Discussion

This study was carried out to better understand the relationship between perceptions of health coaching and the ability to lose weight and if personality style is related to perceptions of health coaching. Multiple studies indicate that encouraging lifestyle modifications with motivational interviewing techniques is perceived positively.[17, 21] However, further research on how an individual's perception of health coaching is affected by personality style as well as how perceptions of health coaching affects that ability to lose weight needs to be conducted. The findings of this study may reasonably suggest that personality style is not a sole determining factor for perceptions of health coaching. Rather, other factors in conjunction may be more indicative of perceptions and the ability to lose weight in a health coaching program.

Perceptions of Health Coaching & Weight Loss

In comprehensive lifestyle programs, health coaching perceptions could be improved through having a more structure such as requiring set number of health coaching times and meeting with the same health coach. Participants of our study met with their coaches a variable amount of times, but those who attended 1 or more coaching sessions displayed a greater weight loss than those who did not meet with a health coach. Also, individuals that met with the same coach as opposed to different coaches had a lower percent of starting weight. If program participants were held accountable to attend at least one coaching session and meet with the same coach for each session, greater weight loss could be achieved and long-term health outcomes could improve.

Greater weight loss was seen in individuals who preferred to meet with the same coach or a variety compared to having no preference. Simply having a preference on a health coach could reflect in the individuals desire to meet with a health coach and actively make behavior changes. No difference in weight loss was seen between having no preference and those who preferred no coaching or preferred virtual sessions. These health coaching preferences (no preference, no coaching, and virtual sessions) might be indicative of apathy towards implementing lifestyle changes which could result in negative perceptions of health coaching and a lesser amount of weight lost.

Client satisfaction scores in knowledge, ability, time, support, and relationship indicated that the more satisfied the participant was with their health coach in these areas the greater amount of weight lost. Thus, as health coaching satisfaction increased, so did weight loss. These satisfaction scores can be considered positive perceptions of health coaching which resulted in significant weight loss. It is reasonable to infer that the health coaches were effectively caring out motivational interviewing techniques with participants because of the positive perceptions. Properly implementing motivational interviewing techniques in health coaching sessions with clients can improve the perceptions of health coaching and ultimately result in behavior change and weight loss.

Perceptions of Health Coaching & Personality

Only 2 personality domains, extraversion and emotionally stability, were associated with health coaching satisfaction. Individuals who consider themselves to be extroverted identify as being talkative, outgoing, sociable, assertive, and enthusiastic.[19, 22] This may explain why participants who identified as extroverted reported being satisfied

with the relationship built with their health coach. An individual who is sociable and assertive may be able to communicate more effectively with another in order to build relationships. The qualities of an extroverted individual may make them more apt to form strong relationships in comparison to other personality domains.

A person identifying as emotionally stable would possess the traits of self-confidence, being relaxed, not easily upset or anxious.[19,22] These qualities may explain why participants who considered themselves to be emotionally stable reported being satisfied with the support provided by their health coach. This positive perception may also be reflected in the results of association between health coach time preferences and weight loss. Participants that met with their coach 0 times may have chosen do so because they possess the trait of self-confidence or identify as being emotionally stable. Being emotionally stable may result in more positive perceptions and more satisfaction with health coaching experiences.

Although some personality domains were associated with satisfaction of health coaching, the results of this study do not imply that personality is the only indicator of perceptions of health coaching. It may be reasonable to suggest that personality does not significantly influence perceptions.

No associations were found between any of the personality domains and coaching preferences. Also, no associations were found among personality domains and health coach times. Specific personality domains may not be predictors of preferences or health coach times. Other factors such as an individual's self-efficacy and willingness to change behaviors may have a greater influence on health coaching preferences and the number of health coaching sessions attended.

Future Directions

Health coaches may intend to interact with clients in a certain way but actions are not consistent which could skew clients' perceptions. According to Cognitive Dissonance Theory, a state of discomfort occurs when "an individual holds two or more elements of knowledge that are relevant to each other but inconsistent with one another".[24] This can be seen when an individual's thoughts and beliefs are not accurately portrayed and perceived in actions. In future research, it would be useful for health coaches to complete a survey similar to the CEMI to better understand the health coaches' perception of their own ability to carry out motivational interviewing. These results could be compared with clients' CEMI scores to determine if cognitive dissonance could be affecting clients' perceptions of health coaches.

Other literature has shown that individuals with higher education in health-related disciplines providing health coaching and utilizing motivational interviewing were able to influence long-term behavior change in those they worked with. A randomized control trial analyzing the impact of motivational interviewing carried out by registered dietitians and primary care providers found that those receiving health education displayed significant reductions in BMI at a 2 year follow up.[23] Thus, as comprehensive lifestyle programs evolve, it is reasonable to suggest that education requirements of a health coach encompass a minimum of a higher degree in dietetics, internal medicine, or health-related fields. Ensuring health coaches have the necessary knowledge and coaching abilities to carry out motivational interviewing is necessary to enhance overall perceptions of health coaching and improve long-term outcomes of program participants.

Limitations

Certain personalities may be more apt to complete an online survey. Further research should determine which personality styles are more likely to take a survey and consider this when analyzing the data. In the survey, weight records, initial weight at the start of the program and current weight at the time of the survey, were the only weights utilized. With limited weight information, we were unable to determine if participants were continuing to lose weight, at their goal weight, or if they had regained weight but were still less than their starting weight. Thus, long-term success of the program could not be determined. In future research, sequential weights should be reported by participants to better determine weight loss outcomes. Along with this, participants' weights were self-reported. This may have resulted in recall bias, particularly with starting weight.

Conclusions

The findings of this study could potentially lend to the idea that health coaches do not have to tailor coaching styles to specific personality types to improve clients' perceptions. Rather, the focus could be placed on carrying out motivational interviewing approaches effectively to manifest sustainable behavior change in clients. However, conducting further research on personality styles and perceptions is necessary to improve health coaching efforts in regards to clients achieving long term weight loss, and therefore effectively producing positive perceptions of health coaching within those clients. Such research could help MR programs improve their health coaching regimen to better suit clients' needs. This information can be used to improve counseling for various

behaviors that require a positive lifestyle change including the cessation of smoking or drug abuse, managing type 2 diabetes, and coping with psychological disorders such as anxiety or depression. Overall, the findings will be applicable to methods that will aid in reducing the prevalence of obesity. Ultimately, the findings of this study hope to provide a better understanding of how the possible association between personality style, perception of health coaching, and weight loss influence the efficacy of meal replacement programs.

APPENDIX

Table 1. Relationship between percent of starting weight and health coaching preferences and perceptions

Health Coaching Preferences/Perceptions	Mean % of starting weight ± SE	Coefficient & Standard Error	P-Value	95% Confidence Interval
Health Coach Times				
0 Times (ref)	88.0 ± .42	-	-	-
1 Times	84.5 ± .48	-3.66 ± .64	0.00	(-4.9, -2.4)
2 Times	84.7 ± .35	-3.248 ± .545	0.00	(-4.3, -2.2)
4 Times or more	86.1 ± .39	-1.943 ± .574	0.001	(-3.1, -.8)
Meeting with Coach				
Different coach (ref)	86.3 ± .31	-	-	-
Same coach	85.2 ± .26	-1.02 ± .409	0.013	(-1.8, -.2)
Coach Type				
No Preference (ref)	89.2 ± .29	-	-	-
Variety of coaches	85.1 ± .45	-2.56 ± .745	0.001	(-4.0, -1.0)
Same Coach	87.6 ± .59	-2.468 ± .656	0.00	(-3.8, -1.2)
No coaching	89.2 ± .98	1.536 ± 1.141	0.178	(-.7, 3.8)
Virtual Sessions	86.8 ± .97	-.847 ± .903	0.348	(-2.6, .9)
Client Satisfaction				
Knowledge	N/A	-.825 ± .094	0.00	(-1.0, -.6)
Ability	N/A	-.839 ± .096	0.00	(-1.0, -.7)
Time	N/A	-.719 ± .091	0.00	(-.9, -.5)
Support	N/A	-.807 ± .083	0.00	(-1.0, -.6)
Relationship	N/A	-.707 ± .077	0.00	(-.9, -.6)

Table 2. Relationship between personality domains and coach type preference

Personality Domain & Coach Type	Coefficient & Standard Error	P-Value	95% Confidence Interval
No Preference			
Extraversion	0.0 ± .073	1.0	(-.143, .143)
Agreeableness	.023 ± .118	0.847	(-.209, .254)
Conscientiousness	.02 ±.146	0.889	(-.265, .306)
Emotional Stability	.019 ± .01	0.852	(-.177, .214)
Openness	.031 ± .11	0.776	(-.184, .247)
Same Coach			
Extraversion	-.002 ± .053	0.967	(-.106, .101)
Agreeableness	.032 ± .068	0.642	(-.102, .165)
Conscientiousness	-.028 ± .085	0.744	(-.195, .139)
Emotional Stability	-.016 ± .058	0.779	(-.131, .098)
Openness	.032 ± .063	0.611	(-.092, .157)
Variety of Coaches			
Extraversion	-.021 ± .06	0.726	(-.139, .097)
Agreeableness	-.002 ± .077	0.983	(-.154, .15)
Conscientiousness	.004 ± .096	0.971	(-.185, .192)
Emotional Stability	-.037 ± .066	0.576	(-.167, .093)
Openness	.089 ± .072	0.212	(-.051, .23)
Virtual Sessions			
Extraversion	0.0 ± .073	1.0	(-.143, .143)
Agreeableness	.053 ± .094	0.576	(-.131, .236)
Conscientiousness	-.059 ± .119	0.619	(-.292, .174)
Emotional Stability	-.043 ± .081	0.593	(-.201, .115)
Openness	.015 ± .088	0.865	(-.158, .188)

Table 3. Relationship between personality domains and health coach times

Personality Domain & Coach Time	Coefficient & Standard Error	P-Value	95% Confidence Interval
Extraversion			
1 Time	.017 ± .052	0.74	(-.085, .12)
2 Times	.018 ± .044	0.68	(-.068, .104)
4 Times or More	-.037 ± .047	0.42	(-.13, .053)
Agreeableness			
1 Time	-.085 ± .067	0.21	(-.22, .047)
2 Times	-.012 ± .056	0.84	(-.12, .098)
4 Times or More	.019 ± .059	0.75	(-.097, .13)
Conscientiousness			
1 Time	-.039 ± .08	0.64	(-.2, .12)
2 Times	-.07 ± .06	0.31	(-.21, .06)
4 Times or More	-.01 ± .072	0.88	(-.15, .13)
Emotional Stability			
1 Time	.036 ± .056	0.52	(-.074, .146)
2 Times	-.02 ± .048	0.62	(-.119, .07)
4 Times or More	.02 ± .05	0.66	(-.077, .121)
Openness			
1 Time	.009 ± .06	0.88	(-.11, .13)
2 Times	.007 ± .05	0.88	(-.09, .11)
4 Times or More	-.005 ± .055	0.93	(-.11, .1)

Table 4. Client Satisfaction Based on Personality

Personality Domain & Satisfaction Categories	Coefficient & Standard Error	P-Value	95% Confidence Interval
Extraversion			
Knowledge	-.027 ± .034	.438	(-.094, .041)
Ability	-.021 ± .034	.525	(-.0878, .045)
Time Utilization	-.035 ± .036	.333	(-.105, .036)
Support	-.064 ± .039	.102	(-.141, .0128)
Relationship	-.087 ± .042	.039	(-.169, -.004)
Agreeableness			
Knowledge	-.058 ± .044	.189	(-.144,.028)
Ability	-.053 ± .043	.219	(-.137, .031)
Time Utilization	-.011 ± .046	.814	(-.1, -.079)
Support	-.021 ± .049	.68	(-.118, .077)
Relationship	-.018 ± .054	.731	(-.123, .087)
Conscientiousness			
Knowledge	-.048 ± .055	.384	(-.155, .06)
Ability	-.054 ± .054	.314	(-.159, .051)
Time Utilization	-.081 ± .057	.155	(-.193, .031)
Support	-.05 ± .062	.418	(-.172, .071)
Relationship	-.069 ± .067	.303	(-.199, .062)
Emotional Stability			
Knowledge	-.009 ± .038	.82	(-.083, .066)
Ability	-.029 ± .038	.441	(-.101, .044)
Time Utilization	-.063 ± .039	.111	(-.14, .014)
Support	-.081 ± .043	.061	(-.165, .004)
Relationship	-.073 ± .046	.115	(-.162, .018)
Openness			
Knowledge	.009 ± .041	.825	(-.071, .089)
Ability	.0127 ± .04	.753	(-.066, .092)
Time Utilization	.027 ± .043	.529	(-.057, .111)
Support	.009 ± .047	.842	(-.082, .101)
Relationship	-.018 ± .05	.726	(-.116, .081)

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