THE EFFECT OF TEAM (TOGETHER EATING AND ACTIVITY MATTERS) INTERVENTION ON WEIGHT LOSS AMONG BLACK MEN

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ABSTRACT

Candice Lynette Alick: The Effect of TEAM (Together Eating and Activity Matters) Intervention on Weight Loss among Black Men
(Under the direction of Deborah F. Tate)

Black men (BM) suffer disproportionately from obesity related conditions when compared to White men and women. Behavioral lifestyle weight loss(WL) interventions are the gold standard for obesity treatment. BM experience low participation rates and reduced efficacy in response to these interventions. Partner involvement, a culturally-appropriate source of social support (SS), and the use of the Theory of Interdependence of Communal Coping, a dyadic theoretical framework, provide the opportunity to increase enrollment and WL. The overall goal of this research was to assess whether a spousal support-enhanced WL intervention (EG) was effective in producing significant WL among BM. Aim 1 examined factors that influence WL among Black heterosexual couples (n=20) using in-depth interviews. Couples reported reasons for maintaining a healthy weight/WL, barriers and facilitators to WL, and preferences for working together. Aim 2 evaluated the feasibility and preliminary efficacy of a 12-week, EG aimed at increasing WL compared to a standard treatment (SG). All (n=40) male participants and 98% of female partners were retained. Between 63-73% of group sessions were attended. Self-monitoring were low in both groups (BG). Participants (n=40) loss weight (standard: 3%, p=0.05 vs. enhanced:4%, p=0.001), with no significant differences between groups. Waist circumferences decreased in BG, with no significant differences between groups overtime.

Participants in the EG(n=21), reduced diastolic blood pressure, moderately decreased daily caloric intake, and increased weekly energy expenditure over time. Female partners of the EG lost 2.24% of initial weight compared to female partners of SG (0.15%). Aim 3 examined the effects of the intervention on family functioning, SS, self-regulation and self-efficacy. Examining medium effect sizes between groups, EG reported improved communication (0.23; d=0.64, p=0.06), increased incendiary communication (0.52, d=0.44, p=0.19), decreased cohesion (-2.33, d=0.76, p=0.03), and decreased emotional involvement (-1.70, d=0.77, p=0.4) relative to the SG over time. SS, self-regulation and self-efficacy did not change over time. Shifts in family functioning in the opposite direction did not influence WL in the EG. These results suggest that an EG may be a promising approach to WL among BM. Additional research is needed to examine these effects in a larger sample with a longer study duration.

To the most important Black men in my life…

To my pastor daddy…you ARE my model of love, kindness, patience and humility. Without your model, this would not be possible.

To my daddy Ahmad…you are what you eat. You passed the baton and I finished the race. This is for you.

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In the middle of this journey, in the middle of this marathon, in the middle of what felt like an abyss, over the phone, my mother sang, “Living on a Prayer.”

We're half way there… livin' on a prayer…take my hand, we'll make it I swear

Firstly, I would like to thank my mother, who instilled in me my efforts alone would not be enough to complete this journey. Through every triumph and failure, she has been my peace in the midst of the storm and prayed with and for me. We are indebted to your parents for the sacrifices and guidance through the years, my debt will never be paid. I can only say thank you.

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To my participants, thank you for being a part of this research and making the decision to take a step to change your lives. It is my hope you take this information and use it and share among others in our community. You are now ambassadors. Each one, teach one.

Lastly, I would like to thank my chair, Deborah Tate. Deb took me on as her student after the untimely passing of my advisor, Dr. Marci Campbell. I am also grateful to my committee: Christine Rini, Carmen Samuel-Hodge, Dianne Ward and Alice Ammerman.

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CHAPTER 1: INTRODUCTION

I.A. Overview

In 2014, Blacks were 1.5 times more likely to be overweight and obese than non-Hispanic Whites. [1] The Office of Minority Health reports the prevalence of overweight and obesity (BMI>25) among Black men age 20 and older is 70%.[1] Black men suffer disproportionately from obesity-related consequences. Modest weight loss of 5-10% improves cardiovascular disease risk factors and reduces the risk of type 2 diabetes.[2] However, the majority of participants in behavioral weight loss interventions are most commonly Caucasian women. While men are unrepresented in weight loss programs, even fewer studies examine weight loss in Black men. The participation rate for Black men in research was only 4.5%, according to the National Institute of Health (NIH).[3] Efforts to increase Black participation in weight loss interventions have resulted in Black male enrollment between 5.7-11.6% of study sample.[4,5] When Black men have participated in behavioral weight loss interventions, they have lost less weight compared to White men.[4-6] Consequently, the evidence on the appropriateness of the current weight loss strategies and recommendations for Black men is limited because of their lack of participation providing few opportunities to review weight loss among Black men. In a review reporting dietary, physical activity and weight loss outcome for Black men, only 4 studies were designed specifically for Black and none reported weight loss as their primary outcome.[7] To our knowledge there are no weight loss interventions specifically for black men. Low participation rates and reduced efficacy

may be a result of lack of knowing what works best for this population i.e., the strategies, the messages, etc. for appropriately engaging and impacting Black men. Given the current level of research, it is clear the need for weight loss interventions targeting Black men have not been conducted and are needed. In an evaluation of results from NIH-funded, multicentre, randomized controlled trials (RCT) of lifestyle interventions, it was found that despite losing less weight, when compared to Whites, Blacks experienced no differences in incidences of diabetes or in blood pressure reduction.[8] In response to the disparities in obesity related conditions, greater improvements in risk factors might be achieved with equal or greater weight loss since comparable reductions have been seen at lower weight loss.

Current lifestyle weight loss interventions ineffectively engage black men and have shown reduced efficacy. Consequently, culturally adapting standard behavioral weight loss interventions is appropriate. Involving family in weight loss programs targeting Blacks is culturally appropriate because family is a culturally valued among Black. From research in diabetes self-management, the family unit is shown to be a critical source of health promotion in men's health.[9] Families can help reduce the impact of diabetes through education, reinforcement, and direct assistance.[9-11] Without family involvement, Black men are less likely to seek out prevention programming and stay involved in interventions. [9] Because of the value of family, and given culturally defined gender roles among Black men, they may be more likely to engage in changing their lifestyle behaviors to promote health if the goal is to continue to adequately provide for the family rather than simply participate in prevention programs to be healthier.[9] The influence of family is more pronounced for individuals residing in the same household as the targeted individual, such as partners or spouses. In a weight loss intervention targeting the social and environmental factors influencing weight loss, participants lost more weight during the initial weight loss phase with these

modifications where partners were included when compared to participants who received standard treatment only where partners did not particpate.[12] The effect of partner involvement in weight loss among Black men is unknown however and requires further investigation.

There is evidence that having a spouse or partner present can positively influence weight loss.[13] Partners can provide the functional support needed to improve and sustain dietary and physical activity changes needed for achieving weight loss. Longitudinal studies provide additional evidence of the influence of partner/spouses on health behavior.[14] Interventions that have attempted to leverage the influence of partners in the form of spousal support (i.e., social support) have yielded inconsistent results.[15] Social support is a predictor of weight loss, and support from family is important in Black culture.[16-19] Interventions using spousal support as a strategy to facilitate weight loss have been conducted largely in White populations.[15] The use of individual based theoretical frameworks may explain these inconsistencies. Health behaviors (e.g., healthy eating and physical activity) are influenced by social and environment factors and interventions should address these factors to facilitate long-term behavior change in combination with intrapersonal factors. Spouses/partners are both social and environmental factors that are important to the health of Black men.[9] Framing health promotion as a means for Black men to fulfill their roles to their family is important. Addressing the interpersonal factors (i.e., communication with family members or partners) and intrapersonal factors (i.e., self-efficacy and self-regulation) in weight loss interventions take into consideration multiple influences on behavior change. Using a dyad-based theory like the Interdependence Theory to develop a conceptual framework may produce different results providing consistent evidence of the benefit of partner involvement. The use of a dyad based theoretical framework and testing the effects of

spousal support adds to the literature of weight loss among Black men and couples-based weight loss interventions.

The purpose of this study is to determine the effective strategies to recruit overweight and obese Black men to participate in a weight loss program and examine the feasibility and preliminary efficacy of a 3-month spousal support enhanced behavioral weight loss intervention immediate post-intervention. The enhanced intervention is compared to a standard behavioral weight loss intervention, with weight loss as the primary outcome.

I.B. Specific Aims

Aim 1. To determine the role of spousal support in a weight loss program among Black couples by identifying the salient factors that support and influence weight loss from their own perspectives and that of their partners using in-depth interviews.

Aim 2. To test the feasibility and preliminary efficacy of a 3-month behavioral weight loss program with enhanced spousal support (partners participate together) (e.g., enhanced group) on weight loss (kg) among Black men compared to a traditional behavioral weight loss program (men participate alone) (e.g., standard group).

Secondary Outcomes: To compare changes in lifestyle behaviors (diet and physical activity) between men in the enhanced vs. standard groups.

Tertiary Outcomes: To compare changes in weight (kg) in spouse/cohabitating partner in the enhanced vs. standard groups.

Aim 3. To compare men in the enhanced and standard groups on changes in psychosocial measures (spousal support, self-efficacy for weight loss, self-regulation, transformation of motivation and communal coping).

CHAPTER II: LITERATURE REVIEW

II.A. Obesity: The Epidemic

The National Health and Nutrition Examination Survey (NHANES) reports over one third of adults in the United States are obese; this does not account for overweight adults on the trajectory to become obese. Obesity rates have increased steadily from 14.5% in 1976-1980 to 22.5% in 1988-1994 to 32% in 1999-2004 among adults. The leading causes of preventable death in the United States are obesity related: heart disease, diabetes, some cancers, and hypertension.[20] Additionally, obesity has non-health related effects: obesity-related medical costs impact both the private and public sector. As of 2009, the per capita medical spending for an obese individual was $1,429 higher per year than a normal weight individual.

National surveys suggest disparities in prevalence of obesity exist among subpopulations, specifically, racial-ethnic minority groups compared to Whites. The Morbidity and Mortality Weekly Report (MMWR) reports that non-Hispanic Blacks (35.7%) had 51% greater prevalence of obesity, and Hispanics (28.7%) had 21% greater prevalence, when compared with non-Hispanic Whites (23.7%) from 2006-2008. Non-Hispanic Black women had the greatest prevalence (39.2%), followed by non-Hispanic Black men (31.6%), Hispanic women (29.4%), Hispanic men (27.8%), non-Hispanic White men (25.4%), and non-Hispanic White women (21.8%). [21] The rates of overweight and obesity in Blacks are among the highest in the United States. [22,23] Though Black women have the highest prevalence,[24] Black men suffer disproportionately more from obesity related diseases. Approximately three out of four Black men are at increased risk for chronic

diseases such as diabetes, [11] hypertension, [25,26,27] and some cancers [28] because of their overweight or obesity status. Appropriate strategies to help at-risk subpopulations achieve and maintain healthy weights are needed to reduce the impact of the obesity epidemic in the United States and worldwide.

II.B. Obesity Treatment: Combating the problem

The causes of obesity are complex; an individual's weight can be influenced by genetics, an individual's metabolism, culture, the environment in which they live, socioeconomic status and/or behavior. Environment and behavior are two areas in which the potential for intervening is the greatest. Environmental changes often involve shifts in population level factors and may involve policy change. Behavior change, on the individual level, is the focus of many interventions seeking to achieve modest weight loss in overweight and obese individuals. Modest weight loss of 5-10% is associated with significant improvements in cardiovascular disease risk factors;[2] with modest weight <5%, there are more modest and more variable reductions in blood pressure.[29] Pharmacology, surgery, and lifestyle or behavioral interventions have been prescribed as effective methods of weight reduction. Selecting the appropriate method for weight reduction should be guided by an individual's BMI, health risks and the individual's past history of weight loss attempts. [30] The method should sustain the weight loss long term to increase the benefits associated with weight management.

II.B.1. Lifestyle and behavioral weight loss: The long-term fix

The use of lifestyle behavioral modifications to facilitate weight loss has been used since the 1960s.[31] Behavioral programs have served as a treatment option for individuals with BMI 25-39 kg/m^2; these programs can produce 8-10% of initial weight loss during 4-6 months of treatment. In clinical trials, 80%-85% of enrolled participants complete this form of treatment. [30] Research

suggests that lifestyle weight loss interventions facilitate both short-term weight loss and long-term weight maintenance and have greater impact on clinical endpoints such as diabetes compared to medication.[32] These programs typically target diet/nutrition, physical activity and behavior modification.[33] Particularly, increasing daily fruit and vegetable intake combined with regular physical activity has been proven to improve an individual's weight status, potentially reducing the risk of various chronic conditions (e.g., obesity,[34] cardiovascular disease,[35,36] hypertension, [37] and reduced physical function). Behavioral weight loss programs may: 1) provide access to a behavioral therapist and/or a nutritionist; 2) encourage frequent weigh-ins and self-monitoring of behaviors and weight; 3) require attendance to group sessions for education and/or discussion; 4) promote setting goals; and 5) provide diet and physical activity prescriptions and behavioral lessons.[38] The mode of delivery is an important consideration when implementing the above components; the appropriateness of the modality for the target population may consider socioeconomic factors, degree of medical mistrust and access to transportation. Deciding whether to deliver a component face-to-face vs electronically, in a group setting vs individual contact; and within, or in a community setting vs a clinic, can influence the effectiveness of the delivered program.

Lifestyle Factors Targeted in Weight Loss Programs: Diet and Physical Activity

Behavioral weight loss programs that focus on diet change and increasing activity are considered the most effective to management of weight. ChooseMyPlate.gov is the current website published by the United States Department of Agriculture (USDA) providing dietary (and physical activity) guidelines to the general public. The 2015-2020 guidelines suggest men 19-50 years of age should consume >2 cups of fruit and >3 cups of vegetables; these recommendations are for men who get less than 30 minutes per day of moderate physical activity beyond normal daily

activities. Consuming low-energy dense foods (e.g., fruits and vegetables) reduces daily caloric intake, which recommended for weight loss. [39,34,40] Currently, Black men consume fewer fruits and vegetables when compared to Whites.[41,42] Through nutrition education, however, Black men can learn to reduce calories by eating balanced diets, reducing fat intake, increasing fiber and complex carbohydrates, and eating nutrient-rich foods.

To further offset the calorie balance to produce weight loss, physical activity is prescribed in weight loss studies. According to the American College of Sport Medicine, both male and female adults should get at least 150 minutes of moderate-intensity exercise per week. For modest weight loss, 150-250 minutes/week of moderate-intensity physical activity is recommended and greater amounts (i.e., >250) provide clinically significant weight loss. Currently, Black men have lower rates of physical activity than Whites. [41] In the South, Northeast and Western regions of the United States, Black men had lower odds of meeting federal recommendations for physical activity compared to white men in 2008.[43] Lifestyle activity (e.g., mowing the lawn, bowling) and short bouts of activity (e.g. <10 minutes of activity accumulated over time) are suggested in tandem with or in addition to more traditional long bouts and aerobic activities to account for the variation in ways participants can achieve the goal of increasing physical activity. Increasing daily fruit and vegetable intake to reduce caloric intake combined with regular physical activity improves weight and weight related conditions [33,34,35,36]

Theory-based Behavioral Approaches to change Physical Activity and Dietary Intake

To change the dietary and activity behaviors of study participants in weight loss programs, researchers often use theory to help explain the nature of the problem and to identify modifiable factors. Theory is also used to develop and implement intervention strategies. Common theory-based techniques shown to be effective in changing weight-related behaviors (e.g. physical activity

and dietary intake) in both the general and minority populations include goal setting, self-monitoring, feedback and reinforcement, self-efficacy enhancement, incentives, modeling, problem solving, and motivational interviewing.[44]

Bandura suggests that self-regulation must involve monitoring one's own behavior to provide the information needed to set realistic goals and evaluate one's progress toward them.[45] Through monitoring or self-observation, an individual becomes more aware of personal thought patterns and actions in different social contexts; this can produce self-directed change.[45] Stuart-Shor et al. suggest that awareness of daily lifestyle habits through self-monitoring using simple approaches, like handwritten diaries or online electronic logs, is associated with positive lifestyle change. Self-monitoring is a strategy for self-regulation.[46] Participants in weight loss programs often monitor their daily diet by recording calories each day, tracking the number of minutes engaged in activity and recording their daily weight.

Goal setting, another self-regulatory strategy, is one of the most frequently used strategies for self-regulation; it involves developing an action plan to motivate and guide an individual toward a particular goal. It is commonly used to increase physical activity among both men and women.[47] Weight loss programs prescribe daily calorie restrictions, typically based on initial body weight and daily to weekly minutes of activity, based on current activity level, as goals for participants to achieve. Pedometers and, most recently, wearables (e.g., fitbits) have made monitoring and setting personal goals more accessible to the general public. These strategies commonly used in weight control studies, but more specifically in men-only randomized controlled trials, should help to maintain behavior change long term. [48]

Self-efficacy has been described as an antecedent to self-regulation.[49] Bandura, who developed the Social Cognitive Theory, defines self-efficacy as the degree to which one feels confident to enact behaviors necessary to accomplish a behavior or goal in a specific situation. Goal setting, described previously, positive reinforcement using persuasion, and the use of skill-building activities to promote skills mastery builds self, all build self-efficacy.[50] Giving recommendations about daily caloric intake and minutes of moderate to vigorous activity in addition to providing tailored information (e.g. positive feedback on progress and emphasizing the importance and personal relevance of changing individual behavior) can build efficacy. [51] Repeated recording of daily behaviors is a common skill-building method in weight loss programs that also builds self-efficacy through mastering or becoming proficient in relevant skills. Within weight management trials, building self-efficacy is associated with increasing moderate or vigorous physical activity and strength training. [41] In a weight loss study targeting young adults, men were shown to have lower self-efficacy for health eating in addition to poorer eating habits (e.g. high sodium consumption); researchers recommended heathy eating programs targeting men should focus on improving self-efficacy for healthy eating before expecting behavior change. [52]

Perceived social support has been described as an antecedent to self-efficacy [53] and self-regulation.[54] Perceived support for healthy eating from family and friends has been associated with better nutrition behaviors.[55,56] Enacted social support from friends and family has also been shown to increase physical activity in Black men. [18] Identifying strategies to increase and/or improve social support is necessary to observe change in these constructs and ultimately behavior change.

Based on the literature examining studies involving components of behavioral weight loss programs and the target population, self-efficacy, self-regulation and social support are key

constructs that will be targeted to improve physical activity and dietary intake in the proposed study.

II.B.2. Effectiveness of Behavioral weight loss programs: Do they work?

There have been landmark trails that provide evidence for the effectiveness of behavioral weight loss interventions on weight loss and other health outcomes. The Diabetes Prevention Program (DPP)[57] was a 6-month behavioral weight loss intervention. Participants were to achieve and maintain a weight reduction of at least 7% of initial body weight through a low caloric diet and engagement in moderate physical activity. The 3-arm randomized control trial found the lifestyle-intensive behavioral intervention was more effective than metformin, an oral diabetes drug, in reducing the incidence of diabetes in 3234 non-diabetic persons with elevated fasting and post-load plasma glucose concentrations at baseline. Behavior modification reduced the incidence of diabetes by 58% compared to the placebo and metformin reduced the incidence by 31%; the behavioral intervention was significantly more effective than metformin after an average of 2.8 years and was also found to be more cost-effective. [58] Fifty percent of the participants in the behavioral-intervention group loss at least 7% or more by the end of treatment, and 38% lost at least 7% at the time of last follow up session. This study was groundbreaking in providing evidence of the effectiveness and health benefit of behavioral weight loss interventions. [57]

Subsequently to the DPP, Look AHEAD (Action for Health in Diabetes) was another behavioral weight loss intervention examining the long-term health consequences of intentional weight loss in overweight and obese individuals with type 2 diabetes. Look AHEAD differed from DPP in several ways. Participants in Look AHEAD already had type 2 diabetes, had higher weight loss goals and had lower calorie and fat gram targets based on initial body weight. In addition, study participants experienced more intensive intervention frequency and were provided with more

structured nutritional intervention strategies, meal replacements, structured menus and combined fat and calorie counting. Despite their differences, both programs focused on (1) goal setting for weight, activity, fat gram and calorie intake; (2) self-monitoring as a method to achieve set goals; (3) frequent contact; and emphasis on (4) problem solving; and (5) managing high-risk situations.[59] The weight loss results of Look AHEAD were a bit higher than DPP at year one likely due the use of meal replacements, a 8.6% and 7.2% reduction in weight from baseline, respectively, providing additional evidence of the effectiveness of a comprehensive behavioral intervention producing clinically significant weight loss (i.e., ≥5%) in overweight/obese participants with type 2 diabetes.[5]

II.C. Disparities in treatment of obesity: Why focus on Black men?

Enrollment of Black men in weight loss programs is low.[5,11] Current behavioral weight loss interventions have been largely tested among women and Whites, which is evident in their representation in study samples. [60] The landmark DPP study targeted underrepresented groups; baseline demographics show the study population was 55% White, 20% Black, 16% Hispanic, 5% American Indian, and 4% Asian-American. Of the 1,043 males who participated, 15.8% were Black compared to 58.3% White and of the 643 Blacks who participated, 26% were men compared to 74% women; Black men accounted for only 5% of the study sample. [61] Moreover, the goal of LOOK Ahead was to recruit equal numbers of men and women and recruit at least 33% of participants from racial ethnic groups. At baseline, approximately 60% of participants were female and nearly 40% belonged to an US racial or ethnic group; 15.6% of the total study population was Black. However, only 3.7% of the study population was non-Hispanic Black men compared to 30.7% White men. [62] In PREMIER and Weight Loss Maintenance(WLM), efforts to enrollment more Blacks resulted in Black male enrollment reaching 11.6%.[63] Taking in consideration the

disparities in obesity-related chronic conditions affecting Black men, additional efforts are needed to enroll this population to identify the appropriate strategies to facilitate weight loss among Black men. These landmark studies represent current obesity treatment among Black men.[6] Low enrollment suggests Black men are not seeking weight management treatment despite experiencing poorer health outcomes than other racial/ethnic groups.

Though enrollment of Black men is low in comparison to other groups, when Black men participate in behavioral weight loss interventions they lose weight, although less weight than their White counterparts. In the Weight Loss Maintenance trial (WLM), consisting of both a 6-month behavioral weight loss intervention (phase I) and a 30-month maintenance intervention (phase II), Black men lost less weight than White men in both phases, mean % change (95% CI): Phase I: -8.1% (CI:−8.8, −7.3) vs −10.3 % (CI:−10.8, −9.8) and Phase II: −4.0 % (CI:−5.2, −2.8) vs −4.5% (CI:−5.7, −4.0)); respectively. [6] Results from the DPP at 12 months show comparable weight losses between racial ethnic groups; however Black men still lost less clinically significant weight compared to White men and women, −7.1% compared to −8.4% and −8.1% respectively. [4] It is widely accepted that initial modest weight losses of 5–10% produces clinically significant improvements in cardiovascular disease risk factors in overweight and obese individuals. In a secondary analysis, greater weight loss was associated with greater improvements in risk factors, blood pressure, glycemic control, and lipids (excluding low density lipoprotein (LDL) cholesterol). [64] Given that benefits to blood pressure and other cardiovascular disease factors improve with each additional kg of weight loss, it could be assumed that Black men experience disparities in improvements in risk factors because they lose less weight in weight loss programs compared to other racial/ethnic groups. However, in a systematic review, it was found that even though Blacks lost less weight, they experienced the same amount of risk reduction in cardiometabolic factors

(e.g. incidence of diabetes and blood pressure) as other racial/ethnic groups.[8] Identifying the causes of the weight loss differences and strategies to eliminate these differences, may help reduce or eliminate the gaps. Black men, who suffer disproportionately from cardiometabolic factors, may benefit from greater weight losses because the benefits of weight loss appear to be more profound in Blacks.[8] Achieving greater or similar weight loss to White men may help reduce the burden of disparities Black men may experience as a result of their weight status.

II.D. Black men's participation in research: How do we get them to participate AND do well?

II.D.1. Recruitment of Black men in research: Will they come?

As previously stated, Black male participation in research is sparse. Research studies specifically recruiting Black men have concluded that a multifaceted approach is not only effective but necessary. In prostate cancer screening, Black men were found more likely to participate if they had knowledge of their individual risk and if the health messages used to communicate their risk featured Black men and reflected Afrocentric perspectives. Other important attributes included a personal invitation, feeling their participation was valued and believing the research staff was truly interested in their participation. Additionally, collaborative community partners (e.g. community groups, Masonic lodges, American Legion, barbershops, and Elks Lodges) [3] and word-of-mouth are effective strategies for recruiting Black men for prostate cancer screening. [65] Furthermore, there are many studies focused on HIV/STD prevention among Black men. In a study recruiting Black men who sleep with men (BMSM), 51% of the study sample report they were referred by social media, word of mouth, or telephone.[66] In the St. Louis Personality and Aging Network (SPAN) study, researchers initially used phone calls and letters to recruit participants. However, after developing and using targeted letters and phone calls to increase the quality of the invitation, the percentage of Black male participants increased from 31% to 43% (500 men). [67]

Personalized invitations via phone calls, letters, social media and community organizations have the potential to be effective primary recruitment strategies for getting Black men to participate in behavioral weight loss interventions. Word-of-mouth is a potential secondary recruitment strategy dependent on the existing recruited sample. These strategies have been used in subpopulations of Black men (e.g. older men for prostate cancer screening, BMSM at risk for infectious disease and men with personality disorders); applying these recruitment strategies to behavioral weight loss interventions may increase Black male participation in behavioral weight loss interventions.

II.D.2. Cultural Appropriateness: What role does culture play in an intervention for Black men?

In a review examining psychosocial factors and systems-level interventions in Black men, the investigators found that interventions should be culturally competent to increase acceptance. Examples of culturally appropriate components include 1) the use of Black interventionists; 2) material/content featuring Black men and their real stories/testimonials; and also 3) the use of a community person as the face of the intervention.[68] These are surface structure adaptations. While surface level adaptations can be helpful, Resnicow suggests that using deep structure adaptations focused on cultural, social, historical, environmental and psychological factors will predict better outcomes.[69]

Feeding studies, like the Dietary Approaches to Stop Hypertension (DASH) study, refute the plausibility of a biologic response differential as the explanation of the imbalance of behavioral outcomes observed among Blacks and Whites, showing that when consuming the same dietary pattern, the same outcomes are possible. [70,71] Ard et al. suggest that psychosocial factors provide an alternative explanation for the differential outcomes.[70] These factors may influence adherence to behavioral interventions and maintenance of target healthy behaviors, and occur within the

context of the population's culture, resulting in the need for culturally appropriate approaches for behavior change.[70] Culturally appropriateness is defined as being in accordance with the cultural framework of the target population. To achieve cultural appropriateness or competency, recruitment and retention strategies, messages, data collection instruments and intervention delivery methods have been targets for cultural adaptation. [70] Considering a population's values, social practices or shared attitudes are cultural characteristics that may influence the psychosocial factors involved in weight management and improving weight-related behaviors.

In 1999, Resnicow called for research to determine the effectiveness of culturally adapted (sensitive) interventions, which involves incorporating important elements of a population's culture into existing programs.[69,69,72] Models for cultural adaptation have slowly been emerging. [70] Certain criteria have been identified to justify cultural adaptation of evidence-based interventions (EBI), including ineffective engagement of and reduced efficacy in the target population. [73] Based on the recruitment data and the weight loss results of previously reviewed trials, this appears true for Black men. However, in most weight loss interventions adapted to target Blacks, Black women have higher rates of enrollment; [74-77] interventions focusing on weight loss among Black men are limited.

Morgan et al., suggest the need for adapting interventions based on gender as a method to engage and retain men in weight loss interventions. Current interventions fail to consider psychological and socio-cultural gender differences in their strategies and program designs.[78] Interventions targeting Black men must address factors that influence them both as Black <u>and</u> as men. Identifying those salient factors which influence weight loss from the perspective of Black men may increase the effectiveness of weight loss interventions.

II.D.2.1. Family Involvement: A cultural adaption for Black men

Interdependence and collectivism: We are in this together

Family involvement has been used a strategy to facilitate behavior change in programs across health outcomes. Family members can influence an individual's psychological adjustment and management of illness, this includes adherence to treatment prescriptions.[79] Family members have been incorporated in substance abuse and misuse prevention, mental illness and diabetes prevention and treatment interventions. Family involvement has also been utilized as a source of naturally occurring social support; perceived social support has been found to be associated with improvements in the behavioral determinants of weight loss among Black men. [18] A review on the role of social support in diabetes management among Blacks, found that Blacks tend to rely more heavily than Whites on their informal social networks (e.g., family) and that enacted social support was significantly associated with improved diabetes management. One explanation for the reliance on family, is that traditionally, the Black family has been a source of social support and a core value in Black culture. [13] Involving a family member in interventions promoting behavior change (e.g. weight loss, diabetes management, substance abuse treatment/prevention) is an example of a cultural adaptation that addresses the social practices and values of Blacks.

Interdependence

Within families, the reliance on one another or having influence on another's life decisions or experiences is common; interdependence exists among people in close relationships. Bowen suggests that the connectedness and reactivity among families makes their interaction and functioning interdependent. Rusbult, who conceptualized interdependence among couples, suggests interdependence can be conceptualized in two ways: 1) the ways in which individuals in a close relationship influence each other's outcomes or 2) the structure of influence in the

relationship.[80] Outcomes, in this context, is described as the results of interaction in the form of motives, preferences, emotions and/or behaviors. Interdependence among families can be as simple as multiple family members assisting with yard work before an approaching storm or as complex as an elder child being responsible for caring for younger siblings when a parent is working and the other parent is incapacitated. In the second conceptualization, the structure of a relationship can display different patterns of interdependence. There are 4 patterns of interdependence: actor effects, partner effects, joint effects and mutual joint effects. These concepts will be described later. [80]

Collectivism

Within a culture, collectivists view people as interdependent. The sociocultural characteristic, collectivism, is a prominent practice or principle among Blacks and is manifested in the role family plays culturally.[81] Collectivists focus less on the advancement or care of the individual but on that of the group, emphasizing interdependence. In contrast, individualism is the belief that the needs of one person are more important than the needs of the group or whole society. Individualism and collectivism are present in all cultures because these values exist along a continuum; however, the weight placed on the importance of these ideals within a culture is useful in identifying cultural beliefs and practices.

The concept of collectivism within Black culture can be traced to West African traditions. Collectivistic practices have been preserved through generations, highlighted during slavery where resources and support were limited and internal support was only available. Survival during this era was a group effort rather than individual. Jim Crow laws also helped preserve the collectivistic attitude among Blacks; the Black family and Black church became central to Black America. This

historical context provides a foundation for the social practices of interdependence dominant in Black culture, and more importantly in this research, the Black family. [19]

In Black families, men and women disregard patriarchal gender roles and each work together collectively to handle tasks in both the public and private sphere of daily living, making the advancement or preservation of the household a priority. However, there exist differences based on socioeconomic status. [82] The patriarchal-based family structure places men as the primary and dominate figure in home; the men hold authority over the women and children and are the breadwinners and make the decisions. Typically, within Black families, this role is shared between men and women. Interestingly, Black men, however, still expect women to be nurturers in their families despite equally sharing the role as breadwinner. [83]

Interdependence within families is not unique to Black culture. Hispanic and Asian cultures also practice collectivism. Asian communities are arranged in intergenerational households, similar to Black families, echoing a sense of high collectivism on the collectivism-individualism spectrum. In some Asian countries, the self is viewed as interdependent and connected to others, and one considers group goals as primary, and personal beliefs, needs, and goals as secondary. Kim, Sherman and Taylor found that soliciting social support in not the norm among Asian and Asian Americans; one explanation is social support is more readily available due to the concern for the group as a whole. [84] This may be the case among Blacks as well.

Does family involvement equal social support?

What is social support?

Social relationships can effect health outcomes; social isolation can result in poorer outcomes compared to individuals who are socially connected. The association between social

connections and their influences on health has been studied across health behaviors and conditions in various populations, including mental health, diabetes management, and HIV prevention. Theoretically, social connections should yield the provision of social support. Social support is important for behavior change and it has been directly associated with both short-term and long-term weight loss. [85,86] The term social support is used for a broad range of concepts and is categorized as functional or structural support.[87] Structural support refers to the availability of an individual who could potentially provide support, for instance, spouses, other family members, friends, co-workers, social groups, and religious groups, creating a social relationship.[88] Some research refers to the links in these social relationships as an individual's social network. This link between two or more individuals gives rise to functional support: emotional, instrumental, informational and appraisal are examples of the categories for supportive behavior.[88] According to Glanz et al, emotional support refers to the provision of empathy, love, trust and caring. Often confused with emotional support, appraisal or esteem support is the provision of information used for self-evaluation purposes, for example, providing constructive feedback and affirmation. Instrumental support involves the provision of tangible aid and services that directly assist the person in need, and informational support is the provision of advice, suggestions, and information that a person can use to address problems.[88] Few behavioral weight loss interventions make distinctions between the types of social support that are most predictive of weight loss; social networks and integration are more commonly studied. The mechanisms that influence social relationships and how they relate to the provision social support requires further study.

Perceived and enacted social support

Perceived social support is defined as an individual's perception of supportive behaviors from people in their social network would be available if needed.[89] When studies have attempted

to increase or elicit social support in interventions, to evaluate the intervention's effect they commonly measure perceived social support. The perception of available social support and the actual provision of social support are not the same. Social links or connections should result in an exchange of social support; the provision of functional social support by the support provider is referred to support received or enacted social support. Enacted support should be more predictive of health outcomes and behaviors. Perceived support is suggested to be a critical component of social support in its stress-buffering effects on health, however, enacted support has been shown to be important in facilitating health behaviors. [90] Research recommends that when possible, both be measured.[91]

Social support effectiveness

Most social support interventions focus on increasing the quantity of the enacted social support, failing to address important characteristics of the support received e.g., quality of social support or the effectiveness of the support provided. Rini et al suggest the enacted support varies in its effectiveness and conceptualizes these influential factors in the social support effectiveness framework (SSE), where the social support provided is appraised on how well it matches the need's of the recipient. SSE takes into account the quality of support delivered, how well the support was delivered, if it was provided unsolicited and whether the support has a negative impact. Interventions seeking to enhance social support must focus both on quantity and quality and matching the attempts with the needs of the recipient. [92]

Familial Support/Involvement in weight loss family interventions

Familial support, a naturally occurring source of structural support, is an important predictor of weight loss attainment.[93] It is suggested social support from a family member should

help with the achievement and maintenance of weight control because of their shared lifestyle of interdependence. Family members, especially those residing in the same household, are more aware of the day-to -day behaviors of an individual. Family members can help model, reinforce and encourage strategies and behaviors for the target individual, providing functional support, that promote healthy eating and increased physical activity. In one study, participants were recruited with either 3 family members or friends and then randomly assigned to receive standard behavioral weight loss treatment or standard behavioral weight loss treatment enhanced with social support strategies. Participants recruited with family or friends and receiving the enhanced treatment had better retention and better weight loss. [94] The 2-year trial, SHARE (Supporting Healthy Activity and eating Right Everyday), was one of the first evaluations of family and friend support specifically for Blacks (female=89.9%). Weight loss was only significant when the supporting partner was also successful in losing weight. [17] In a review of 16 randomized control trials using family involvement to achieve weight management in an index participant, 70% of index participants were female in the 14 studies where gender was specified. In studies involving children, intervening on both parents and children for weight loss seems to yield positive results for children. Results from spousal involvement were inconsistent; 3 studies provided support for the effectiveness of spousal involvement and 3 studies did not. [95]

Spousal support: Results are inconsistent

A review examining male inclusion in randomized control trials of behavioral weight loss interventions described 244 studies. In those studies, only 27% of study participants were male and that percentage was only 14% in studies conducted in the United States were Black. No data was described for sex by ethnic group. Interestingly, only one study used a couple-based approach,

citing that men are not typically the primary grocery shoppers or cooks in their households and partners have been shown to influence men's health behaviors.[96]

Spousal support is a dimension of familial support. Current research suggests that romantic relationships influence weight management and may provide a potential unit of intervention. [97] Results from spousal studies specifically on weight management, defined as a spouse or significant other, have been inconsistent. Early studies have provided evidence of the benefit of enrolling participants with partners, citing that partners can assist in problem solving, help reinforce skills learned during treatment and also provide support during high risk situations. It is believed that partners can play a pivotal role in weight maintenance. Early studies by Brownell et al (1979) and Murphy et al (1979) show improvements in weight management compared to standard treatment, which does not include partner participation. [15] However, while some studies have shown that individuals lose more weight when a partner is enrolled, [98] others do not. [15] More interestingly, these studies rarely report findings by gender and weight loss achieved.

The table in Appendix A shows couple-based treatment in weight loss in both randomized and non-randomized trials. In the reviewed studies, the mere presence of significant other/partner in a weight loss program is not sufficient to significantly impact weight loss for study participants. Cooperative partners must be actively engaged in participant's weight loss efforts. From the studies reviewed, partners were instructed to complete a number of tasks including but not limited to 1) attendance at meetings/groups, 2) monitoring of participant's weight and behavior and in some cases monitoring of their own, 3) provide stimulus control and model exemplary behavior and 4) provide encouragement and reduce negative comments. Stimulus control and reinforcement were the foundation of early couple-based weight loss in the 1970s and 1980s. Researchers have suggested that the degree cooperative partners are implementing these tasks needs evaluation and

that it may provide an explanation for the inconsistent findings on the role of spousal support on weight loss.

Couple-based or spousal support approaches have been used for cardiovascular disease and diabetes mellitus management as well. Trief et al (2011) used the interdependence theory, a dyad based theory, as the foundation for a diabetes mellitus management couples-based pilot study promoting collaborative communication between the partners.[99] Dyad-centered strategies, that address relational or social factors, may produce more positive results in couple-based studies compared to more individual based theoretical frameworks used previously, where intrapersonal factors are targeted. Couple-based weight loss studies seem to have stopped in the early 1980's.

In the reviewed studies in Appendix A, women were primarily the index participants, with some studies recruiting specifically overweight women requiring husbands to sign contracts to assist their wives in losing weight. Gender differences exist in perceived support, enacted support and solicitation of support.[100] In this study, husbands' perceptions of support adequacy predicted marital satisfaction more than their perceptions of the amount of support amount, the opposite was true for wives. Husbands' provision of social support and wives' solicitation of supportive behaviors predicted marital satisfaction. Further research may elucidate different responses to weight loss support provided by a spouse by gender. This suggests different approaches to conceptualization and operationalization of social support may produce different outcomes based on gender in interventions. Additionally, more diverse samples are needed as couple based approaches may be more suitable for specific cultures based on cultural norms, like collectivism. Due to the importance of familial support in Black male culture, spousal support may enhance weight loss among Black men.

II.E. The role of spousal support among Black men in weight loss: The golden ticket?

The purpose of this research was to evaluate the role of spousal support as a strategy to enhance weight loss among Black men. The involvement of a spouse or romantic cohabiting partner serves several potential roles: 1) a source of recruitment, 2) a form of naturally existing cultural adaptation, 3) a source of intervening on social and environmental factors influencing weight loss and 4) an avenue to facilitate weight maintenance. Together with the development of a theoretically dyad-based intervention, spousal involvement and its effects on other factors like communication, commitment and social support as proposed by dyad theories like the interdependence theory, may provide a model for the management of other diseases among Black men and/or provide the overall approach to designing couple based health interventions.

II.F. Conceptual framework

This research is based on the theory of interdependence, the social cognitive theory and social support. Figure 2.1 below depicts the process through which weight loss is hypothesized to be enhanced among Black men. The standard behavioral intervention will target constructs traditionally used in weight loss programs e.g. improving self-efficacy and self-regulation, both of the social cognitive theory. The spousal support enhanced intervention will be enhanced with concepts from a dyadic centered framework, interdependence theory. As such, motivation to transform will lead to communal coping,[80] allowing the spouse to elicit and provide whichever form of social support e.g. instrumental, informational, appraisal and/or emotional, is required for their counterpart to lose weight.

II.F.1. Interdependence Theory: A Dyadic Approach

Interdependence was described previously. Interdependence theory seeks to understand the interaction between dyads and how the interaction influences behaviors, attitudes, motives

and preferences. This theory examines if and how couples influence an outcome, and most importantly, it takes into consideration the perspectives of both individuals. There are 4 patterns of how couples or significant others interact or display interdependence. The following descriptions are adapted from the Actor Partner Interdependence Model (APIM), which is a statistical approach. The first pattern, actor effects refer to each couple member influencing his or her own outcome, suggesting each is responsible for his or her own health and behavior. In this pattern, partner influence is minimal. Partner effects suggest the partner's influence is greater; in this case, each couple member influences their partner's outcomes, but not their own outcomes. Joint effects describe the combination of actor and partner effects, where an individual's outcome is influenced by them and their partner. Lastly, mutual joint effects refer to when both couple members experience joint effects. [80] Mutual joint effects is most effective in sustaining behavior change in close relationships.

To experience the benefits of mutual joint effects, couples must be in agreement about their partner's goals and commit to support and not inhibit their efforts. Lewis explains, couples must be cooperative. Couples-based weight loss interventions have used this term previously. Cooperative referred to, 1) a partner's willingness to participate alongside their partners in a program or 2) a partner's active involvement in achieving their partner's desired outcomes.[101,102] The latter explains the concept of transformation of motivation, where an individual's behavior and/or motivation shifts from a self-centered existence to a pro-relationship orientation. This involves both a cognitive and emotional shift in the direction that any health concerns of an individual are not theirs alone but impact each couple member. It is suggested that transformation of motivation is influenced by relationship roles and norms, functioning (e.g.

commitment, quality, or trust) and emotional and cognitive factors that occur during communication and interaction.[80]

Once transformation has occurred, couples can experience communal coping. Communal coping illustrates the mutual joint effects described previously; and is described as the shared acknowledgement of a health concern by a couple and joint effort to address and/or manage the threat. Communal coping occurs under certain conditions: 1) one or both couple members believe a joint effort is advantageous, needed or useful; 2) couple members communicate about the situation; and (c) the couple engages in cooperative action to solve the problem.[80,103,103] Lewis suggests transformation of motivation activates communal coping and that targeting communication and relationship functioning provide a path to activate transformation of motivation. Figure 2.2 illustrates the interdependence model of couple communal coping and behavior change. Figure 2.1 displays the role of this model in the proposed weight loss model for Black men.

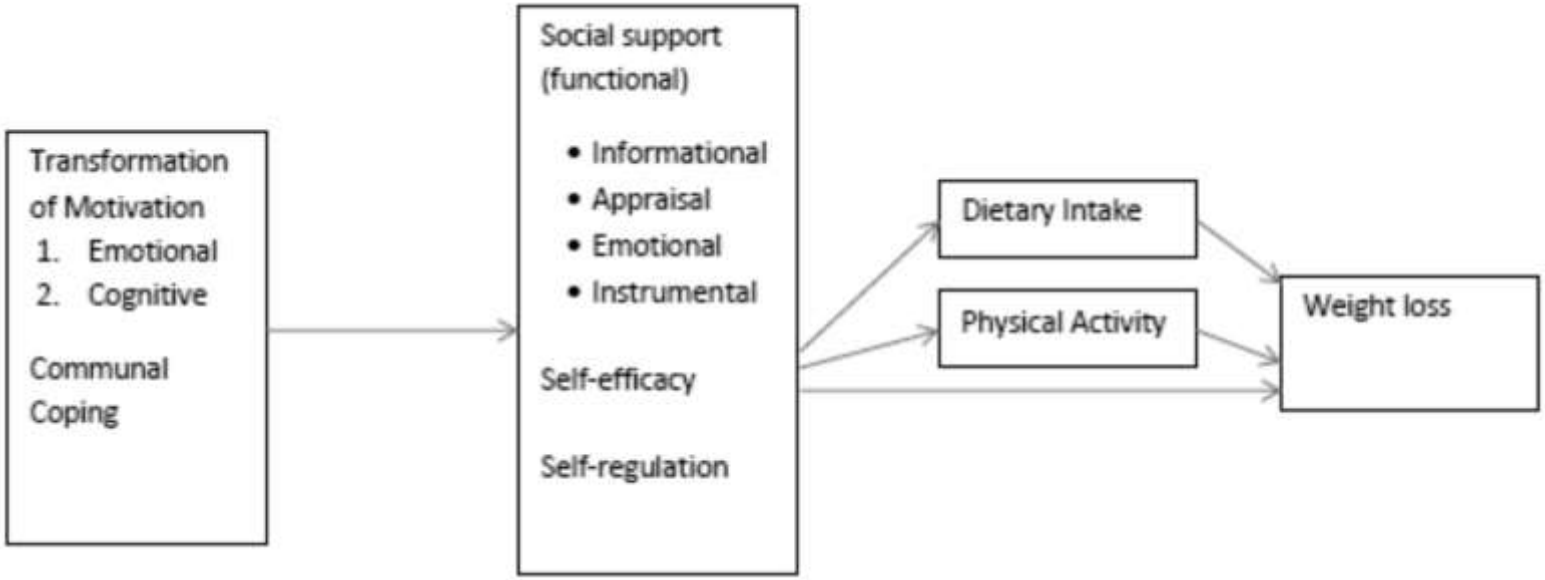

Figure 2.1. Conceptual Model

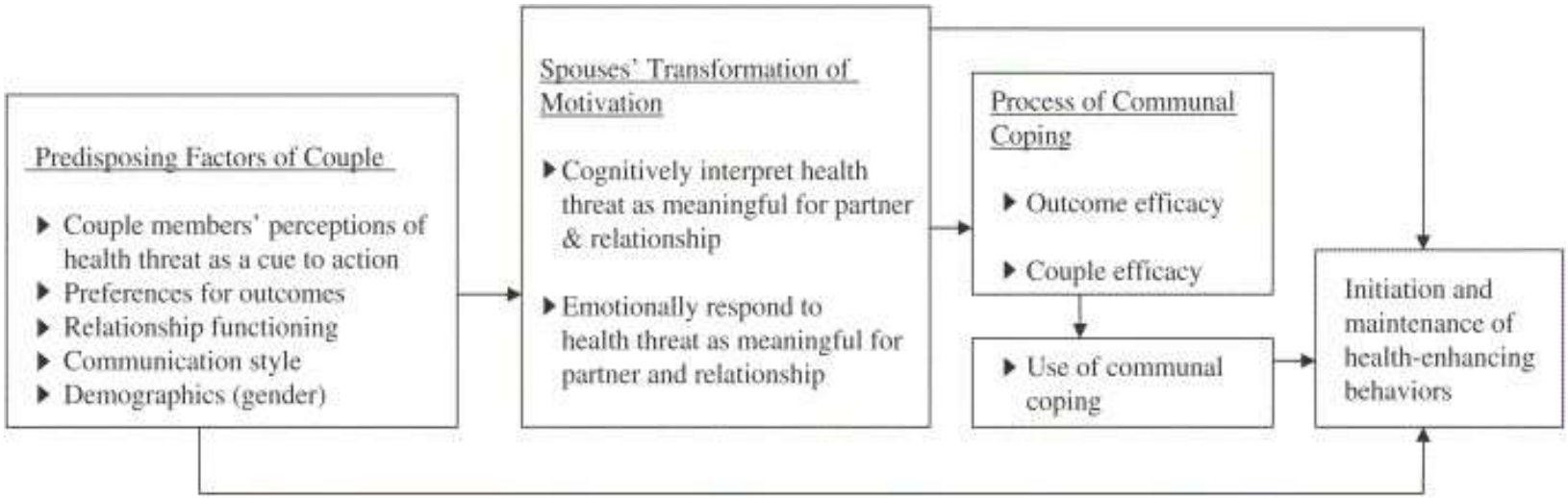

Figure 2.2 The Interdependence Model of Couple Communal Coping and Behavior Change

II.G. Summary and Implications

Identifying a strategy which enhances weight loss among Black men can reduce the prevalence of obesity-related diseases among this population. Additionally, the involvement of a spouse may produce the "Halo Effect," where the partner may experience weight loss as well. Thus, a couples-based approach may be more cost effective than intervening on the individual level. Ultimately, the effects have the potential to trickle down to the household, impacting childhood obesity prevalence.

CHAPTER III: METHODS

III.A. Overview of Together Eating & Activity Matters (TEAM)

This research consisted of two phases. Phase 1 involved qualitative formative research to investigate how couples who have successfully lost weight provided or elicited support from their own perspectives assessed using in depth interviews. Phase 2 consisted of a randomized controlled trial designed to test the feasibility and preliminary efficacy of a spousal support enhanced weight loss intervention on weight loss (kg) among Black men at 3 months compared to a traditional weight loss intervention. TEAM was developed using constructs from Interdependence Theory, Social Cognitive Theory, and social support.

III.B Phase I: Formative Research

Purpose: To determine the role of spousal support in achieving successful weight loss among Black heterosexual couples from their own perspectives using in-depth interviews of Black couples.

Rationale: To develop a spousal support-enhanced weight loss intervention specifically for Black men, with the appropriate types of social support needed to be identified to design and develop the spousal support enhanced program. In-depth interviews provided the opportunity to identify these supportive factors deemed effective in facilitating weight loss from couples where one or both had previously successfully lost weight. These factors were the basis for the adaptation of a standard behavioral weight loss intervention. In-depth interviews provided detailed information on an individual's and their partner's personal experiences on pre-identified topics.

Sample: Ten self-identified Black cohabitating couples residing in Wake, Orange and Durham counties in North Carolina were recruited to participate in one in-depth interview. Black couples where the male successfully lost weight were recruited in greater numbers. Participants and/or their partners had intentionally lost at least 5% of their initial body weight 6 months prior to interviews. Each partner provided informed consent.

Recruitment: Participants were recruited from community organizations, churches and fraternities through brochures, listservs, flyers, and word of mouth. A $20 check was provided as compensation for couples after both partners were interviewed.

In-depth Interviews: Ten couples were recruited, totaling 20 individual phone interviews. The experienced interviewer **created natural involvement** from the interviewee at the beginning of the interview (building rapport, establishing a non-judgmental environment, preserving confidentially and trust and relaying genuine interest). Throughout the interviews, the interviewer encouraged **conversational competence** (using appropriate language to relay the importance of the information being gathered) to **show understanding**, to **gather facts and descriptions**, and to **tone down the emotional level** by reassuring confidentiality. The interviewer used a semi-structured interview guide that explored the topics related to their personal experiences with weight loss, support, and preferences. Interviews took place over the phone from UNC in a location that ensured confidentiality. Each in-depth interview lasted approximately 60-90 minutes in duration.

In-depth Interview Guides: Semi-structured in-depth interview guides were used to conduct interviews consisting of multiple question types beginning with more general questions about weight loss to more specific questions regarding personal experiences, more specifically experiences of supportive and unsupportive behavior. Below are themes that were covered in the

in-depth interview guide. Additional interview probes were added to the guide after reviewing field notes from completed interviews to ensure the intended information was gathered.

1) The importance of maintaining a healthy weight/weight loss

2) The role of social support in weight management/weight loss; more specifically the use of spousal support and the types most effective in weight loss: instrumental, emotional, appraisal, and informational.

3) Individual experiences of maintaining a healthy weight/weight loss as a couple.

In-depth Interview Data Collection: Interviews were recorded using two digital recorders recording. The purpose of the recorder was explained and permission was granted to record prior to conducting the interview. The interviewer took field notes during the interview. Demographic information was collected prior to beginning the interview.

In-depth interview Analysis: All interviews were transcribed by four research assistances trained in qualitative methods. Deidentified memos were created of each transcript, detailing demographic information and important responses from interviewees. A code book was developed from the transcripts of the interviews, reviews of fieldnotes and memos of each transcripts by member of the research team. Transcripts were double coded using Dedoose Qualitative software. The codebook was revised after 2 transcripts were coded. The two members of the research team created summary sheets of selected themes, providing illustrative examples. From these summary sheets, themes were displayed used matrices to explore the relationship between gathered information.

III.C. Phase II: Intervention Study

Purpose: To determine the feasibility and preliminary efficacy of a 3-month behavioral weight loss program with enhanced spousal support on weight loss (kg) among Black men compared to a traditional weight loss intervention.

Intervention Overview: Black men who were overweight and obese were recruited with a spouse/intimate partner to enroll in a 3 month two-arm randomized pilot weight loss intervention. The two arms included a spousal support enhanced arm and a traditional weight loss arm. The intervention was delivered face-to-face in group sessions and in electronic formats and provided tools to facilitate weight loss through reduced calories intake, improved diet quality, increased physical activity and behavior modification. The intervention was delivered via several components: group discussions, website/mobile applications, and emails. Participants in the enhanced intervention attended group sessions with their partners and participated in activities to promote their partner's participation in their weight loss efforts. Participants in the traditional group participated alone. Changes in participant's weight, the primary outcome, from baseline to post intervention was measured. Demographic information, daily dietary intake, weekly minutes of moderate to vigorous physical activity, blood pressure, waist circumference and changes in psychosocial factors (e.g., self-regulation, self-efficacy, social support and relationship functioning) were measured at baseline and post intervention for male participants. Change in female's weight was measured also.

Conceptual Framework: The **T**ogether **E**ating and **A**ctivity **M**atters (TEAM) Program was developed using interdependence theory, social cognitive theory and social support research. The conceptual model previously discussed depicts the relationships between the theoretical constructs. The traditional weight loss program targeting social cognitive constructs included

self-monitoring, goal setting, and skills practice. The enhanced program additionally targeted constructs from interdependence theory and social support research. A pre-treatment Couples Skills Training session with an accompanying workbook was a component of the enhanced intervention. It focused on communication and commitment as key factors in increasing motivation for behavior change as a unit as opposed to on an individual level. These concepts were addressed throughout the enhanced program, providing the tools participants and their partners needed to transformation motivation and communally cope to facilitate solicitation and provision of social support for weight loss.

Sample The target population for the TEAM study was self-identified Black men aged 18-65 BMI 25-45 kg/m^2 and their partners, defined as a spouse or cohabiting female intimate partner. The age criteria for this study was been selected: 1) because >60% Black men between age 20 and 60 are overweight or obese,[23] 2) to increase the number of couples eligible to participate in the study and (3) to minimize the risk of injury in older men due to physical activity prescriptions. The BMI criterion was selected because other weight loss therapies are more effective long term for higher BMIs.[95,12]

The inclusion of both married and cohabiting couples acknowledged the growing trend of cohabitation in the US and it was also meant to increase the number of eligible participants, who may have been excluded if marriage was a criterion. Durham, Orange and Wake counties have approximately 265,847 households with a spouse or an unmarried partner present.[104] Based on our knowledge, demographic data are unavailable on these households. In 2012, 95,770 Black men resided in the three counties mentioned previously. Data were unavailable on the marital or cohabiting status for this population in North Carolina statewide or locally. Nationwide data suggest 58% of Black men have cohabitated and 31% of married adults in the US are Black men.

Weekly access to the internet and/or a mobile phone with internet capabilities was required to participate in the study; participants tracked their behaviors and weight loss through an online application, received weekly feedback on their progress via email and received weekly lessons through email.

Participants were excluded if they were taking any medications that affected weight, e.g., medications with high lithium levels, potent antihistamine activity, high corticosteroid levels, or that stimulate insulin production. These medications can cause weight gain and would interfere with the primary outcome. Participants were also excluded if they were experiencing any contraindications that affect the primary outcome of the study, e.g., gallstones and electrolyte disorders. Other exclusions included current participation in any other weight loss program, or recent weight loss of 10 lbs or more.

Setting The study was coordinated out of the Weight Research Lab at the University of North Carolina (UNC) at Chapel Hill under the direction of Dr. Deborah F. Tate.

Recruitment: Flyers were posted, emailed, and distributed in churches, universities, community centers, libraries and on work place community boards. Established connections within the target communities such as businesses (barbershops, retail stores) and organizations (local historically black fraternities) were used as gate keepers to the target population, local historically black sororities (recruitment through a female significant other) were also contacted. The research team attended local events and meetings, and gave presentations to recruit participants. Participants were directed to the recruitment website for more information and completed an online screener. Eligible participants and their partners were asked to give informed consent online and were invited to an orientation. Consented participants attended an orientation session and completed baseline measurements.

Randomization and Retention: Couples were randomized following the orientation session, after baseline measurements had been collected. Participants in each group received one $40 check (per couple) for attending the 3-month follow-up assessment. Contact information on multiple family members was collected to track changes in contact information for participant. Participants received reminder calls and emails to remind them to complete tracking information and to attend group sessions/assessments.

Couples Skills Training Participants in the enhanced group were invited to a pre-session before weight loss treatment. Participants and their partners attended a 2-hour pre-session covering topics important in increasing collaborative problem solving and communication targeting the constructs of transformation of motivation and communal coping. The training addressed confirming and strengthening commitment, improving communication skills and learning to give and receive support. Below are the objectives of the Couples Skills Training component. In the training, each topic was presented and participants and their partners participated in skill building activities for reinforcement.

Table 3.1 Intervention Components, Concepts/Constructs Targeted, Method and Strategies

Intervention Component	Enhanced	Standard	Concept/Construct Targeted	Method	Strategy
Couples Skills Training	X	-	Motivation of Transformation	**MT:** Communication	Couples participate in partner activities to build communication skills & complete a workbook with information on improving communication skills (Listener-Speaker) and activities
	X	-		**MT:** Commitment	Couples sign a Commitment Contract committing to each other, weight loss and the TEAM program
	X	-		**MT:** Personalize risk (change awareness and risk perception)	Couples complete a Couple/Health Assessment to personalize their health risks and evaluate their couple coping skills, i.e., communication, problem solving, etc
	X	-		**MT:** Scenario-based risk information (change awareness and risk perception)	Couples are introduced to a fictional couple or man with similar health profile
	X	-	Communal Coping	**CC**: Problem Coping Strategy (Cognitive)	Couples participate in partner activities to build coping skills & complete a workbook

	X	-		**CC**: Emotional Coping Strategy (proactive, anticipatory, preventive, reactive-downward comparison, avoidance, support seeking)	Couples participate in partner activities to build coping skills & complete a workbook
	X	-	Social Support	**SS:** Communication	Couples participate in scenario activities requiring using communication skills
	X	-		**SS**: Problem Solving	Couples participate in scenario activities requiring using problem solving
	X	-		**SS**: Skills Training	Couples participate in workshop practicing providing various forms of support in real life scenarios
	X	-		**SS**: Facilitation	Workshop
Group sessions					
with partner	X	-	Motivation of Transformation	**MT:** Fear Arousal - Scenario-based risk information (change awareness and risk perception)	Couples participate in group scenario based activities focused on diet, exercise and weight loss topics
	X	-	Communal Coping	**CC:** Problem Coping Strategy (Cognitive)	Couples participate in group scenario based activities focused on diet, exercise and weight loss topics
	X	-		**CC:** Emotional Coping Strategy (proactive,	Couples participate in group scenario based activities

			anticipatory, preventive, reactive-downward comparison, avoidance, support seeking)	focused on diet, exercise and weight loss topics
X	X	Self- Efficacy	**SE:** Mastery experience	Participants practice skills and techniques during session i.e. self- monitoring, refusal, reward, goal setting
X	X		**SE:** Modeling	Group facilitator presents material providing examples of desired behaviors i.e. lecture, video, speak guest. Group discussion among peers provides opportunity to display modeled behavior
X	X		**SE:** Verbal Persuasion	Group facilitator presents material highlighting desired behavior. Group discussion among peers provides opportunity to discuss success stories/experiences.
X	X		**SE:** Guided Practice	Participants practice skills and techniques during session under the supervision/guidance of trained staff.
X	X	Self-Regulation	**SR:** Goal setting	Participants set diet, activity and physical activity goals during session. (Can share with group if desired-

						accountability, reinforcement)
		X	X		**SR:** Enlisting Social support	Participants participate in scenario based activities requiring decisions on when, how and what support to provide.
		X	-	Social Support	**SS:** Persuasive Communication	Participants attending with partners will
		X	-		**SS:** Modeling	Lecture/Discussion
		X	-		**SS**: Problem Solving	Activities
		X	-		**SS**: Skills Training	Participants learn skills with partners
		X	-		**SS**: Facilitation	Participants participate with partners
Notebook:						
12 weekly behavioral lessons enhanced with support tips, examples (inserts	X		X	Behavioral Capability	**BC**: Facilitation	Participants are provided with a reference tool comprised of all lessons, techniques, tips, etc to be successful in weight loss attempt and maintenance
	X			Social Support	**SS**: Role modeling or Behavioral Journalism	Participants will witness testimonials from previous weight loss participants
Tailored emails						

Tailored feedback on weight loss progress	X	X	Reinforcement	**R:** Feedback	Participants receive weekly emails providing feedback on their previous week's diet, activity and weight loss goal
Tailored feedback on dietary and physical activity behaviors	X	X	Self- Regulation	**SR:** Feedback	Participants receive weekly emails providing feedback on their previous week's diet, activity and weight loss goal
Recommendations	X	X	Social Support	**SS:** Persuasive Communication	
Diary (Food and physical activity)- online/mobile					
MyFitnessPal	X	X	Self- Efficacy	**SE:** Mastery Experience	Participants record diet and activity daily on electronic diary
	X	X	Self -Regulation	**SR:** Self -monitoring	Participants record diet and activity daily on electronic diary

Table 3.2 Couples Skills Training Objectives

Topics	Overview	Objectives
Topic 1: Commitment	Couples are introduced to our couple-enhanced intervention for weight loss, are oriented to how weight management is affected by peer relationship functioning, and are led in a discussion of their commitment to each other and the program.	1. Describe the importance of partner relationships and health status 2. Define commitment 3. Confirm commitment to relationship and weight loss program 4. Identify ways to strengthen commitment
Topic 2: Communication	Couples are taught the importance of communication in a relationship; focusing on listener-speaker skills, non-verbal communication and identifying go-to techniques/strategies for Communication toolbox	1.Define supportive communication 2. Understand how important attitude is for successful communications 3. Identify and practice speaker skills 4. Identify and practice listener skills by actively listening to others and asking effective questions to ensure understanding 5.Make deposits in the Emotional Bank Account 6. Identify non-verbal communication 7. Develop a communication tool kit
Topic 3: Social Support/Control	Couples will learn how to be supportive to each other emphasizing effective social support.	1. Identify a supportive and non-supportive partner in different circumstances 2. Identify strategies to support their partner from their perspective 3. Identify strategies to cope with an unsupportive partner

Participants received a workbook that was used during the sessions and used a reference at home with their partner after the training. The workbook consisted of 3 modules identical to the topic covered in the training: commitment, communication and social support/control. The modules included the significance of the topics covered, the scientific evidence supporting the association with weight loss, exercises to be completed with partner, character highlight and tips.

Group Sessions Each intervention group attended group sessions based on standard weight loss programs. Enhanced group participants attended the face-to- face group sessions with their partner. By attending together, partners addressed weight loss together, acknowledged the severity of the problem, identified strategies to achieve weight loss and committed to implement the plan together. Standard group participants attended alone. Participants attended weekly group sessions for weeks 1-4, bi-weekly sessions for weeks 5-8 and one during weeks 9-12 for approximately 60 minutes.

Diet and physical activity plans were provided during the first session based on baseline weight and self-reported minutes of moderate to vigorous activity. Upon arrival to each group sessions, participants were weighed in a private area. Group feedback on progress was provided at the beginning of each session and participants were provided the opportunity to discussion the past week's success and failures related to their weight and weight related goals. [94] Appendix B outlines the topics that were presented each week. Sessions included group activities to be completed either with or without partner. Open discussions provided the opportunity for participants to problem solve and strategize together on the hypothetical/real-life problem situations. Participants were also given the opportunity to receive additional feedback on their self-monitoring records i.e., diet and physical activity plan. Each session concluded with setting SMART goals for participant's diet and physical activity plans.

Notebook Each participant received a notebook that included an overview of the program, a section to collect the behavioral lessons emailed each week, diet and physical activity plans, printed instructions for using MyFitnessPal, and the digital scale and section to collect weekly feedback. The enhanced program notebook included an additional section to collect weekly at-home couple's activities.

Overview The overview introduced the participant to the program and detailed how the components would result in clinically significant weight loss over the next 12 weeks. This section included the importance of the research, the expectations of the participants, and instructions to the participating on how to properly use the program to achieve weight loss.

Behavioral Lessons One of the 12 core lessons based on evidence-based programs was provided weekly both in email and printed formats. Participants were encouraged to keep lessons in the notebook to be reviewed throughout the duration of the program. Behavioral core topics included but were not limited to the list in Appendix B. [38] These topics focused on behavioral techniques to help participants modify eating and physical activity habits.

Enhanced: Lessons provided to participants receiving the enhanced treatment included the content described above in addition to a section entitled, "Just the Two of Us." This section highlighted ways the participant and their partner could put into action the topic for that week.

Diet and Physical Activity Plans Participants were instructed to self-monitor all calories using MyFitnessPal eating the foods of their choice. Participants weighing less than 200 lb (90.7 kg) were instructed to eat no more than 1,200 kcal/day, with 22 grams of fat (20% fat diet). Participants weighing more than 200 lb (90.7 kg) were instructed to eat no more than 1,500 kcal/day, with 33 grams of fat. [94] Participants were also given sample meal plans and a calorie guide.

Participants were given a physical activity plan based on their current physical activity level i.e., if a participant was active less than 60 minutes per week of moderate-vigorous physical activity, they began with Plan A until they reached 60 minutes of physical activity per week and then changed to Plan B, the Somewhat Active Plan. The overall goal was 200 minutes per week of moderate-vigorous physical activity.

Tailored Emails Participants received a tailored email providing feedback on their weekly weight loss, cumulative weight loss, and diet and physical activity each week. The messages provided evaluative feedback on the participant's progress and current behaviors, and suggestions for moving forward to reinforce the program's core content. Tailored emails were used because it was hypothesized there would be significant variability in the target audience on key determinants e.g. diet and physical activity, affecting weight loss.[37] It was further hypothesized that personalizing information would enhance its relevance and would increase the probability of desired change prescribed by the program. These emails contain evaluative feedback on weight loss progress and adherence to the diet and physical activity plan, "Great job!" You reached your physical activity goal this week by participating in >60 minutes of physical activity in the past 7 days". The evaluative feedback was coupled with content matching, meaning the email contained direct messages to individuals' status on key theoretical determinants of the behavior of interest. A message algorithm was created to address the potential scenarios for each week. Messages were framed as being sent from the study's principal investigator. [105]

Diary (Food and physical activity)-online/mobile: Detailed instructions were provided during the orientation on how to use MyFitnessPal and also were provided in the notebook as a reference.

Participants in each comparison group self-monitored both caloric intake and physical activity with dairies completed daily, recording the time (breakfast, lunch, dinner, snack), type, amount of food eaten, and the type and minutes spent being physically active. Participants created a profile on MyFitnessPal.com, a free food and physical activity diary available online and as a mobile application (dual platform). An online diary was thought to reduce some of the barriers of paper diaries, for example, the task of carry the diary everywhere throughout the day and the required additional physical space for storage. MyFitnessPal has been used in several research studies, is available in Apple store and Google Play and is seen as the top free alternative to Weight Watchers offering similar features.[106] Participants provide their unique login and password to study staff to allow access to diary information. Reports and charts of participant's progress from the past 7 days to the past year were available to participants through MyFitnessPal.

Measurement

Data Collection and Procedures

Data was collected at baseline, 6 and 12 weeks for the primary outcome, weight (kg). The protocol for obtaining weight, height and weight circumference was adapted from the Study of Novel Approaches to Prevention (SNAP) Program.[107]

Demographics

Demographic data were collected at baseline to describe the study sample including age, household status, educational attainment, income, occupation, and current marital status.

Primary Outcome

The primary outcome was weight loss (kg) or weight change from baseline to post intervention (3 months). Body weight(kg) expressed as a continuous variable was collected on a

digital scale at the UNC Weight Research Center at baseline and at 6 and 12 weeks wearing light clothing and no shoes. Two readings were recorded to the nearest 0.1 kg at time of assessment. If two measurements were not within 0.2 kg, a third measure was taken.

Secondary Outcomes

Physical Outcomes

Height: Height was measured to calculate body mass index (BMI). Height was measured on a wall-mounted stadiometer at the UNC Weight Research Center. Participants were asked to stand erect with back parallel to the vertical mounted measure scale, looking straight ahead and head in the Frankfort horizontal plane. Two measurements were recorded to the nearest 0.5 cm. If the first two measurements were not within 0.5 cm, a third measure was obtained.

Body Mass Index (BMI) BMI, a measure of adiposity (body fat), was calculated from height and weight (a ratio of height over weight squared). BMI was not used as an indicator of change in body composition but was used to communicate potential health risk based on BMI category to participants.

Waist Circumference Waist circumference, an indicator of subcutaneous and visceral fat located around the abdominal region and associated with cardiovascular disease, was measured using a Gullick II tape measure.

Blood Pressure Fasting blood pressure was taking using a GE Dinamap ProCare Patient Monitor Blood Pressure Temp SPO2 recorder. Participants rested 5 minutes prior to measurements and were instructed to refrain from using cellular phones and/or reading. A series of 3 measurements were taken with one minute a part.

Behavioral Outcomes

Diet (Caloric Intake) Typical diet was measured by assessing caloric intake at baseline and post intervention using repeat 24-hour multiple pass recalls (MPR). The U.S. Department of Agriculture's (USDA) Automated Multiple-Pass Method (AMPM) has been used in the U.S. National Health and Nutrition Examination Survey (NHANES), the country's only nationally representative dietary survey. A web-based version was used in this study, the Automated Self-Administered 24-hour dietary recall (ASA) developed at the National Cancer Institute (NCI). The assessment tool used multimedia visual cues, prompts, and an animated character to assist participants when completing the recall. Participants were provided unique login and password. Participants were prompted to complete 2 recalls at both baseline and post intervention. At least 2 recalls are recommended to obtain dietary intake on the individual level if 3 recalls are not feasible. One recall was for a weekday and the other for a weekend day. Recalls were appropriate for assessing dietary intake during a short time period of recall. Staff were available to answer questions and troubleshoot any problems regarding the online software for the participants. [108,109]

Eating Behavior Participants were encouraged to increase eating behaviors associated with weight loss e.g., monitoring the quantity of food eaten, how quickly food is eaten and other eating behaviors associated with weight management. Eating Behavior Inventory (EBI) is a validated questionnaire used by researchers to measure the adoption of these types of behaviors and has been shown to be sensitive to behavioral weight loss interventions. Changes in EBI scores have been shown to be positively correlated with the amount of weight loss. Studies involving spouses in weight loss found correlation with weight loss with EBI score change. [110,111] The EBI was administered at baseline and post intervention to participants to assess change in the eating behavior strategies.

Physical Activity Weekly energy expenditure and current level of physical activity measured as minutes of moderate to vigorous physical activity (MVPA) was assessed using the Paffenbarger Physical Activity Questionnaire (PAF) at baseline and post-intervention. The PAF assessed planned and lifestyle associated physical activity. Items included time spent walking, number of stairs climbed and types and duration of sports and recreational activity from the previous "usual" week. The PAF was used to calculate the total energy expenditure for the past week; MVPA was also calculated using the physical activity inventory associated with the questionnaire. The PAF was developed to assess physical activity in an all-male population.[112,113]

Psychosocial Measures

Spousal Support - Exposure Variable- operationalized as social support The Social Support Effectiveness–Questionnaire[92] assessed three types of support (emotional, informational, instrumental). Participants reported quantity of support provided compared to the amount needed, the extent to which the participant wished the support provided had been different somehow, the extent to which support was perceived skillfully, the difficulty in receiving it, and whether the support was solicited or not. This measure included an additional 10 items to measure unintended negative consequences of receiving support. The 25-item questionnaire's total scores ranged from 0 to 80, with higher scores indicating more effective support during that time period. This questionnaire was administered to participants in both groups at baseline, 6 and 12 weeks.

Social Support for Eating: The Social Support and Eating Habits Survey (SSEH) measured social support specific health related eating. The survey contained 10 items and asked questions about encouragement and discouragement for eating behaviors from family and friends

but only family support was assessed. This questionnaire was administered to participants in both groups at baseline, 6 and 12 weeks.

Social Support for Physical Activity: Social Support and Exercise Survey (SSE) measured enacted social support specific to exercise behaviors. The survey contained 13 items and asked questions regarding the level of support for exercise from family and friends. Family support was only assessed. This questionnaire was administered to participants in both groups at baseline, 6, and 12 weeks. [114]

Self-Efficacy: The Weight Efficacy Life-Style Questionnaire (WEL) measured individuals' perceptions of their ability to control their weight related to eating patterns and attitudes at baseline and post intervention. The 20-item survey assessed self-efficacy in five situational factors: Negative Emotions, Availability, Social Pressure, Physical Discomfort, and Positive Activities. Each subscale consisted of items with a 10-point scale ranging from 0 (not confident) to 9 (very confident), with higher scores indicating greater self-efficacy. Scale scores were calculated by adding the four items in each scale, and a total WEL score provides an overall index of self-efficacy.

Participants in both arms completed the Physical Activity: Confidence section of the Patient-centered Assessment & Counseling for Exercise (PACE+) Adult Diet and Physical Activity Measure. It assessed an individual's confidence in participating in regular exercise or physical activity in different situations at baseline and post intervention. The questionnaire section consists of 6 items with a scale from 1 (not at all confident) to 6 (extremely confident).[115]

Self-Regulation: The Eating Behaviors Inventory (EBI)[116] measure includes self-regulation items theoretically associated with weight loss. The inventory consists of 26 items

with a scale from 1(Never/ Hardly ever) to 6 (Always or almost always). Changes in self-regulation were evaluated from baseline to post intervention.

Transformation of Motivation/Communal Coping Scales from the Family Context questionnaire[13] from the Weight Loss Maintenance Trial was used to assess couple dynamics. The themes assessed through the questionnaire were consistent with the constructs necessary to transform motivation and increase communal coping amongst couples; the McMaster Family Assessment Device focused on assessing family communication (six item) and problem solving (five items); the ten-item scale from the Family Adaptability and Cohesion Evaluation Scale III instrument assessing family cohesion; the Family Emotional Involvement and Criticism Scale measuring family emotional involvement (seven items) and perceived criticism (seven items); and Family composition (2 items). This questionnaire was used in a highly educated older population consisting of both cohabitating and married partner where 75% self-identified as Black.[13]

Other Measures

Partner's Weight Body weight (kg) was collected on partners in both arms at baseline and post intervention.

Marital Satisfaction Locke Wallace Marital Adjustment[117] test was a 15-item scale that measured marital satisfaction (represented as a sum score). Higher scores indicated greater satisfaction. The test contained one global adjustment questions, eight possible disagreement questions, and six questions measuring conflict resolution, cohesion and communication.[117]

Process Measures

Adherence: Adherence to study components by participants (and their partners) was measured by 1) recording attendance at group sessions and 2) tracking frequency of using MyFitnessPal.

Self –Monitoring: Participants monitored dietary intake and physical activity using the MyFitnessPal mobile application/website. As stated previously, participants provided account login information to research staff. Research staff recorded the frequency of monitoring for both behaviors, providing an objective measure.

CHAPTER IV: WEIGHT LOSS AMONG BLACK COUPLES: A QUALTITATIVE ANALYSIS OF SALIENT FACTORS THAT INFLUENCE AND SUPPOT WEIGHT LOSS FROM PERSONAL PERSPECTIVES AND EXPERIENCES

IV.A. Introduction

Obesity is a significant health problem in the United States, where the prevalence of obesity in Blacks is among the highest in the United States (48.5%).[118] Many of the top preventable diseases in the United States are obesity related. Blacks, for example, have the second highest rates of diabetes in the US.[119] Moreover, over 40 percent of both Black men and women have high blood pressure[120] and Blacks have one of the highest rates of deaths caused by heart disease (CDC, 2013). The causes of obesity are complex. Participation in behavioral weight loss programs, however, could help prevent or reduce weight-related health problems.

Comprehensive face-to-face behavioral weight loss programs are considered among the most effective treatments for obesity.[44] Treatment typically consists of diet and physical activity goals with behavioral and cognitive techniques to promote self-regulation and behavior changes. Many of these components target intrapersonal factors, however, research shows benefits of addressing social and interpersonal influences as well.

Social relationships affect health outcomes, for example, mental health,[121] progression of cardiovascular disease,[122] cancer and cancer recovery,[123] and health behaviors.[124,125,125,125,125] Research suggests that relationships, like those that involve family, can play an important role in

an individual's health.[126] Family is an important value in Black culture and has been used in weight loss interventions as a source of social support.[16,17] In adult-only family-based weight loss interventions, enrolled family members are typically romantic partners.[95] However, interventions involving spouses or romantic partners have yielded inconsistent results.[15]

One explanation for inconsistent results is the lack of a clear role for support partners. Partners, as sources of naturally occurring social support, may be critical to initial weight loss and maintenance because they extend support outside of the clinical setting. Partners can provide instrumental or tangible, informational, emotional and appraisal support to meet the needs of weight losers. Interventions have suggested tasks for partners in an effort to support weight loss (e.g., attendance at group sessions, track partner's progress); however, specific supportive behaviors have not been reported. Retrospective studies may be useful in identifying examples of what partners did, or did not do, to help their partners lose weight.[15]

To our knowledge, no studies have explored the type of social support needed to support weight loss among Black couples. The study sought to determine the role of spousal support in achieving successful weight loss among both Black men and women by identifying the salient factors (e.g., motivators, facilitators/barriers, preferences, and personal experiences) from their own individual perspectives using in-depth interviews to inform the development of TEAM (Together Eat & Activity Matter), a spousal support weight loss intervention for Black men.

IV.B. Methods

We conducted in-depth semi-structured interviews between June 2015 to March 2016 to gain a better understanding of Black heterosexual couples' perceptions and experiences during weight loss and weight related behaviors (e.g., eating and physical activity). A purposive sample of 10 Black heterosexual couples (10 men and 10 women) from 3 counties in North Carolina (Wake, Durham and Orange) participated in the individual telephone interviews (Table 4.1). The primary purpose of the interviews was to collect formative data to inform the design of a couples based intervention aimed at using spousal support to facilitate weight loss among Blacks. The study protocol was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill.

Recruitment

Invitations to participate in the interviews were emailed to fitness centers, university listservs, local graduate/alumni chapters of historically Black fraternities and sororities and social media outlets (Facebook). In person recruitment was conducted at area shopping centers, churches, fitness centers, grocery stores and restaurants. Potential participants completed an online screener available on the study website. Potential participants were eligible if they were a self-identified Black couple where one or both had intentionally lost 5 to 10% of their body weight in the last 6 months. Couples received a $20 check as an incentive after both partners completed separate phone interviews.

Data Collection

Couples provided separate informed consent before being interviewed. Each member of the couples was interviewed separately over the phone for 60-90 minutes. One experienced investigator (CA) conducted all interviews to ensure consistency in data collection. Interviews were recorded using a digital recorder and the audio files were uploaded to a secure server at the research site. The interviewer used a semi-structured interview guide consisting of open-ended questions exploring topics related to personal beliefs, motivation, facilitators and barriers, social support, and personal experiences with weight loss. Interviews questions and prompts were developed from previous research, extensive literature review and from adapted questionnaires.[80,127] Examples of interview prompts are found in Table 4.2. Data saturation was reached after interviewing twenty participants, when no new themes emerged from the interviews.

Analysis

Interviews were transcribed verbatim by research assistants. Three members of the research team (CA, LA, HL) created codes based on reflexive memos of all transcripts, research questions and prior knowledge from weight management research resulting in hierarchical coding:17 preliminary parent codes (e.g., higher level code), 20 child codes (e.g., subordinate/lower level code) and 46 second generation codes (e.g., lowest level code) with operational definitions. Using this starting list of codes, two members of the research team selected and independently coded two study transcripts using Dedoose (an online qualitative software management system). Team members (CA, HA, HL) met to discuss and reconcile coding and fine-tune coding definitions and decision rules. Codes were reorganized to 19 parent

codes, 30 child codes and 22 second generation codes. The remaining (n=18) transcripts were coded independently by two team members (JR, ES). Matrices were created to display relationships between codes and summary reports were created. Table 4.3 presents the 19 parent codes. In this paper, we will discuss the 10 parent codes in detail that provide the most relevant information in identifying the types of spousal support associated with achieving successful weight loss. The remaining nine parent codes are not discussed in this analysis. Below are the emergent themes for each parent code.

IV.C. Results

Participant Demographics

Table 4.1 describes the demographic characteristic of participants in this study. Participants were on average 40 years of age and weighed 95.9±25.8 kg. Of the participants who reported losing weight in the past 6 months (65%), the average weight loss was 7.6±2.8 kg. Three fourths (75%) had at least some college education, and 90% were employed full-time, with 85% reporting an annual household income house of $50,000 or greater. Couples reported being in a committed relationship for 12.4±7.5 years and had 2.2±2.1 children.

Importance of maintaining a healthy weight/weight loss

From the accounts of couples in this study, maintaining optimal daily functioning or life preservation, reducing risk of developing an illness, and having self-confidence in physical appearance were reported as the main reasons individuals were concerned about their weight.

Sub-theme 1: Optimal daily functioning/life preservation

Participants reported an association between their weight and being able to perform daily routines without hindrance.

> "*One of the things that is important to me is that being healthy and physically fit, [is] to make sure that I can maintain my independence and maintain the lifestyle that I like to live*," (female, 37) reported one participant.

Sub-theme 2: Health Risk Reduction

Participants felt weight was also related to health risk. One participants said:

> *"…heart disease, just being obese, … joint issues, I see a lot of those in my family and it's because they don't take care of themselves, they don't work out, they don't eat right, so I'm trying to prevent all of that" (female, 35).*

Sub-theme 3: Self-confidence in physical appearance

In addition to health-related concerns, healthy weight was associated with an ideal body appearance. Having a particular physique yields self-confidence. One participant said:

> "*It definitely has a lot to do with physical appearance and having confidence in how I look and present myself. I mean, being able to go to the store and find things that fit me well, have the ability to shop kind of wherever or whatever and not being limited by my size. I would also say, just in terms of like my own personal and mental health, like I fell*

a lot better when I look better, and when I'm working out consistently as well as like when I'm eating right." (male, 46)

In discussing the importance of healthy weight, men often reported prioritizing their roles as men as reason to neglect personal health and not seek health care services; their roles as men, fathers, and providers were higher priorities. Interestingly, other men reported prioritizing health and seeking health care services because being healthy allowed them to fulfill their roles as men. Both men and women reported no desired amount of weight loss; the goal was to experience improvements in their lifestyle, health status and appearance.

"But I do believe that there's a point where you could be losing too much weight and it's not healthy for you. I don't think I've reached that point. So that's the best way I can describe it. It's subjective and for me it's always been kind of based on what other people have thought about me. Oh, you weigh too much, oh you don't weigh enough. I just kind of focus on how do I feel, and am I satisfied with my lifestyle and how I look." (male, 35)

Trigger for weight loss

Participants were asked about the pivotal point that triggered them to lose weight. Four sub-themes emerged: a "Who is that?" moment, putting family first, a medical diagnosis and "my clothes don't fit."

Sub-theme 1: "Who is that?" moment

Participants reported not realizing they had gained considerable weight and a moment of shock triggered them to take action to lose weight. One male participant stated:

> *"I saw a picture of when we went on a family vacation to the zoo and I saw [it} about a couple months later. We were looking at pictures from the zoo and you know I was looking through, "Oh! like who's that fat man? Oh, that's me!" I was like, "What?! Like oh my God! disgusting," and so yeah that was about it." (male, 33)*

Sub-theme 2: Putting family first

Participants also indicated family as a trigger for losing weight; getting married and wanting to start the new journey in life as healthy as possible for their partner, or being in an existing happy and healthy relationship where their partner inspired them to be better. Being able to be an active and present parent and grandparent were also important.

Sub-theme 3: Medical diagnosis

Medical issues are another common trigger cited by Black couples. Severe cases of high blood pressure, suffering from severe headache, lupus, type 2 and gestational diabetes diagnoses, and doctor threatening medication, triggered both male and female participants to lose weight. One said:

"It's kinda dark, I had a sister that passed away from Lupus and I have Lupus. So, what motivates me is to live as long as I can in a healthy manner with this, and not you know die at an early age like she did." (female, 54)

Sub-theme 4: "My clothes don't fit"

Other participants indicated not being able to fit clothes as a trigger.

"*Well most of the time, when I get where I can't really fit my clothes I know it's time to lose weight. I don't have to get on no scale because I don't want to buy no new clothes" (male, 45),* reported an interviewee.

Triggers were mostly the same in couples where both participants lost weight, from medical issues to wanting to make a change for the benefit of each other. Participants reported a single trigger to initiate weight loss and women report medical diagnosis more often as triggers than men.

Facilitators/Barriers to health eating, exercise and weight loss

Participants were asked to discuss their weight loss journeys detailing "the good," "the bad" and "the ugly." In describing the steps to successful weight loss, participants included facilitators and barriers to weight management and related behaviors. Five parent codes emerged. The factors and barriers that influence healthy eating, factors and barriers that influence exercise, and factors that influence weight loss parent codes were then combined into one theme because participants often discussed them together. Six sub-themes were derived: Partners,

availability/choice, time, discipline or mental resolve, information acquisition and other influences were mentioned the most across each parent code.

Sub-theme1: Partners

Participants reported partners as both a facilitator and barrier to healthy behaviors. Partners were supportive, motivational, and served as accountability partners and validated progress and choices. Supportive behaviors included tangible, emotional and informational support. One female participant stated she provides healthy meals for her partner:

> *"… typically, whenever I cook I make sure I cook enough for him cause… with him working nights he's in the bed by 4 or 5 so we typically, when I'm home during the week, we don't necessarily get to eat dinner together but I make sure I fix enough for him. I fix his plate, I stick it in the microwave so that he can get to it, heat it up when he gets up. So the only thing that I won't necessarily cook and leave over you know a couple of hours is fish so then I find like maybe I fix some grilled chicken for him or bake some chicken. So I try to find healthy alternatives for him to eat and make sure I make enough so he can have you know some tonight and maybe tomorrow night. So that's how when I'm home and I'm cooking that's how I do that. He says thank you. Now when I'm gone out of town that's probably you know all bets are off" (female, 49)*

Partners were also motivational; they modelled behaviors important for weight management. One participant described his wife's influence on his eating and physical activity:

"*I try not to let too many people influence my behavior because basically, I got a very small group that I let in on that level. But my-I think my wife is probably my biggest motivator because I can watch her eat certain things and I watch her excel in what she's doing as far as losing weight. But, I want to be able to create the male form of what she's doing. That's where I-that's where I focus.*" (male, 46)

"*My wife has been, my heroine. Not heroin like the drug. But she is my hero. The reason why I say that is because, she had the same conversation with our doctor. We go to the same doctor. And he pulled her aside and said "Hey. You got a life. And if you stay this way, you're going to die. I need you to drop the weight." And she's been at it ever since. Now, that's the reason why you can look at somebody and say 'Wow, I need my household.' Well, my wife needs me when it comes to the exercise route because I see her, there's nothing that she can't say to me that I cannot just say, 'I believe you. I know that this is working because I'm looking at her every day.' So me, I'm trying to basically maintain everything that I said from a male perspective, I want to be as successful as her, from a male perspective." (male, 46)*

According to participants, partners can have a positive or negative influence on weight and weight related behaviors. Partners were also saboteurs. Participants reported partners often discouraged frequent exercising or encouraged consuming less healthy options by promoting "cheat days," where one takes a break from their healthy choices because, according to a sabotaging partner, "one drink is not going to kill you". The participant stated,

"*We are social drinkers and he loves to mix alcohol…His thing is he'll come up with some type of fancy stuff that he can make and serve it to me, you know what I mean and I'm like dude I'm not supposed to be drinking I'm supposed to be on a clean diet. "One drink, one drink is not going to kill you," [he says]. Okay, but we do this like 3 nights for the weekend…I'm not mad at him for it because that's who we are together but I can't be mad. It's just that it frustrates me because I'm like, "Oh God so and here we go!'" (female, 44)*

Sub-theme 2: Choices/Availability

In describing influences on weight related behaviors (e.g., eating and physical activity), choices or availability also emerged as a theme. Participants stated having time to prepare food facilitates making better food choices and more choices helps the participant avoid certain foods. The availability of bad choices is reported as another barrier e.g., fast food restaurants, junk food in the home or being in social situations with limited or no healthy choices. A mother of four stated,

"*You get invited to little birthday parties and stuff like that a lot. You take the children out so they can have a good time and there's always the foods that children are going to like. There's always pizza, there's always cake, there's always ice cream, hot dogs and burgers and that's hard to be around. Unless you brought yourself your little lunch with your carrots and stuff, but that's still hard to be around so, you know. You gotta prepare food for all the kids and there are cookies and then you pull out your veggie tray or something" (female, 31)*

Having choices in physical activity helps reduce boredom; keeping the individual interested in remaining active.

> *"Well, I typically am an exercise person who likes to have a lot of different activities. Because I get bored with activities real quick. So, if I'm running one day, I'll be walking another day, or I'll be lifting weights one day, or I'm on an elliptical machine the next day. Because what happens is like I said, I burn out real quick. And I come from a sports background. When I was in high school, I was actually- I played football, I ran track, I lifted weights, everything to help me on the field" (male, 46)*

Sub-theme 3: Time

Time also emerged in conjunction with other themes from participant interviews; time and availability/choices as mentioned above, and time and responsibilities. However, participants stated in changing priorities and realizing the benefit of making healthier decisions, time became less of a factor.

> *"I think sometimes it's hard, when there's a lot going on, to keep working out a priority. I noticed like during midterm, or finals, and like papers and stuff galore, then it's easier for me to like not work out, but I notice how that impacts my mood and so kind of like… no, I need to work out cuz it helps me [be] like happier and better approached, but it's like I also have other things going on. So, it's figuring that out too, that balance',* reported one participant." (female, 39)

Sub-theme 4: Discipline or "mental immersion"

Setting goals, accountability to oneself and others, being conscious, and "giving yourself a push" were often cited as examples of having discipline or having "mental immersion". Participants described the mental component to making healthier choices that contributed to their successful weight loss. In addition to having the knowledge and resources, mental readiness and the willingness to train oneself to form healthy habits were equally important. According to one participant,

> *"It wasn't really a big struggle. It was just like I had to… my job… I work late night and usually when I got off work, I would go by McDonalds or whatever was open and grab a full meal. It just was like a daily thing. I had to tell myself ok nope, go home, you can't, don't stop, don't get this, don't do that, don't let this bad thing …like I said I didn't. Once I trained my mind to do that, it was pretty easy after that. It wasn't really a big struggle or big hassle. I just I set my mind to the goal and I get it." (male, 48)*

Sub theme 5: Information Acquisition

According to participants, information from online/social -based resources, licensed professional and/or family/friends were both useful and harmful. The popularity of social media sites and online publications made information instantly available. One participant reported how a podcast changed their eating habits:

"I've been listening to this podcast and I feel like that's really been like transformational in terms of how I view eating and like nutrition and all that kind of stuff... So that's one where it's actively changed my approach to what I eat and my relationship with food and all that." (female, 31)

When information is tailored to the individual and from a professional, participants reported using that knowledge to change their behavior and experienced success. One stated:

"I gained that knowledge [about serving size] from a guy who almost killed me in the gym at my personal trainer. And he told me that 'Here's what we're going to do.' Because I explained my whole situation, my health situation, everything. And he said 'I want you to drop down to…' He gave me a caloric intake; I think it was a little bit…2200 calories or something like that. And he also- my wife was training with him as well and she had something that was like, 1300 or something like that, some ungodly number. Something that if she went out to [fast food restaurant] she could wipe out her whole meal intake in one shot. So, my thing was, he taught me how to, you know, and a lot of ways to do what you have to do until you can get, you know, your body into that mode. You know, eat about 3 to 5 meals a day. Well, not 3 to 5, but more like 6 to 7 meals a day, you know, small meals. And those consisting of one serving. So, protein, one serving of, you know carbs, and all of that stuff. And then my body basically, and I had the exercise and all that stuff. And then my body responded after that." (male, 46).

Sub-theme 6: Other Influences

There were other influences reported specifically for each behavior. For example, the desire to consume unhealthy foods was reported by a participant. He stated,

> *"My flaw is myself sometimes, when you want what you want, you want it you just want it. The thing about me is... starting over is better than going backwards." (male, 40)*

In recognizing there would be instances of unhealthy food choices and that they were temporary lapses, allowed him to still successfully lose weight. In addition, *a*ccording to participants, unsupportive people, especially family, negatively impacted attempts to make healthier choices through negative comments and attempts to discourage change.

Upbringing and culture influenced eating behaviors, one participant said, *"I was poor, when you finally have food on the table and your father tells you, "eat everything."* For him, it was a *"waste of food"* not to eat everything on your plate (male, 40). Another participant stated,

> *"within the African American community there's the approach of food is love...and you show love through food and you show love … with friends. Like there's so much of like a fellowship aspect to…" (female, 31).*

In describing influences on physical activity, fatigue was often reported as a barrier e.g., being too exhausted to go the gym after work, being too tired from all other responsibilities or being too tired to continue after a small bout of activity. However, being a role model to others,

family, friends and social network followers, provided a source of accountability. One participant felt being active at work, or having a laborious job, was a substitute for exercise. Another participant found it difficult to remain active without the involvement of their partner.

Partner Social Support

In identifying the behaviors partners provided as support for losing weight, three areas emerged: considering and prioritizing a partner's goals, "giving her lip service" and "uh uh Imma do this."

Sub-theme 1: Considering and prioritizing a partner's goals

Some participants reported positive support, where partners were supportive of their significant other's goal and made comprises to help them. Participants may not have directly benefited from the support they provided but still prioritized the needs and wants of their partner's attempting to lose weight or change behavior. One partner recognized working together helped her partner stay on task and motivated him:

> *"I already changed my lifestyle and I made a few changes before that and I was comfortable with what I was doing and the choices I was making but he was interested. To me, he was like, I want you to do this with me. Participate it in because you motivate me. Which entails that I have to. So, the fact that he said that I motivate him that made me accountable to do it with him to motivate him. So that was a big thing that [for] him that a lot of times, when we do things together, we stay on task together." (female, 37).*

Partners also recognized social influences on their partner's behaviors, being mindful of situations that may sabotage or produce temptation. Another woman when speaking of her partner stated:

> *"…when we're going out to do things with his parents, or with his siblings or whatever. Before they choose the restaurant, you know, he'll say where do you want to go, let me run it by [Name] so she can look at the menu. …cuz that's really important to me, and so he'll do that rather than just choosing a place. And usually if we're about to go out, we'll decide together or, you know, he'll be like this is where I'm thinking, you wanna check out the menu to see if that's somewhere you want to go." (female, 31).*

According to participants, supporting their partner's goals often involved simply listening and taking a genuine interest. One man stated:

> *"They post the workout of the day on their blog, I guess the night before or day before or something like that. One of the things she likes to do is read me the next day blogs. Why is this supportive? Because she'll read this to me or have me look at it and I might as well be looking about another language because I don't know any of the stuff they're talking about. Then I have to obviously be like "babe, what's a thruster?' 'Oh! a thruster is you do this da da da da and I'm going to do five of those. And you know, I had a personal best the other day and you know da da da da." It's a way for her to talk about what she's doing and you know being excited about her results and pushing pass what*

she thought her limits were. For me it's kind of like okay I feel kinda of weird, I feel kind of esoteric-geeky but she's really excited about it and she wanting to share it with someone so I'll listen. Although half of the time I don't know what she's talking about. So yeah. (male, 35)

However, others reported unsupportive behaviors: encouraging cheats days, questioning the purpose of weight loss and not taking interest in being active together. These partners did not prioritize the needs of their partners nor did they make compromises.

Sub-theme 2: "Giving her lip service"

Emotional support or "giving her lip service" emerged as social support often provided, making compliments on progress or engagement in healthy behaviors. Commenting "good job" and providing verbal encouragement was important for one male participant (male, 48). When speaking about his wife's weight loss, another participant said:

"My wife is very big on affirmations. So, you know constantly, 'Do I look good?' 'Yes. you do look good.' "Can you tell that I'm smaller?" "Yes, I can tell you're smaller." ...She said 'I was doing this yoga pose, I noticed my legs were smaller, do you see it?' 'Yes, I do see your legs are smaller" and you know, and that just mean you know, give her lip service, but I do notice those things. And when I do notice those things, I do try to tell her cause I know she likes it. She's big on affirmations so. So, I think those are the things that motivate her (male, 35).

In this case, the partner was able to identify the support his partner need and provided it. Men are not alone in giving "lip service." One wife stated, "I'm his number 1 cheerleader." (female, 42)

Sub-theme 3: "*Uh uh Imma do this"*

Prepping meals, grocery shopping, and purchasing exercise equipment are examples of instrumental/task support. As one wife stated when her husband has decided to make an unhealthy food selection, "uh uh Imma do this," followed by her preparing a meal for him.

> *"She takes the reigns and [is] like 'uh uh Imma do this, sit there and wait I'll have it ready in a second' I sit back and wait for her and she'll cook and bring it out and all that and she just keeps me honest." (male, 40)*

The examples of instrumental/task support reported in these interviews were often unsolicited, partners provide these goods or services without being prompted.

> *"It's important to know what you're going to eat. At times where I feel like, you know, it's usually in the morning where he tries to like, you know, he's exercising or if he's running behind he's supposed to wake up earlier to exercise and he woke up later and he went for his normal exercise and he has to get to work, I'll offer to make him eggs or something like that. (female, 31).*

Social Control

Some participants reported social controlling type behavior as opposed to social support. Smacking hands, or giving looks of disapproval of behavior were mentioned. One woman self-identified as a "nag." While this behavior may appear counterproductive, one participant reported its necessity to trigger his weight loss.

> *I mean I guess you could consider nagging sometimes to be difficult but sometimes you just get used to that. So, that's doesn't really always work. I just got used to it and it just don't bother me [but] it was [effective], it got me started (male, 42).*

Preferences for working with partner

As stated previously, partners are natural sources of social support. However, it is important to identify preferences for partner involvement. Participants preferred to work together when their goals were the same. Of the twenty participants, 18 reported wanting to work together when it came to eating. However, preferences being active together varied, leading back to personal goals (Table 4.5).

> "For me it's both because we have separate goals [but] we both… have goals for losing weight… It gives us something to work towards but our goals may be different and they are different. His major [goal] being to walk a mile or two a day and if the weight comes off okay great woo hoo. My goal is very specific, I'm aiming to lose 30 pounds. So in order to do that there are other things that I need to do. Like …working on …starting with the detoxing my body with this cleanse." (female, 37)

IV.D. Discussion

This paper describes the formative research undertaken to inform the development of a spousal support enhanced weight loss intervention for Black men. From the perspectives of Black men and women in romantic relationships, triggers to weight loss; barriers and facilitators to weight loss; partner involvement in weight loss; and personal preferences for working together for weight loss, were identified. From the information gathered, the appropriate strategies to engage this population can be selected and the likelihood of observing the desired outcome (e.g., weight loss) may be increased. There is clear evidence of the health benefits of weight loss,[128] especially among Blacks who experience health disparities related to weight. Despite the clinical evidence, little is known about the reasons and motivations Blacks in committed relationships decide to lose weight.

Findings from in-depth interviews suggest both Black men and women in committed relationships are triggered to lose weight in response to a specific event (e.g., suddenly recognizing a change in weight or appearance; a directive to make changes to prevent premature mortality or decrease disease risk; or reaching a milestone in their romantic relationships). O'Brien et al reported that in a sample of individuals with overweight and obesity seeking treatment, 50% reported health as the primary reason for wanting to lose weight, followed by 30% reporting appearance and the remaining 15% reporting a desire to improve mood-related factors.[129] In this current study, when asked about the importance of maintaining a healthy weight or the importance of weight loss, Black men and women reported that in general, achieving or maintaining a certain weight could address fears of illness or death; improve an individual's self-confidence in appearance; or improve or maintain an individual's quality of life for the benefit of oneself and loved ones. Noted personal triggers for weight loss substantiated

the reported reasons individuals valued a healthy weight in this sample. Health and appearance are consistently common reasons to lose weight in the United States, internationally and among other Black populations. [129,130,131,132] Explanations for why Black men and women decide to lose weight provide insight to facilitate recruitment and retention of Black men and women in committed relationships, enrolling in weight loss studies.

It is noteworthy that beyond health and appearance, being in a relationship is a reported reason among Black couples to lose weight in this sample. One study found that for individuals in romantic relationships, partners or spouses can "nag" them to lose weight and make them feel judged for their weight;[133] interestingly, the negative talk or emotions were not associated with weight loss attempts in that sample. Negative evaluation or feeling judged within close relationships can increase counterproductive coping behaviors (e.g., increasing inactivity, binge eating).[134] However, in the present sample, individuals reported a desire to lose weight because of their relationship. This highlights another dimension of weight loss and romantic relationships. Individuals are sometimes intrinsically motivated to lose weight to be their best selves for their partners, not because of requests or dissatisfaction from their partners. This may explain the success these individuals experienced in losing weight. Dialogue concerning weight within these romantic relationships may be primarily positive and supportive compared to those where an individual is being prompted to lose weight. Positive or acceptance messages within close or romantic relationships are associated with improved well-being,[135] a stable foundation for behavior change,[136] and buffering against stress,[137] each of which can influence in weight loss. However, these factors may be dependent on relationship functioning and dynamics (e.g., communication skills, closeness, interdependence[80]).

Participants cited a range of factors influencing weight loss and weight-related behaviors (e.g., eating and physical activity), for example, lack of time, access to variety and an engaged partner. Weight loss studies have incorporated romantic partners to facilitate short term and long-term weight loss. However, results from partner involvement have been inconsistent.[15,15,94,94,95] One aim of the present analysis was to determine what partner behaviors were considered supportive from the perspective of members of a couple who had successfully lost weight. Weight losers reported tangible support (e.g., the provision of goods and services) and emotional support (e.g., being nurturing) most often. Picking up healthy foods from the grocery store on the way home from work for a partner or walking around the neighborhood together after dinner were supportive tangible behaviors. According to participants, partner involvement was appreciated and needed most of the time. In rare occasions, like when a wife "nagged," partner involvement while accompanied by negative emotions was still effective. A meta-analysis of spousal support based weight loss programs identified types and general examples of support commonly required of support partners enrolled with index subjects.[15] For example, "assist subject at home," "prompt, cue, model appropriate (eating) behavior, and "engage in mutual support and reinforcement, "are a few used in couples based interventions. Our study reported specific examples of these types of support associated with successful weight loss (e.g. riding bikes together, making sure salads and smoothies are packed for the next day's lunch or commenting that a change in body shape was noticeable). Furthermore, participants preferred support for healthy eating and were indifferent or did not want partner involvement in regards to physical activity. Providing detailed examples of supportive behaviors to support partners may enhance the benefit in couples-based trials; by providing examples, individuals have access to a

collection of behaviors or support that may be helpful and can choose to perform them, especially if they have difficulty identifying helpful behaviors on their own.

Strengths of this study include recruiting a sample of both men and women of successful weight losers and to our knowledge, providing the first qualitative investigation to identify supportive behaviors from both the male's and female's perspectives and experiences in weight loss. Though this analysis focused exclusively on Black couples, the disparities among this population justify the exclusion of other racial/ethnic groups in that there is a need for increased efforts to target and understand the mechanisms (e.g., intrapersonal and interpersonal) influencing weight and weigh-related illnesses. Lastly, our sample is comprised of participants of a range of ages, years in a committed relationship and body weight. The similarities reported in experiences and perspectives among this diverse sample, permit confidence in developing messages to recruit a diverse sample of Black couples and information (e.g., content for group activities, and messages and recommendations to support partners) to enhance a spousal support based weight loss intervention for Black men.

The study had several limitations including, a non-random, convenience sample of Black couples. Couples self-identified as Black and heterosexual and were highly educated. This sample was recruited from a metropolitan area in North Carolina. These findings may not hold among couples who do not self-identify as heterosexual, or who are less educated, or who reside in non-metropolitan areas or who are not Black. Secondly, qualitative research often includes small samples and in-depth interviews are typically conducted with individuals who are comfortable discussing their experiences. One potential limitation is that study samples may not be representative of those who may not have been successful losing weight or may be uncomfortable discussing their weight loss journey, and thus, may provide a limited perspective

on the subject. We acknowledge the limitations of this study; however, these findings provide a framework for designing a spousal based weight loss intervention.

Conclusion

Findings from this study highlight the salient factors needed for successful weight loss among Black men and women in committed relationships. Both men and women who lost weight, report the amount of desired weight loss was dependent on observing improvements (e.g., in appearance, health status and daily functioning). Health and appearance were triggers for weight loss in this sample and is well documented in the literature. Being in a committed relationship in Black couples, served as another trigger to initiate weight loss not reported in other research. Highlighting the benefits of weight loss or maintaining a healthy weight among couples may be an additional strategy to: 1) influence initiation of weight loss among this population or 2) recruit individuals to participate in weight loss programs. Success is contingent on the decision to initiate weight loss being of an individual's own volition and not from the negative prompts of a partner. This is important in couples-based weight loss and for individuals in relationships where one individual is attempting weight loss. For the most part, couples in this analysis did not report negative talk or feelings from their partners. Negative situations were related to requests to take a break from healthy routines, being satisfied with their partner's current weight, but not from wanting an individual to change because of dissatisfaction. Time, access to choices and knowledge have been reported previously as barriers and facilitators to weight loss.[138,139,140] From cross-sectional studies, the importance of partner involvement is suggested. However, our research further investigated the types of involvement associated with improvements in weight and weight-related behaviors. "Record subject's weight every day," "prompt, cue, model appropriate behavior," and "assist subject at home" are examples of tasks

required of partners in couple-based weight loss trials.[15] From the accounts of our participants, tasks ranged from purchasing and preparing healthy meals to taking on additional responsibilities to allow more gym time for weight losing partner. In designing spousal- or couples-based interventions, incorporating skill building and scenario based activities may provide a method for participants to explore these supportive behaviors. This analysis brought to light the importance of being in a relationship among Black couples and provide details on using the relationship to produce successful weight loss. The results from analysis informed the design and implementation of a spousal support enhanced weight loss program for Black men. The reasons and triggers Black men and women reported were used as messages throughout recruitment strategies, program materials, and dialogue. Program components were designed to address reported barriers and facilitators of weight and weight related behaviors and examples of support provided through the intervention.

Table 4.1 Demographic Characteristics of Participants

	Total N=20	Men N=10	Women N=10
Age (years), m(sd)	40 (7.62)	41.4(7.14)	38.50(8.17)
Weight (kg), m(sd)	95.89 (25.80)	113.25(23.51)	78.42(13.21)
BMI (kg/m^2), m(sd)	31.59(25.80)	34.04(4.47)	29.14(4.12)
Weight loss in last 6 months (kg), m(sd)	7.57(2.77)*	8.36(2.86)$^+$	6.65(2.59)^
Education			
d. Some College (less than 4 years) or associate degree	5(25)	3(30)	2(20)
e. College graduate/baccalaureate degree	5(25)	4(40)	1(10)
f. Masters or doctoral degree	10(50)	3(30)	7(70)
Employment			
a. Working full-time	18(90)	10(100)	8(80)
b. Working part-time	0(0)	0(0)	0(0)
c. A full-time student	0(0)	0(0)	0(0)
d. A part-time student	0(0)	0(0)	0(0)
e. Retired Not working	1(5)	0(0)	1(10)
f. Looking for work	1(5)	0(0)	1(10)
Income			
f. $50,000 or more, but less than $60,000	3(15)	2(20)	1(10)
g. $60,000 or more	14(70)	7(70)	7(70)
h. Prefer not to answer	3(15)	1(10)	2(20)
Tobacco User			
Yes	1(5)	1(10)	0(0)
No	19(95)	9(90)	10(100)
Committed relationship (years), m(sd)	12.4(7.51)	11.8(7.83)	13.0(7.54)
Children			
Yes	16(80)	9(90)	7(70)
No	4(20)	1(10)	3(30)
No. of Children	2.15(2.06)	2.4(2.0)	1.9(2.23)

*N=13 $^+$n=7 ^n=6

Table 4.2 Selected in-depth interview questions and probes

Questions	Probes
What makes maintaining a healthy weight/weight loss as a priority or important for you.	What does healthy mean to you? Do you think you are healthy? (KP) If not, what are you willing to do to achieve that image of health?
What was the trigger that made you decide to lose weight??	
Please tell me about your experience trying to lose weight OR describe your partner's experience.	The last time you tried to lose weight… (they)
What did your partner do to help you lose weight? OR what did you do to help your partner lose weight?	If you needed… Together you…
Sometimes things that are done with the best intentions, don't work out that way. What did your partner do that made it difficult for you to lose weight? OR what did you do to make it difficult for your partner to lose weight?	When I needed… I wish…
We would like to know how you feel about working together, compared to working on your own (without your partner's involvement), to try to become more physically active(PALS)	How strongly would you prefer to work on your own, without involving your partner, as you try to become more physically active? (PALS) Would you prefer for your partner to try, along with you, to become more physically active? (PALS)
We would like to know how you feel about working together, compared to working on your own (without your partner's involvement), to try to eat healthier (PALS)	

Table 4.3 Parent Codes, Code Definitions and Illustrative Quotes

Code	Definition	Illustrative Quotes Used for Coding
Importance of maintaining a healthy weight/weight loss	Perceptions of health as it relates to weight	005a: …longevity in your life… living healthy every day and time… the healthy weight and scary thing for me is, ….if cancer doesn't kill you, any other illnesses are basically due to nutrition-diabetes high blood pressure, and so forth. So therefore, ….my theory is the healthier you are, the longer you will live… feeling heathy… no problems …waking up pain free, being able to move pain free… just moving day to day without complication and having a healthy diet.
Personal health status	Perception of their own level of health	007: I am healthy but there's always room for improvement…As far as room for improvement meaning like now and again like I talked about with women and you look at the number on the scale and knowing where it is that we want to be, I'm about 30 pounds from where it is I would like to be but does that mean I don't make the right choices no that's not the case. Does that mean as far as food choices does that mean I don't exercise on a regular basis no that's definitely not the case. But just being more cognizant especially as I get older that my body isn't is not responding the same way it used to 20 years ago when I was an athlete in college and you know running and exercising on a daily basis. So there's always room for improvement as far as your health is concerned and for me right now it's reducing that number on the scale as well as my total body mass of my you know reducing my fat percentage.
Reasons for weight loss	General information about the reasons someone gives for losing weight	002a: Vanity… that's all I see is people trying to get into certain outfits or trying to get ready for weddings, or and a special event or something like that, but um I think most people try for vanity really.
Motivation	Intrinsic/extrinsic drive	002a: Really what motivates me is knowing that um it's kinda dark, but you know, I had a sister that passed away from Lupus… and I have Lupus… So what motivates me is to live as long as I can … in a healthy manner with this, and not you know die at an early age like she did.
Trigger for weight loss	A one-time event that triggered the participant to think seriously about losing weight or beginning to lose weight	004: When I was at the fair and they did the guess your weight thing and I stepped on the scale and I was a lot heavier than I thought I was… I didn't step on scale much then I didn't care to step on the scale but when I stepped on the scale at that fair, it was horrible… it is important and I knew at that time that I was a heavier weight … but I never thought I was that heavy and when I saw I was that heavy it was like "wow" so then I started looking at pictures of the old me and pictures of the current me and I could really see the difference in my face but it started

		with me stepping on the scale and saying "woah that's way too much you can't weight that much."
Factors that influence healthy eating	Any factor that influences an individual to eat healthier	0011a: …reminding him you know he may want to stay away from sugar and bread and all that kind of stuff. When I go grocery shopping, I will you know try to keep him, pick him up salads, stuff to make salads and keep getting out, so I was doing that at one point, I'm always making him a salad day and night…
Factors that influence exercise	Any factor that influences an individual to exercise (facilitators)	008a: I'm one of the people who need it, I mean, I don't know if you know this about me, I used to play professional football... And um me doing that, like I played football since I was seven years old, so I've always been in the limelight of doing activities… and sports and stuff like that. You got, I guess I got burnt out … you know, I got burnt out with that and um so I guess that's where the weight started coming on …and stuff like that. But, for her to push me to a certain point it really helps me out… Because you know, it's one thing to do it when you getting paid, and one thing to do it when you're doing it by yourself … and it's different. You got different motivations, so um her pushing me is something totally different. So, I like it and I like the fact I'm in a, I'm not in the forefront of everything I'm in the back (both laughing) and its on me if I choose something or not. So, I mean, it's just I really got burnt out. Yea.
Factors/Barriers that influence weight	Any factor that influences weight (promotes, inhibits, etc)	009a: So I think what prevented her at times was really sort of a mentality around what's realistic. And also kind of losing boundaries around "hey, you know, what's acceptable." You know. Everything in moderation. You know, eat healthy during the week and you work out during the week but allow yourself a day or rest or a nice dessert every now and then you know and I think kinda just seeing like, it doesn't have to be all or nothing. You can build this some sort of moderate lifestyle where you can lose the weight and maintain a certain weight, but it doesn't mean you're some sort of monk or you know I'm not allowed to splurge and when your weight does fluctuate back up it can fluctuate back down. So I think it's a mentality that really prevented her.
Barriers to Healthy eating	Any barrier that influences healthy eating	0010a: Well we eat out a lot… before so you know when you eat out you eat more … you don't necessarily make the right choices, so we were eating out maybe… 3 to 4 days a week we would eat out so now we might eat out once every two weeks, I cook most I cook at least 4 to 5 days a week
Barriers to Exercise	Any barrier that influences exercise	006: in the past you know I've tried to lose weight before … and she'd be like "oh you working out too much" blah blah blah and it'd lead to arguments… and I'd like stop

		working out and then I just get fatter again or whatever but as far as now she no longer um she no longer is fussing at me about working out and I don't have to go to the gym … because I have a I have like a whole bunch of weights and I have an elliptical machine at the house you know punching bag and I have a lot of stuff at home so my home is my gym so I don't really have to leave… to work out which I think helps us you know because I have that all at home.
Partner Social Support	Social support	008a: Um something she does, I mean, she cooks for me. She understand sometime I just get so lazy that I don't wanna cook and I grab the first thing and that might be something unhealthy and …she takes the reigns and be like "uh uh Ima do this," .. Sit there and wait I'll have it ready in a second.
Partner Social Control	Partner's attempts to influence and/or regulate behavior	004: …I been trying to lose weight for a while and what happens is we do good for a week … but then she wants her chocolate chip cookies and she will bring it in the house and I know I need the strength to stay away from it … but she bring in chocolate chip cookies but I don't have the strength that's my favorite …when she wants something to eat …she will say "look that's my body and I want it and I'm going to get it now." She will go to this place called only burger that serves burgers and jalapeno peppers … and … when she first says do you want anything I say nahh I don't want anything I'm good but then I think about if I don't eat anything now with her I aint gonna be able to eat anything tonight so I need to be able to get some food tonight too. So, I try to get something as well. And I try to do a healthier snack like if you go to only burger I get the turkey burger without cheese and stuff or if she goes to Taco Bell I make sure not to get the tacos I try to get one of those slush to hold me over until I actually get my own food or something.
Other Social Support	Social support provided by and to those other than partner	009: In term of like people in my, my life and my close circle I think like with doing cross-fit, you know, the kind of community and accountability and so like working out keeps you motivated um because you kind of build relationships outside of just working out, but also um there is that kind of like ability to progress where its like oh I was like I did this now I want this. It keeps you wanting more.
Black Community/Cultural Issues	Mention of black experience or community/culture	009: ... within the African American community there's the approach of food is love…and you show love through food and you show love and not even just like with um not even just, it happens with friends. Like there's so much of like a fellowship aspect to …like food and it's like all intertwined, so it's kind of really hard to figure out how to connect with people that doesn't always involve food

Relationship Description	How the individual would describe the dynamic or interactions with their partner	003: He is very supportive (CA: okay). Um he he calls me crazy sometimes because like this morning for instance I'm walking around like [a monster] because I worked out all and it's a good [monster] you know but he was like so is today a rest day and I'm like nope gotta go to toning and [name of exercise class] and he's like you go so he's like he's always been supportive um of everything that I've done because he knows how important it is to me so he's always been had my back he's always been there he's always been there.
Preferences for working with partner	An individual's general preference for working together with their partner on healthy habits	003: I feel well okay this sounds kind of hard … Just let me put this disclaimer on it I love my husband but I can work out with or without him because it's not about him it's about being trying to be healthy he'll be downstairs working and gaining and I hop on the treadmill and I can get my workout done and he just sits there and looks at me. And every now and then I'm like you should join me. You crazy I'm not doing that okay and I just keep going. You know so when we workout together I do it more for him then for me because I know he needs that support but for me I can be by myself I could be in a group of people I can be with him. I'm on a mission.
Working Together	Individual and partner doing healthy behaviors together	005a: … the fact that we partners, we're life partners, it's only right that we do that. It's only right that we lift each other up and push each other, to excel in life. Whether it's fitness or it's just day to day.
Experience with Weight Loss/Healthy Behavior	Struggles/Success with losing weight and engaging in healthy behavior	04: The good… I was able to lose like quick weight at the beginning… and first I brought a scale just to keep monitoring my weight… and I was able to lose good weight at the beginning like maybe like 2-3 pounds… a week at the beginning cuz I was cutting out the fried food…the fast food and not as much and when I go somewhere and I do go fast food I get something healthier …or that they said is healthier at least. Umm the bad was when I get to that point where it seems like everything you do anything you do is not helping… Umm I got to that point probably about two months ago… nothing I can do can move that scale anymore but if I go back home for a weekend the scale moves up but it will never move down anymore past that past that one level and I haven't got across that hump yet.
Weight Loss Program Wants	What individuals discussed wanting in a weight loss program and recruitment	003a: Um, it would have to be something that would show me fast results. If you frag me into something and it's gonna take me 6 weeks to see, you know, what sorta like this body building is not an exercise that you can get somebody to get into and see results tomorrow. They're going to see more pain tomorrow than they will see results. So you basically, um, you have to figure out a way to make it, you know, whatever that person is coming for. Some people come for to bulk up, some people come to

		trim down, um you know basically I would just say, put together a plan based on what that person need is. So like with mine I need to lose some weight but I also want to keep my muscle back. So if you could figure you know, a way to address that issue all in one, hey, I would be on board with it.

Table 4.4 Supportive vs Unsupportive Behaviors

Helpful Partners	Support Coding	Unhelpful Partners	Support Coding
Purchase Foods	*Instrumental*	Prepare Unhealthy meals	*Instrumental*
Participate in Joint Gym Sessions	*Instrumental/ Emotional*	Satisfied with current appearance	*Emotional/Appraisal*
Prepare/Pack Foods	*Instrumental*	Not participate in activity	*Emotional/ Instrumental*
Provide Motivation/ Inspiration	*Emotional*	Request for unhealthy meals	*Instrumental*
Compliment Progress	*Emotional/Appraisal*	Encourage unhealthy behavior	*Emotional/Appraisal*
Offer Sexual Favors		Nagging	*Emotional/Appraisal*

Table 4.5 Couple's Preferences for Working Together on Weight-Related Behaviors

	Participants																			
	2	**2a**	**3**	**3a**	**4**	**4a**	**5**	**5a**	**6**	**6a**	**7**	**7a**	**8**	**8a**	**9**	**9a**	**10**	**10a**	**11**	**11a**
Eating	Y	Y	Y	Y	Y	Y	Y	ID	Y	Y	Y	ID	Y	Y	Y	Y	Y	Y	Y	Y
Physical activity	Y	Y	ID	Y	Y	Y	ID	ID	N	N	ID	N	ID	Y	ID	N	N	N	Y	Y

y=yes, n=no, id=it depends

CHAPTER V: TOGETHER EATING & ACTIVITY MATTERS (TEAM): RESULTS OF A PILOT RANDOMIZED-CONTROLLED TRIAL OF A SPOUSAL SUPPORT WEIGHT LOSS INTERVENTION FOR BLACK MEN

V.A. Introduction

Black men have the shortest life span of any racial or ethnic group in the United States. According to the Office of Minority Health, 70% of Black men age 20 and older are overweight and obesity (BMI>25 and >30, respectively) [1]. Although preventive or routine visits could prevent or reduce n health problems, Black men are less likely to seek treatment for obesity-related conditions [141,142,143,144] compared to both white men and Black women. This contributes to disparities in morbidity and mortality of the top chronic diseases in the population. Differences in health behaviors contribute partly to these health inequalities among Black men.[11,25,26,145,146]

Few studies include data on Black men in sufficient quantities to enable evaluation of their weight-related behaviors and outcomes. In several landmark weight loss trials, Black men achieved an initial weight loss of 3-7% at 6 months, which would likely be of a level that would confer CVD benefit.[4-6] Unfortunately, Black men represented only 4-12% of the total study population of these studies and they lost less weight than Whites. In a published review of interventions reporting weight loss, diet or PA among Black men, only four studies were specifically designed for Black men; only one of these interventions was a randomized controlled trial, and none of the studies had weight change as the primary outcome,

demonstrating the paucity of published weight loss interventions both attracting and developed for this population. [7]

To address ineffective engagement of and reduced intervention efficacy in a population, Castro et al. suggest cultural adaptation of evidence-based interventions.[73] The CDC supports these findings for Black men. [68] Addressing the socio-cultural needs of being both a male and being Black in strategies and program designs may be important. In a qualitative study conducted in preparation for this intervention, issues salient to being a Black male included prioritizing gender roles and its influence on personal health (Alick et al., In review). Future research could examine whether addressing these concerns may be effective in improving enrollment in and efficacy of weight loss interventions.

Studies showing that social support for health behavior change is important to Blacks has led researchers to involve family members, more specifically, spouses, in intervention studies (Hooker et al., 2011).[16-18] Family is culturally valued in the Black community; it provides consistent social connections that lay the foundation for exchange of social support.[19] Moreover, family members, specifically partners, can reinforce strategies and behaviors for the targeted individual. Research suggests that romantic relationships influence weight management and provide a potential unit of intervention.[97] Spousal support, defined as support from a spouse or romantic partner, is naturally occurring and is associated with adopting new health behaviors and with short term and long-term weight loss. [138]

Previous studies among adults have used a spousal support-based approach for promoting weight loss in the general population. In one review of couples-based weight loss interventions, inconsistent findings were reported; some studies suggested advantages to partner inclusion and others did not support a couples based approach.[15] Intervention strategies focused on improving

spousal support included having partners attend group sessions, signing commitment contracts, self-monitoring behaviors and providing encouragement and modeling. In these studies, participants were majority White women, raising questions regarding the findings' generalizability to males and non-White populations. In a weight loss intervention targeting the social and environmental factors influencing weight loss, participants in the weight loss treatment with home modifications, which included involving a household partner, had more initial weight loss compared to participants with these modifications. The weight loss advantage of the home modification group diminished over time.[12] This study highlighted the need to identify the appropriate strategies to maximize the benefit of partner involvement in initial weight loss and improve the involvement of partners during weight maintenance. Interestingly, gender moderated the effects of this study; women lost more initial weight with the home modifications and men lost more weight without the home modifications. However, 82.4% of the study sample were non-Hispanic Whites, limiting the generalizability to other racial ethnic groups. [12] This study highlighted the need for more diverse samples in weight loss programs involving partners, i.e. Blacks. A spousal -support or couples based approach may be more appropriate for a specific racial ethnic group or a specific gender.

One weight loss study for Black adults found no difference in weight change when assigned to participate with a family member or friend. Interestingly, of the 130 pairs, only 18% were romantic couples as opposed to friends or family.[17] Thus, that study did not provide sufficient data to evaluate the effect of a couples-based approach among Blacks. More research is needed to evaluate this approach's effectiveness on weight loss among Blacks. In each of these studies, male enrollment was low compared to women, 21.9% and 10.2% of the study samples were male, respectively, and Blacks were underrepresented in the latter study.[12,17]

Diabetes management research, however, provides evidence supporting the use of spouses/partners as an approach to weight loss by providing data on Black men and family involvement. The family unit is a critical source of health promotion in men's health and can impact diabetes through education, reinforcement, and direct assistance. [9,10] In a qualitative investigation, Black men encouraged the involvement of spouses/partners, citing these individuals provide critical assistance to men in encouraging positive health behaviors.[147] Approaching Black men to lose weight as a strategy to help them fulfill their roles as men to provide for their families can increase enrollment and retention in health promotion services and programs.[147] The importance of support in changing behaviors, the value of family reported by this population and the evidence from the literature on diabetes management suggest a couples-based approach as a promising strategy that should be evaluated, both for attracting Black men to participate and for promoting weight loss. To date no study has used spouses or partner to provide social support for weight loss among Black men.

This paper describes Together Eating & Activity Matters (TEAM): a 12-week randomized controlled pilot study for weight loss among Black men. TEAM tested whether adding a spousal support component to a standard behavioral intervention produces greater weight loss compared to the standard behavioral weight loss (BWL) treatment alone. We hypothesized that the group with the added spousal support component would have greater percent weight loss at 12 weeks compared to a standard BWL group. In addition to this evaluation of preliminary efficacy, this study evaluated the feasibility, participation, and retention in this couples-based intervention among Black men.

V.B. Methods

Design Overview

TEAM was a two- arm randomized controlled pilot study conducted at the University of North Carolina Weight Research program in Chapel Hill, North Carolina. Each participant was provided with 12 weeks of weight loss intervention and participated in 2 assessments, one at baseline (up to 2 weeks before treatment) and one at follow-up (up to 2 weeks after treatment.)

Recruitment

From March 2016 to September 2016, potential participants (n=73) were screened through the study website. Participants were recruited from community organizations, universities, churches and fraternities through brochures, listservs, flyers and referrals and face-to-face engagement. Eligible participants self-identified as a Black male and were between 18-65 years of age with a body mass index (BMI) of 25-45 kg/m^2. They also had to have access to the internet and a personal email account at least twice a week. The exclusion criteria were current enrollment in a weight loss program, having lost 10 pounds or more in the last 6 months, currently being treated for cancer, being diagnosed with type 1 diabetes, and taking medications that affects body weight (e.g., insulin, chronic steroid use). Participants had to live with their self-identified Black female spouse or cohabiting intimate partner, who also had to agree to participant in the study. Partners did not have a BMI requirement. Eligible participants and their partners e-signed informed consent forms and completed baseline questionnaires online. In-person orientations conducted with each couple included: signing paper informed consents, physical/clinical baseline assessments and random assignment to the enhanced treatment (spousal support enhanced behavioral weight loss) or standard treatment (standard behavioral

weight loss) group. The study protocol was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill.

Randomization

Participants were randomly allocated 1:1 to the enhanced or standard group. In the informed consent form, partners agreed to attend group sessions with partners if assigned to the enhanced group and accept randomization. The randomization sequences were generated with the Rand function in Microsoft Excel using unique participant identification numbers (PIN). This study included four cohorts of participants, based on time of enrollment. Twenty PINs were randomized per cohort. Randomizations were performed by a UNC Weight Research staff member not affiliated with the study. During individual orientations, the randomization process and probability of assignment to each group were explained to participants. Group assignment was revealed to the participant and his partner through sequentially labeled opaque envelopes prepared by staff. Participants selected the next available envelope to reveal assignment.

Intervention

One interventionist delivered both study treatments, which were adapted specifically for this population from a variety of studies conducted by our research center,[51,107,148-150] based largely on the Diabetes Prevention Program and Look AHEAD interventions. Table 5.1 presents intervention components. Both groups received 7 face-to-face group sessions over 12 weeks, each lasting 60 minutes (4 weekly session in the first 4 weeks, 2 bi-weekly sessions in the second 4 weeks and 1 session during the last 4 weeks.) In each session, a behavioral topic was presented, participants discussed barriers and facilitators to meeting weekly goals, and group and individual activities were completed. Group session topics aligned with emailed weekly lessons.

Participants monitored daily weight, dietary intake and physical activity using the free web/smartphone based calorie counter, diet and exercise journal, MyFitnessPal. At baseline, all participants received an exercise plan based on their baseline minutes of physical activity and a caloric prescription based on their weight at baseline. Prescriptions were designed to help participants lose 1-2 lbs per week. Each week, progress on individual goals was assessed and feedback was provided by the group facilitator in group sessions and by email. All participants received a program notebook and a digital scale. It was recommended that participants weigh themselves and track weight daily.

Participants in the enhanced spousal support group attended one Couples Skills Training session with their partners prior to beginning the standard behavioral weight loss group sessions. Training consisted of signing commitment contracts, completing communication exercises, and honing collaborative problem-solving skills using scenarios. Weight loss was not required of spouse/partners; however, they were given weight goals, exercise plans and calorie prescriptions upon request. Each lesson for this group included a section devoted to at-home couples' activities to supplement the one session Couples Skills Training; each weekly lesson included an additional section entitled "Just the Two of Us." This section provided a weekly "to-do" list to be completed as a couple, targeting the core concepts of the Couples Skills Training: commitment, communication and social support. The "to-do" lists consisted of tasks reinforcing the lesson of the week (e.g., Week 4 Get FITT- Commit: Chat about the role physical activity plays in your relationship). In group sessions, couples were encouraged to complete in-class activities together (e.g., modifying a favorite recipe) and share obstacles and successes as a couple to the group during the open discussion.

Participants in the standard group attended group sessions without partners and lessons did not include couples' activities.

Measures

Participants completed a physical measurement and online questionnaires at baseline and 12 weeks. To improve retention, participants were provided a $40 check and two free personal training sessions at a local fitness center (given at week 12). The main components of the physical examination included body weight, height, waist circumference, and blood pressure. Current minutes of moderate to vigorous physical activity (MVPA) were assessed using the Paffenbarger Physical Activity Questionnaire (PAF).[113] The PAF includes items about minutes of brisk walks, number of flights of stairs climbed and type and duration of sports and recreation activities in the last previous week. Dietary intake was assessed using two 24-hour dietary recalls using the Automated Self-Administered 24-hour dietary recall (ASA 24-2014) at baseline and week 12. The assessment tool uses multimedia visual cues, prompts, and an animated character to assist participants when completing the recall. Participants completed up to 2 recalls at both baseline and post intervention.[151]

The primary outcome was weight change expressed as kg lost and as the percent of initial body weight lost from baseline to post intervention (week 12). Body weight (kg) was assessed using a digital scale at the UNC Weight Research Center at baseline and at 6 and 12 weeks wearing light clothing and no shoes. Two readings were recorded to the nearest 0.1 kg at time of assessment. If two measurements were not within 0.2 kg, a third measure was taken.

Secondary outcomes included changes in weekly energy expenditure and daily caloric intake from baseline to week 12. Change scores were calculated by subtracting values at 12

weeks from values at baseline. Partner's weight change was also measured from baseline to post intervention as a secondary measure.

Adherence was measured by logging attendance at group sessions and recording frequency of self-monitoring of weight, dietary intake, and physical activity. Self-monitoring frequency was assessed by accessing participants' MyFitnessPal accounts and recording the number of days per week of entries of weight and each behavior.

Statistical Analysis

This study was designed as a preliminary investigation to test the effect of spousal support on weight loss. Experimental, quasi-experimental and observational studies were used to estimate the sample size. The studies took into account several factors: treatment duration, intervention arms and target population (male and Black). Given that weight loss differences in previous studies ranged from 1.1 to 4.4 kgs, the treatment durations range from 6 weeks to 6 months, and the use of an active comparison group was variable, a difference in weight loss of 2.5 kg was chosen as it would signify additional clinical benefit. [17,152,153] With 80% power, a total of 20 participants per group allowed us to detect a 2.5 kg difference between groups at 3 months with a standard deviation of 2.75 kg. The sample size reflects only male participants; a total of 40 couples (80 total measured participants) were recruited reflecting male participants and their partners.

Descriptive statistics of baseline characteristics and comparison between study groups were evaluated using chi-square and t-tests, assessing for successful randomization. For analysis of the primary outcome, t-tests and effect sizes were calculated for difference between groups at 12 weeks. Given the small sample size, frequency distribution of percent weight loss was also

calculated. For analysis of secondary outcomes, chi-square and t-tests were conducted for categorical and continuous variables, respectively. Fischer's exact test and Wilcoxon's Signed Rank were used when appropriate. To assess change, change scores were calculated from differences from baseline to 12 weeks on each variable. There are no adjustments for baseline variables; there were no differences between groups. SAS software (Version 9.4, SAS Institute, Cary, NC) was used for all analyses.

V.C. Results

Baseline Characteristics and Enrollment

Seventy-three Black men and their partners were screened over a 7-month period of recruitment. Twenty four of 73 (32.9 %) were ineligible and 49 were invited to an orientation. Of these, 40 completed baseline assessments and were randomized to the two treatment groups (Figure 5.1). Table 5.2 shows baseline characteristics by study group. Male participants were on average 47.3 (±11) years old, obese (BMI of 35.0 kg/m2 (±6.1)), and had a baseline weight of 112.7 (± 22.8) kg. Most participants reported being married (90%). Most men had at least a four-year college degree (67.5%), worked full time (85%) and had a yearly income of $60,000 or more (60%). Based on self-reported measures, fewer than half had high blood pressure (42.5%) or high triglyceride/cholesterol (27.5%), and few reported heart disease (2.5%). At baseline, participants reported an average caloric intake of 2219.0 (± 1037.2) kcal per day and 100.4 (±121.8) minutes of moderate to vigorous activity per week. There were no significant differences in baseline characteristics between the intervention and comparison group (Table 5.2).

Retention and Adherence

At 12 weeks, 100% of physical measures and 95% of online assessments for the male participants were completed. There were no differences in completion rates among groups. No adverse events were reported during the course of the study. At 12 weeks, 97.5% of female participants completed the physical measurement.

Among the enhanced group, 85.7% of couples attended the initial Couples Skills Training session. Male participants attended 63% (mean=4.4(2.5); median=5) and 73% (mean=5.1 (1.9); median=6) of 7 possible group weight loss sessions in the standard and enhanced group, respectively. There was no difference in attendance among groups (t=-1.03, p= 0.31). The average number of days of self-weighing was low; 19 and 23 days of the 90 days prescribed, among the standard and enhanced groups, respectively. There was no difference in weighing frequency among groups (t=-0.55, p=0.58). Mean days of calorie tracking among male participants was also low 29 and 31 out of 90 prescribed days in standard and enhanced groups, respectively with no significant difference between groups (t=-0.72, p=0.47). Out of 90 prescribed days, the average number of days of activity tracking was 18 in the standard group compared to 16 days in the enhanced group. No differences were observed between groups (t=0.22, p=0.77) (Table 5.3).

Weight

Weight data were obtained for 100 % (40 of 40) of male participants at 12 weeks (Table 5.4). Both groups did not experience a significant reduction in weight over time (standard group: -3.4 (8.04) kg (t=0.50, p=0.62) vs enhanced: -4.7(5.9) kg (t=0.61, p= 0.55). The difference in weight between groups was −1.3 kg, (t=-0.58, p=0.57). The effect size was small (d=0.18). Findings for percent weight loss were significant; standard group = 3.0% (t=-2.11, p <

0.05) and (enhanced group =4.0% (t=-3.86, p=0.001)). However, no difference between the groups (t= -0.76, p= 0.45). In the standard group, 42% (8 of 19) lost at least 5% of initial weight, compared with 38% (8 of 21) in the enhanced. Among standard participants, 11% (2 of 19) lost 10% of initial weight compared to 14% (3 of 21) of enhanced participants (Table 5.5).

Anthropometric Outcomes

There was no significant change in BMI over 12 weeks (standard, -1.2 kg/m^2 (t=0.59, p= 0.56) and enhanced, - 1.5 kg/m^2 (t=0.86, p=0.39), and no between group difference (effect size d=0.14, t=-0.47, p=0.64). Mean waist circumference in both decreased significantly over 12 weeks (standard: -2.9 (4.0) cm, t=-13.16, p= 0.001) and enhanced: -4.7 (5.3) cm, t=-11.61, p= 0.006), but no difference between groups (effect size d=0.38, t=-1.11, p=0.27). There was no significant difference between groups in systolic blood pressure (effect size d= 0.22, t=-0.65, p=0.52,). In the enhanced group, there was significant decrease in diastolic blood pressure, over time (t=3.04, p=0.004), however, no significant difference between groups was observed (d=0.26, t=-0.75, p=0.46).

Behavioral Outcomes

There were no differences between groups in caloric intake (d=0.21, t=-0.60, p=0.55) and energy expenditure (d=0.63, t= -1.85, p= 0.07). From baseline to 12 weeks, there was no change in caloric intake per day in the standard group (366 $\pm$ 1103 kcal, t= 1.08, p=0.29) nor the enhanced group (594 $\pm$1101 kcal, t= 1.98, p= 0.06), though the change over time showed a trend. Change in caloric intake had a significant positive correlation with change in weight from baseline to 12 weeks (r=0.40, p=0.02). At 12 weeks, there was a significant increase in energy

expenditure in the enhanced group (t=-3.73, p=0.001). Energy expenditure was not significantly correlated with weight change (r=0.09, p=0.59).

Partner Outcomes

Among female partners in the standard group, there was a 0.2 kg (0.2%) decrease in weight from baseline to 12 weeks. In the enhanced group, there was a 2.5 kg (2.2%) decrease in weight. No significant between group differences were observed (p= 0.21); effect size weight change, d=0.55. Female participants' weight loss was marginally associated with men's weight loss (r=-0.29, p=0.07).

V.D. Discussion

This study demonstrated the feasibility of recruiting 40 Black couples and retaining almost 100% of the sample (100% of the male participants, and 98% of the female participants). Attendance at group sessions was acceptable but not high, 63-73% of sessions were attended by males or males and their partners. Men in the enhanced group, who attended weight loss groups with their partner, lost 1% more weight than those men in the standard group who attended weight loss groups without their partner. As there was no statistical difference between groups and the effect size was small, findings did not support our hypothesis that a weight loss program enhanced by partner involvement would be superior to weight loss achieved with a program that did not involve the partner.

The study was powered to detect a fairly large between group difference (2.5 kg) with a small standard deviation (2.75 kg). The difference observed here was smaller than we projected (1.3 kg difference, d=.18) and with greater variability (3.2 kg). As this was a pilot study, we also examined effect sizes. [154] Small to medium effects were observed between groups on most

outcomes and provide some preliminary evidence for future investigations or larger randomized trials.

Importantly, our study results add to the limited research on weight management among Black men. These results are consistent with research involving active treatment comparison groups among Blacks. In a randomized control trial of older Black male adults, at 3 months, a -2.0-kg difference (was observed between groups (intervention: -2.2 kg, usual care: 0.3 kg)[152] compared to -1.3 kg difference in this study. Previous studies reporting weight outcomes during similar time points reported weight reduction up to -2.2 kg.[152,155] In our study, weight reductions in both groups compare favorably to these interventions at similar time points; our enhanced group lost double the amount at the same time point compared to previous interventions (-4.7 kg vs -2.2. kg, respectively). Other interventions had greater contact time; 8-12 group sessions lasting at least 90 minutes each compared to seven 60-minute group sessions used in this study. A longer intervention and follow-up would be needed to compare with most other weight loss trials enrolling and reporting the weight losses of Black men specifically. Furthermore, in trials that enrolled Black adults, it was found that index participants experienced greater weight reduction when a family member was an active participant.[16,17] We observed similar associations between male weight loss and partner weight change ($r=-0.33$, $p=0.04$), when compared to these studies. Future studies should investigate dose of partner participation to maximize health benefits.

Interestingly, in our study, female partners were not required to be overweight at enrollment or to lose weight, however, in the enhanced group, partners experienced weight loss. The weight losses observed in the enhanced treatment is in accordance with the results of Look AHEAD, where they found a ripple effect on spouses whose partners were enrolled in the

intensive behavioral intervention. [156] The impact on both the index participant and partner can provide a synergic effect for the household and reduce family-level obesity risk.

On other outcomes, compared to the standard group, we observed small to medium effects in the expected direction among male participants in the enhanced group. For example, they showed positive (albeit non-significant) changes in BMI, waist circumference, blood pressure (systolic and diastolic), energy intake and energy expenditure that were in the expected direction when compared to the standard group. Male participants in the enhanced group attended more group sessions and completed more days of self-monitoring of weight and caloric intake compared to the standard group, though overall rates of self-monitoring in this population were low. Thus, our study demonstrates a slight advantage in participating with a partner that might be investigated in a longer and larger study.

It is also worth noting, men in the standard group experienced significant percent weight loss and blood pressure changes. These findings confirm the effectiveness of the standard treatment and provide additional evidence Black men can make clinically significant improvements without partner involvement. Furthermore, these findings can inform decision making for the most efficient and effective approaches to engage and impact Black men. Recruiting men alone is easier and requires less time of others. Future investigation should focus on improving adherence to behavioral techniques as they may produce better outcomes.[157] In particular, in both our study groups, self-monitoring was low. One weight loss study in men reported adherence for other forms of self-monitoring including a checklist form (23.4%) and self-monitoring their diet using a mobile application or website (44.7%). Adherence to daily self-weighing increased in that study from baseline to 6 months (16.7% vs 62.5%, $p < 0.001$).[158] The percentage of days of self- weighing during the program was not reported. Interventions

focusing on daily self- weighing can produce clinically significant weight loss.[159] Among Black breast cancer survivors, 1 day of non-daily self-weighing was associated with 0.031 kg increase in weight.[160] Of the 90 prescribed days of daily self-weighing in our study, men in both groups, reported monitoring weight only 23.4% of the days. The low rate of monitoring observed in both groups suggests efforts to improve adherence to self-monitoring may result in better weight losses. Future research is needed to evaluate approaches to improve adherence to self-monitoring among Black men.

To our knowledge, our study is the first to use a couples-based approach to weight loss among Black men. Previous couples-based weight loss interventions were primarily designed to treat women as the index subject and enrolled mostly White participants. These studies have yielded mixed results. When compared to usual care, interventions using a couples' approach were more effective.[15] More interestingly, of the randomized controlled trials comparing partner involvement vs no involvement, 50% of the couple focused interventions were more effective.[161] Our approach to use wives/co-habiting girlfriends capitalized on previous strategies and expanded them to include a theoretically dyadic approach compared to the typical intrapersonal approaches used in weight loss research. Through the use of the Couples Skills Training, joint group session attendance and weekly couples' activities, this intervention sought to improve the functioning of the couple as a means to facilitate weight loss. Fifteen percent of couples did not attend the Couples Skills Training session and we were unable to determine the extent to which couples completed the at-home activities. It is possible that the dose of couples skills training was not sufficient to see a meaningful effect of spousal support on weight loss. Further research is needed examine improving communication and collaborative problem solving to determine whether improvements result in more weight loss.

There are several other possible reasons a larger weight loss difference was not observed between groups. Due to the pilot nature of the study, TEAM had a shorter active treatment phase compared to other weight loss interventions; more contact would provide more time to build and hone skills required to maintain weight loss. Future studies should investigate the appropriate balance of dose and length of intervention. Lastly, one eligibility criterion was commitment from a partner. From enrollment, partners agreed to support their partners, therefore partners randomized to the standard group (not participating with their male partner), may have provided support outside the program in efforts to help men achieve their goals. In such a case, this would lessen the differential effects of the couple's component.

We were also able to recruit and retain Black men for a weight loss intervention. Of the 73 participants screened, 33% were ineligible, only 2% of men invited to an orientation passively declined participation through non-response. Sixteen percent of eligible participants declined participation due to work schedules, emerging medical issues, and distance to travel. This is promising for scalable interventions seeking to recruit Black men, a group traditionally labeled "hard to reach." Most randomized participants (65%) reported face-to-face interaction with a study representative or a recommendation from a current participant as the way they learned about the study. In-person communication is reported as one of the most effect methods to engage Black men[3,3,162] and was the most influential method in this study as well (data not shown). The study reported excellent retention rates in both groups also shedding light on the ability to engage and retain Black men in weight management research over a short duration study (12 weeks).

Though we observed weight losses in both groups we did not see significant changes to diet and activity. We used the Automated Self-Administered 24-hour dietary assessment tool, to

measure typical dietary intake. Participants in both groups experienced difficulty using the tool. As a result, some participants completed only one dietary recall of the requested two. The issue most often reported as accounting for failure or delay to complete recalls was installation of software required to run the ASA-24 recall. This required use of clinic computers to complete the recall, which changed the intended random nature of the assessment. In future studies, interviewer administered 24 hour recalls may result in higher completion rates. Moreover, the Paffenberger is a self-report measure for physical activity. Reporting of physical activity may have been influenced by social desirability. Future studies should use accelerometry for objective data collection to reduce the risk of bias in reporting.

There are several additional limitations to this study. Generalizability is limited by the small sample size; which is highly educated and fairly healthy. The lack of a no treatment control group does not permit assessment of the effectiveness of the intervention compared to no treatment. Other limitations are the use of self-report measures of eating and activity and limited study duration.

Our study also had several strengths. First, we retained all 40 Black men and their partners for 12 weeks. Secondly, this feasibility study was randomized and included an active comparison group to control for attention and contact, as well as general behavioral weight loss skills training, to permit examination of the additional benefit of spousal social support on weight loss. Thirdly, our source of social support was innovative in that is was both culturally appropriate for Blacks and self-sustaining through the use of an existing relationship for social support. The importance of family is a strong cultural value among Blacks. More importantly, this study adds to the limited research conducted on weight loss among Black men and used a couples-based approach to weight loss among heterosexual couples.

Future research could increase intensity of couples' component or increase intensity of the standard program and intervene for a longer period. Additionally, incorporating follow-up assessment post-intervention would provide information on weight maintenance. Lastly, an assessment of environmental changes within the home and measures on behaviors of children present in the home would provide preliminary data on other potential effects of a family-based intervention.

Table 5.1 Intervention Components, Concepts/Constructs Targeted, Method and Strategies

Intervention Component	E	S	Concept/ Construct Targeted	Method	Strategy
Couples Skill Building Session	X	-	Motivation of Transformation	**MT:** Communication	Couples participate in partner activities to build communication skills & complete a workbook with information on improving communication skills (Listener-Speaker) and activities
	X	-		**MT:** Commitment	Couples sign a Commitment Contract committing to each other, weight loss and the TEAM program
	X	-		**MT:** Scenario-based risk information (change awareness and risk perception)	Couples are introduced to a fictional couple or man with similar health profile
	X	-	Communal Coping	**CC**: Problem Coping Strategy (Cognitive)	Couples participate in partner activities to build coping skills & complete a workbook
	X	-		**CC**: Emotional Coping Strategy (proactive, anticipatory, preventive, reactive-downward comparison, avoidance, support seeking)	Couples participate in partner activities to build coping skills & complete a workbook
	X	-	Social Support	**SS:** Communication	Couples participate in scenario activities requiring using communication skills
	X	-		**SS**: Problem Solving	Couples participate in scenario activities requiring using problem solving
	X	-		**SS**: Skills Training	Couples participate in workshop practicing providing various forms of support in real life scenarios
Group sessions					
with partner	X	-	Motivation of Transformation	**MT:** Fear Arousal **-** Scenario-based risk information (change awareness and risk perception)	Couples participate in group scenario based activities focused on diet, exercise and weight loss topics
	X	-	Communal Coping	**CC:** Problem Coping Strategy (Cognitive)	Couples participate in group scenario based activities focused on diet, exercise and weight loss topics
	X	-		**CC:** Emotional Coping Strategy (proactive, anticipatory, preventive, reactive-downward comparison, avoidance, support seeking)	Couples participate in group scenario based activities focused on diet, exercise and weight loss topics

	X	X	Self- Efficacy	**SE:** Mastery experience	Participants practice skills and techniques during session i.e. self-monitoring, refusal, reward, goal setting
	X	X		**SE:** Modeling	Group facilitator presents material providing examples of desired behaviors i.e. lecture, video, speak guest. Group discussion among peers provides opportunity to display modeled behavior
	X	X		**SE:** Verbal Persuasion	Group facilitator presents material highlighting desired behavior. Group discussion among peers provides opportunity to discuss success stories/experiences.
	X	X		**SE:** Guided Practice	Participants practice skills and techniques during session under the supervision/guidance of trained staff.
	X	X	Self-Regulation	**SR:** Goal setting	Participants set diet, activity and physical activity goals during session. (Can share with group if desired- accountability, reinforcement)
	X	X		**SR:** Enlisting Social support	Participants participate in scenario based activities requiring decisions on when, how and what support to provide.
	X	-	Social Support	**SS:** Persuasive Communication	Participants attending with partners will
	X	-		**SS:** Modeling	Lecture/Discussion
	X	-		**SS**: Problem Solving	Activities
	X	-		**SS**: Skills Training	Participants learn skills with partners
Behavioral Lessons					
12 weekly behavioral lessons	X	X	Behavioral Capability	**BC**: Facilitation	Participants are provided with a reference tool comprised of all lessons, techniques, tips, etc to be successful in weight loss attempt and maintenance
Couples At-Home Activities					
12 weekly couple activities	X		Social Support	**SS**: Skill Building	Participants are provided was short fun weekly activities to practice closeness and communication
Tailored emails					
Tailored feedback on weight loss progress	X	X	Reinforcement	**R:** Feedback	Participants receive weekly emails providing feedback on their previous week's diet, activity and weight loss goal
Tailored feedback on dietary and physical activity behaviors	X	X	Self-Regulation	**SR:** Feedback	Participants receive weekly emails providing feedback on their previous week's diet, activity and weight loss goal

Recommendations	X	X	Social Support	**SS:** Persuasive Communication	
Diary (Food and physical activity)- online/mobile					
MyFitnessPal	X	X	Self- Efficacy	**SE:** Mastery Experience	Participants record diet and activity daily on electronic diary
	X	X	Self - Regulation	**SR:** Self -monitoring	Participants record diet and activity daily on electronic diary

Figure 5.1 CONSORT Flow Diagram

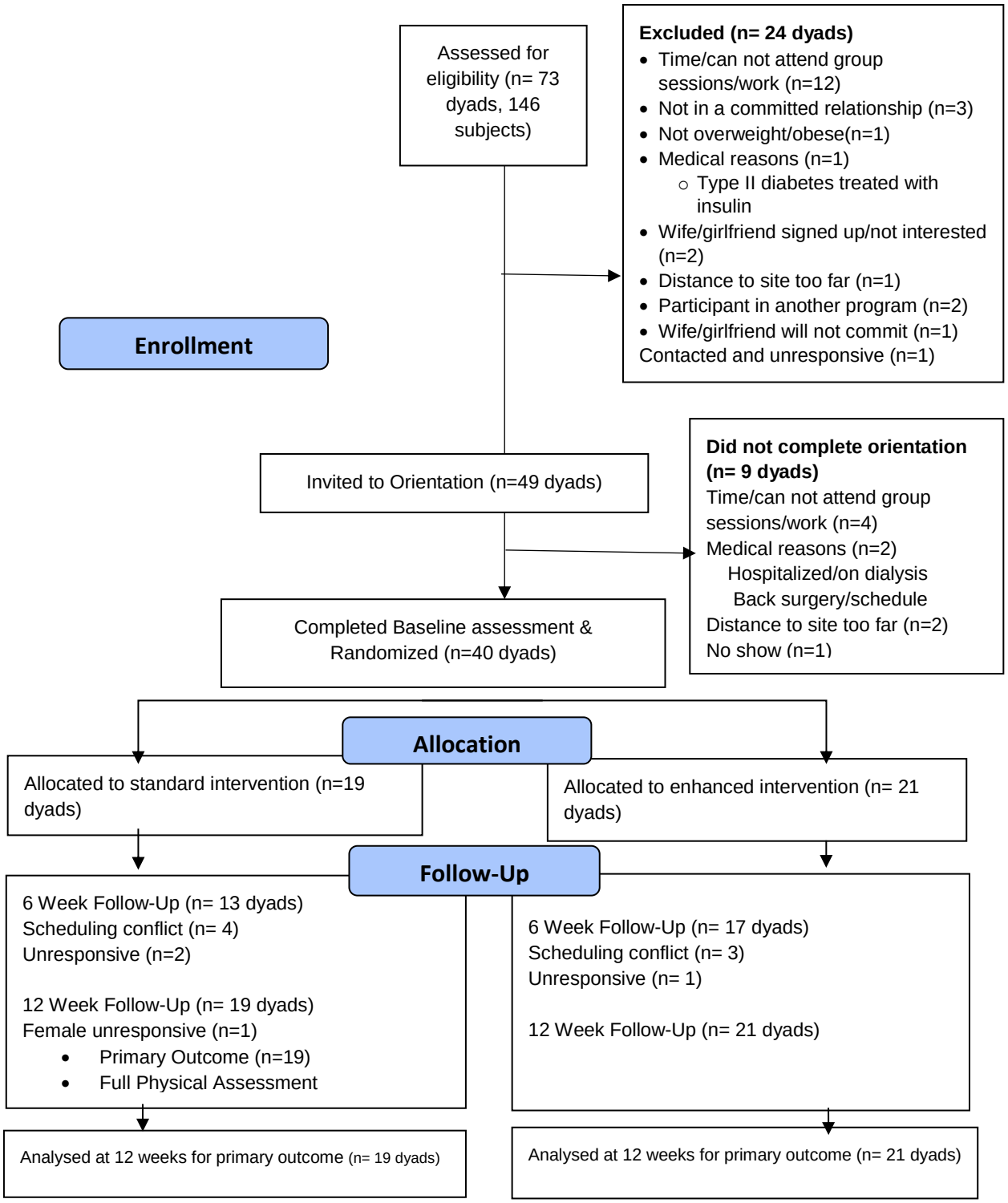

Table 5.2. Baseline Characteristics of TEAM Participants

Variable	All (n=40)	Standard Treatment (n=19)	Enhanced (n=21)	P-value
Age, years	47.4 ± 11	46.0 ± 12	49.0 ± 10	0.43
Education level, n (%)				0.91
Less than College	13(32.50)	6 (31.58)	7(33.33)	
College or more	27(67.50)	13 (68.42)	14(66.67)	
Marital Status, n(%)				0.33*
Married	36(90.0)	16 (84.21)	20 (95.24)	
Living with Partner	4(10.0)	3(15.79)	1(4.76)	
Employment, n (%)				0.21*
Working full-time	34(85.0)	15(78.95)	19(90.48)	
Working not-time	6(15.0)	4(21.05)	2(9.52)	
Income, n (%)				0.41*
less than $60,000	12(30.0)	6(31.58)	6(28.57)	
$60,000 or more	24(60.0)	10(52.63)	14(66.67)	
Prefer not to answer	4(10.0)	3(15.79)	1(4.76)	
Tobacco User, n (%)				1.00*
Yes	1(2.50)	0 (0)	1(4.76)	
No	39(97.50)	19(100)	20(95.24)	
Weight, kg	112.7 ± 22.8	114.2±20.8	111.3 ± 24.9	0.69
BMI, kg/m^2	35.0± 6.1	35.2± 6.2	34.9± 6.2	0.85
Energy intake, kcal/day[ɨ]	N=37 2219.0± 1037.2	N=18 2344.8±1171.3	N=19 2099.8±908.3	0.48
Energy Expenditure, kcal/ week	938.6 ± 1387.2	1423.4±1822.0	500.0±582.7	0.05
Marital satisfaction	25.7± 8.1	25.6 ± 8.0	25.8 ± 8.4	0.96
Comorbid conditions, n (%)				
Diabetes				0.65*
Yes	5(12.50)	3(15.79)	2(9.52)	
No	35(87.50)	16(84.21)	19(90.48)	
High blood pressure				0.55
Yes	17(42.50)	9(47.37)	8(38.10)	
No	23(57.50)	10(52.63)	13(61.90)	
High triglycerides/cholesterol				0.58
Yes	11(27.50)	6(31.58)	5(23.81)	
No	29(72.50)	13(68.42)	16(76.19	
Heart disease				0.48*
Yes	1(2.50)	1(5.26)	0(0)	
No	39(97.50)	18(94.74)	21(100)	
Cancer				
Yes		0(0)	0(0)	
No	40(100)	19(100)	21(100)	

*Fischer's Test "%"of the cells have expected counts less than 5. Chi-Square may not be a valid test.

ɨ n=36 total, standard n=19; enhanced n=17

Table 5.3 Recruitment and Adherence to Assessments, Group Session Attendance and Self-Monitoring

Variable	**All (n=40)** n(%)	**Standard (n=19)** n(%)	**Enhanced (n=21)** n(%)	**p-value**
Recruitment				0.67
Passive (Email, Website, Flyer)	14(35.0)	6 (31.58)	8 (38.10)	
Active (Another participant, Face-to-face)	26(65.0)	13 (68.42)	13 (61.90)	
In-person data collection				
12 weeks	40(100)	19(100)	21(100)	
Online survey completion				
12 weeks	38(95.00)	17 (89.47)	21 (100)	0.22
	All (n=38) Mean (SD)	**Standard (n=17)** Mean (SD)	**Enhanced (n=21)** Mean (SD)	**p-value**
Session Attendance				
Couples Training(n=1), n (%)		---	18(85.71)	
Male Weekly Sessions (n= 7)	4.8 ± 2.2	4.4 (2.5)	5.1 (1.9)	0.31
Couple Attendance(n=7)		---	4.8(1.8)	
Days of Self-monitoring (n=90)				
Self-weighing frequency ɨ	21.1 ± 24.4	18.7 ± 23.27*	23.10 ± 25.59	0.59
Dietary tracking frequency ɨ	34.63± 27.68	31.0 ± 25.51*	37.57 ± 29.62	0.47
Activity tracking frequency ɨ	17.08 ± 20.51	18.18 ± 19.94*	16.19 + 21.41	0.77

ɨ n=38 no login information

* n=17

Table 5.4 Outcomes across Groups at Baseline and 12 Weeks

				Change from Baseline to 12 Weeks			
Outcome Variable and Group	**Baseline Mean (SD)**	**12 weeks Mean (SD)**	**p-value within group**	**p-value for standard vs. enhanced**	**Mean(SD)**	**p-value for standard vs. enhanced**	**Effect Size Cohen's d**
Weight, kg							
Standard	114.2 (20.8)	110.8(21.7)	0.62	0.58	3.4(8.04)	0.57	0.18
Enhanced	111.3 (24.9)	106.6 (25.4)	0.55		4.7 (5.9)		
% Weight change							
Standard		3.0(6.0)	0.05	0.45			0.18
Enhanced		4.0 (5.0)	0.001				
BMI							
Standard	35.2 (6.2)	34.0(5.7)	0.56	0.73	1.2(2.3)	0.64	0.15
Enhanced	34.9(6.2)	33.3 (6.4)	0.39		1.5(1.8)		
Waist circumference, cm							
Standard	111.3 (12.8)	107.7 (12.0)	<.0001	0.89	N=15 2.9(4.0)	0.27	0.39
Enhanced	113.2(15.2)	108.4 (16.7)	<.0001		N=21 4.7 (5.3)		
Systolic Blood Pressure, mmHg							
Standard	131.6(39.3)	134.0(25.3)	0.83	0.51	N=16 -2.4 (38.3)	0.52	0.23
Enhanced	136.1(21.9)	129.2(19.4)	0.29		N=20 4.4(18.0)		
Diastolic Blood Pressure, mmHg							
Standard	83.3(27.8)	78.0(12.6)	0.46	0.64	N=16 4.3(26.2)	0.46	0.26
Enhanced	86.7(11.5)	76.2 (10.4)	0.004		N=20 9.35(8.47)		
Energy Intake (kcal/day)							
Standard	N=18 2344.8(1171.3)	N=16 1952.8(908.8)	0.29	0.18	N=16 366.046 (1103)	0.55	0.21
Enhanced	N=19 2099.8(908.3)	N=18 1572.0(692.7)	0.06		N=18 593.843 (1101)		
Energy Expenditure (kcal/week)							
Standard	1423.4 (1822.0)	1412.2 (1076.6)	0.98	0.88	N=16 308.4(845.3)	0.07	0.63
Enhanced	500.0 (582.7)	1363.8 (866.8)	0.001		N=19 826.1 (806.4)		
Partner's Weight							
Standard	86.5(16.4)	N=18 86.5(17.3)	0.99	0.44	0.2306 (4.4619)	0.09	0.55
Enhanced	94.0(23.7)	91.5(22.1)	0.73		2.4738 (3.6169)		
Partner's % Weight change							
Standard		-0.15 (6.21)		0.22			0.42
Enhanced		-2.24 (3.43)					

Table 5.5 Percent Weight Loss

	-10%	**-5-9%**	**-1-4%**	**+1>n<-1**	**+1-4%**	**+5-9%**	**+10%**
Standard	2 (10.5)	6 (31.6)	7(36.8)	2(10.5)	0	1(5.3)	1(5.3)
Enhanced	3 (14.2)	5(23.8)	7(33.3)	4 (19.0)	2 (9.5)	0	0

CHAPTER VI: FAMILY FUNCTIONING, SOCIAL SUPPORT, SELF-REGULATION AND SELF-EFFICACY IN A SPOUSAL SUPPORT WEIGHT LOSS INTERVENTION FOR BLACK MEN

VI.A. Introduction

Obesity remains a major public health concern, particularly among Black men; 38% are classified as obese .[118] Nearly three out of four Black men are at an increased risk for chronic diseases such as diabetes, hypertension, and some cancers due to their weight status.[11,25-28] Appropriate strategies to achieve and maintain healthy weight are needed to reduce the impact of the growing epidemic of obesity.

Since the 1960s, increasingly effective behavioral weight loss programs have been developed, but these interventions have been largely tested among women and Caucasians. However, enrollment in such programs is lower among Black males compared to White males, and when enrolled, they lose less weight. [4,6] Research indicates that differential responses to behavioral interventions are not biologic, but suggests psychosocial factors influence adherence and maintenance of healthy behaviors.[163] The factors that affect behavior change occur within the context of an individual's culture; therefore, when selecting appropriate approaches to change behavior, the culture of the target population should be taken into consideration. In 1999, Resnicow called for research to determine the effectiveness of culturally adapted (sensitive) interventions.[69] However, it is often unclear when culturally adapted interventions are necessary. One approach suggests that ineffective engagement of and reduced efficacy in the target population justify cultural adaptation of evidence-based interventions.[73] Given the low

participation rates in weight loss studies among Black men and their suboptimal weight loss outcomes, they may benefit from culturally adapted weight loss programs.

Effective cultural adaptations to interventions have included intervening in community rather than clinical settings, communication using the target population's native language, and inclusion of cultural values in recruitment and intervention strategies.[16,17,164,165] Historically, interdependence or reliance of individuals on each other within a family has been a strong part of Black culture. This interdependence translates into social support that occurs naturally within the family. A review on the role of social support in diabetes management among Blacks found that Blacks rely more heavily than whites on informal social networks (e.g., family) and that, in this population, social support has been associated with improved diabetes management.[166] Family members may be more cognizant of an individual's weight-related behaviors and barriers compared to non-family members and in turn may be able to encourage, help model, and/or reinforce strategies to modify behaviors for their family member.

Family inclusion in weight management trials has yielded inconsistent results. In family-based weight management trials, factors that may influence outcomes include which family member is involved and the type and degree of family involvement.[95] The composition of family involvement varies; studies have included parent-child dyads, a child and both parents, and romantic dyads.[95] Simply having family involved does not mean support is being provided. Research has evaluated provision of active, passive, and no support. For example, active support may include collaborative communication and problem solving, whereas passive support would include attendance at group sessions with no further responsibilities. The effects of these different types of support have been inconsistent in the literature. One study involving spouses found a difference in weight change between comparison groups; participants were randomized

into one of three study arms: a cooperative spouse (e.g., a spouse willing to participate in the study program) attending training and program sessions group, a cooperative spouse with no attendance group, and an uncooperative spouse group. At the three-month follow-up, weight changes were significantly better among the cooperative spouse with attendance group compared to the other two groups.[167] These researchers, however, were unable to replicate these results in a subsequent study.[168]

The theoretical foundation for weight control interventions involving dyads or groups has historically focused on intrapersonal factors such as stimulus control, reinforcement, and self-regulation.[167-171] The Academy of Nutrition and Dietetics suggests weight loss interventions incorporating more than one level of the socioecological model and addressing several factors in each level may be more successful than intervention targeting one level and one factor.[172] Intervening on both the individual level (on the index participant) and interpersonal level (e.g., sociocultural) (on family) requires a shift to family based strategies. The influence of family is more pronounced for individuals residing in the same household, such as partners or spouses. The home environment can be obesogenic. In a weight loss intervention targeting the social and environmental factors influencing weight loss, participants in the weight loss treatment with home modifications, which included involving a household partner, had more initial weight loss compared to participants with these modifications. Weight losses at dyad- based strategies. Dyad-based strategies may produce more positive results in couple-based studies compared to couples based studies designed and implemented using only individual-based (intrapersonal) theoretical frameworks.

Dyad-based theories take into account both interpersonal (couple-level) and intrapersonal (individual-level) factors affecting behavior change. In a review of weight loss interventions for

men, only one study used a couples-based approach. This review highlighted the fact that men are not typically the primary grocery shoppers or cooks in the households of heterosexual couples, suggesting the importance of considering the interdependence of a man's behavior on his partner's behavior.[96] Trief et al[99] used interdependence theory, a dyad-based theory, as the foundation for a diabetes mellitus management couples-based pilot program and found that promoting collaborative communication between the partners yielded meaningful clinical improvements in medical outcomes. Effective communication and collaborative problem solving were also targeted in a family-based weight loss/maintenance intervention for Black adults with type 2 diabetes with successful outcomes.[16] However, 81% of the sample was female; the effectiveness of this approach among men is uncertain given the low male participation.

Research suggests that individuals in romantic relationships have both individual and joint influence on each other's health practices; [173] individuals in relationships affect their own health behaviors and that of their partners' health behaviors. Longitudinal studies have investigated associations between marital status and health behaviors among men. Marriage was associated with decreased physical activity and increased fruit and vegetable intake; divorce, however, was associated with reduction in Body Mass Index (BMI).[14] These data highlight varying spousal influences on weight and related behaviors. Moreover, couple-based interventions addressing relationship functioning have had more success than interventions not targeting relationship dynamics.[174] Taking advantage of the individual and mutual influence and targeting improvements in couple functioning may be a better target of couple-based interventions.

Together Eating & Activity Matters (TEAM) was a culturally adapted weight loss intervention developed for Black men that used interdependence theory to inform spousal

support enhancements to a standard behavioral weight loss intervention. The results of a randomized pilot study with 40 couples have been reported (Alick et al, under review). Briefly, the partner intervention produced weight loss of 4.7 kg ±8.04 at 3 months compared with 3.4 kg±5.9 in the standard intervention. To follow up on those findings, the present study is conducted to determine the effects of a couples-based weight management intervention (TEAM) on key variables targeted by the intervention such as family/couple functioning, social support, self-regulation, and self-efficacy. Additional aims of this research were to examine the association of the support variables and changes in weight. Figure 2.1 depicts the conceptual framework used to guide the development of the intervention and this analysis. The TEAM intervention was hypothesized to improve couples' functioning, thereby improving the quality and quantity of social support provided to Black men for changing diet and activity behaviors to facilitate weight loss. By examining the theoretical constructs targeted by the intervention we can learn more about whether the intervention had the intended effects.

VI.B. Methods

Participants

Black men and their partners were recruited through passive (email, social media, and flyers) and active (referral from other participants and personal invitation) strategies. Eligibility criteria included: 1) self-identification as a Black male, 2) cohabitation with self-identified Black girlfriend or wife, 3) aged between 18-65 at time of enrollment, 4) BMI of 25-45 kg/m2, and 5) access to the internet and a personal email at least twice a week. Exclusion criteria included: 1) current enrollment in a weight loss program, 2) self-reported weight loss of 10 lbs or more in the last 6 months, 3) undergoing cancer treatment, 4) a type 1 diabetes diagnosis, and 5) taking medication that affect body weight (e.g., insulin, chronic steroid use).

Procedures

The TEAM intervention aimed to achieve weight loss among Black men using a cohabiting partner as a source of social support. Methods are described in detail in a prior publication (Alick et al, in review) Briefly, participants were randomized to one of two behavioral weight loss programs: a spousal support enhanced intervention or standard behavioral weight loss comparison group. The theoretical framework for the intervention was based on the Social Cognitive Theory and the theory of Interdependence and communal coping. [80] Strategies addressing transformation of motivation (i.e., where an individual's behavior and/or motivation shifts from a self-centered existence to a pro-relationship orientation) and communal coping (i.e., the shared acknowledgement of a health concern by a couple and the joint effort to address and/or manage the threat) were incorporated in the components in the enhanced group. Each intervention was 12 weeks and participants received a standard behavioral weight loss program that included calorie reduction and physical activity prescriptions, individualized weekly feedback, and a digital weighing scale with recommendations for daily weighing. Participants were encouraged to monitor diet and activity behaviors using MyFitnessPal to build self-efficacy and practice self-regulation. Participants in each arm attended group sessions and received weekly emailed lessons. The enhanced arm participants attended group sessions with their partners and a single Couples Skills Training session focused on improving commitment, communication, and social support. Topics in enhanced and standard weight loss groups included navigating high risk situations, learning to incorporate more physical activity and integrating healthy eating into lifestyle, and recognizing cues for unhealthy behaviors. A portion of each session focused on goal setting and scenario-based problem solving. Homework activities were designed to build self-efficacy and practice skill building. In the enhanced groups,

group session activities were completed as couples and at home activities targeted increasing collective efficacy, improving collaborative problem solving, enhancing personal risk perception, and exploring coping strategies (e.g., proactive, anticipatory, preventive, avoidance, support seeking). Participants were weighed in person and completed online questionnaires at baseline and 12 weeks. The study protocol was approved by the Institutional Review Board at the University of North Carolina at Chapel Hill.

Measures

Demographics. Participants completed an online questionnaire to provide information on age, work status, income, marital status, tobacco usage, and medical history.

Weight. Research staff trained in anthropometrics obtained weight (kg) at baseline and at 12 weeks using a digital scale. Participants were weighed with light clothing and no shoes. Two readings were recorded to the nearest 0.1 kg.

Diet. The Automated Self-Administered 24-hour dietary recall (ASA) assessment tool, developed at the National Cancer Institute (NCI) Diet (Caloric Intake), measured daily caloric intake. The assessment tool uses multimedia visual cues, prompts, and an animated character to assist participants when completing the recall. Participants completed up to two recalls at both baseline and post intervention. [151]

Physical activity. The Paffenbarger Physical Activity Questionnaire (PAF)/ (College Alumnus Questionnaire (CAQ) (7-items)[175] was administered by research staff at baseline and post-intervention assessing planned and lifestyle-associated physical activity. Total energy expenditure for the past week was calculated. The PAF was developed to assess physical activity in an all-male population.[176]

Family Functioning. Scales from the Family Context questionnaire used in the Weight Loss Maintenance Trial[13] were used to assess couple dynamics. The themes assessed through the questionnaire were consistent with the constructs (e.g., communication, relationship functioning) necessary to transform motivation and increase communal coping (i.e., theory of Interdependence and communal coping) amongst couples. Below are the subscales used in this study: family communication, family cohesion, emotional involvement and perceived criticism.

Family communication was assessed with the communication subscale (6 items; Cronbach's α= 0.54) of the McMaster Family Assessment Device,[177] as an indication of family functioning. The measure is based on the McMaster Model of Family Functioning. Communication was defined as the exchange of information among family members. Items focused on whether verbal messages were clear and direct for the intended recipient. Reponses ranged from strongly agree to strongly disagree. Higher scores represent unhealthy communication.

The cohesion subscale (10-items; Cronbach's α=0.86) of the Family Adaptability and Cohesion Evaluation Scale III (FACES III)[178] measured the emotional bonding family members have with one another. Items like "Family members ask each other for help" were rated on a 5-point Likert scale from *almost never* to *almost always*.

The family emotional involvement (7 items; Cronbach's α=0 .71) and perceived criticism (7 items; Cronbach's α=0.81) subscales of the Family Emotional Involvement and Criticism Scale[179] (Cronbach's α= 0.54) measured Items like "I am upset if anyone else in my family was upset" were rated on a 5-point Likert scale from almost never to almost always.

Collaborative Problem Solving. The Family Problem-Solving Communication Index (10-items; Cronbach's α= 0.26)[180] was used to measure the specific communication style that families use to manage and solve problems and conflicts in various types of stressful situations. Consisting of two subscales, affirmatory communication (Cronbach's α= 0.81) and incendiary communication (Cronbach's α= 0.54), the response options were false, mostly false, mostly true and true).

Social Support. Social Support Effectiveness (SSE)–Questionnaire (25 items; Cronbach's α=0.81)[181] measured partner social support effectiveness. The measure included items assessing the quantity and quality (e.g., To what extent did you wish this person's advice or information had been different somehow—for instance, a different type of help, or offered in a different way or at a different time?) on a rating scale ranging from not at all to extremely for three types of support (e.g. emotional, informational and instrumental). The measure also assessed negative byproducts of support provided (e.g., feelings of guilt or indebtedness); responses options were Yes or No. Total scores ranged from 0 to 80, with higher scores indicating more effective support.

The Social Support and Eating Habits Survey (SSEH) (10 items; Cronbach's α=0.72)[182] measured enacted social support specific to healthy eating. Subscales assessed encouragement for eating behaviors from partners (e.g., Encouraged me not to eat "unhealthy food" when I am tempted) (Cronbach's α=0.90) and discouragement for eating behaviors from partners (e.g., Brought home foods I am trying not to eat) (Cronbach's α=0.74). The items were rated on a scale of *none* to *very often*. Total scores ranged from 5 to 50, with higher scores indicating more social support for eating behaviors.

The exercise participation subscale of the Social Support and Exercise Survey (SSE) (10 items; Cronbach's α=0.90)[182] measured enacted social support specific to exercise behaviors. The subscale assessed the level of support for exercise from partners. Subscale example items included, "Exercised with me," and "Criticized or made fun of me for exercising." Total scores ranged from 5 to 50, with higher scores indicating more social support for exercise participation behaviors.

Self-regulation. The Eating Behavior Inventory (EBI) (20-items)[183] measured the adoption of eating behaviors associated with weight loss (e.g., monitoring quantity eaten, frequency of weighing, shopping from a list) and has been shown to be sensitive to behavioral interventions. More specifically, the EBI measured self-regulation behaviors. These items are rated on a 5-point frequency scale from *never or hardly ever* to *always or almost always*. Scores range from 26 to 130.

Self-efficacy. The Weight Efficacy Life-Style Questionnaire (WEL) (20 items; Cronbach's α=.0.93)[184] measured individual's perceptions of their ability to control their weight related to eating patterns and attitudes at baseline and post intervention (e.g., self-efficacy). Five situational factors, Negative Emotions, Availability, Social Pressure, Physical Discomfort, and Positive Activities, were rated with a 10-point scale ranging from 0 (not confident) to 9 (very confident), with higher scores indicating greater self-efficacy. Scale scores are calculated by adding the four items in each scale, and a total WEL score by adding all items.

The confidence subscale of the Patient-centered Assessment & Counseling for Exercise (PACE+) Adult Diet and Physical Activity Measure (6 items; Cronbach's α= 0.87)[185] measured confidence in participating in regular exercise or physical activity in different situations (e.g.,

How confident are you that you would participate in regular exercise or physical activity: When I am tired.?) Items were rated on a scale from 1 (not at all confident) to 6 (extremely confident).

Statistical Analysis

Data were double-entered for verification. Selected baseline characteristics were compared between the standard treatment and enhanced group using 2-sample t-tests for continuous variables and chi-square tests for categorical variables. Change scores for psychosocial factors—family functioning, social support, self-efficacy, and self-regulation—variables were calculated by subtracting the values at baseline from values at 12 weeks. Between-group differences were compared using simple linear regression and effect sizes. Effect sizes reveals the size of the effect between the two groups[186] because given the small sample size, the probability of observing statistical significance was reduced. Further, the associations between changes in psychosocial factors in relation to weight loss were examined using Pearson's correlation.

As a result of the exploratory nature of this study, we were particularly attentive to moderate effect sizes ($d>0.4$) because they represent meaningful differences between groups.[186] Cohen classifies a medium effect as $d=0.5$ and $d= .2$ as a small but not trivial effect. [186] We also were attentive to $p<0.20$ to indicate important relationships to consider for future investigations because this value corresponds with the moderate effect value selected.[187] There were adjustments for baseline variables in the regression models because of differences in groups at baseline and to calculate more precise change scores. SAS software (Version 9.4, SAS Institute, Cary, NC) was used for all analyses.

VI.C. Results

Table 6.1 shows baseline characteristics by study group. On average, participants were 47.3 ± 11 years of age, obese (BMI: 35.0 ± 6.1 kg/m^2), with a baseline weight of 112.7 kg ± 22.8. Most participants reported being married (90%), having a college degree (67.5%), working full time (85%), and having a yearly income of $60,000 or more (60%). At baseline, participants reported an average caloric intake of 2219.0 ± 1037.2 kcal per day and an average energy expenditure of 938.6 + 1387.2 kcal per week. There were significant baseline differences in social support effectiveness, task support effectiveness, emotional involvement, and self-efficacy for physical activity between the enhanced and standard groups. At 12 weeks, 100% of participants were weighed and 87.5% (35) completed the PAF and 24-hour dietary recalls. All 40 participants (100%) completed the online baseline questionnaire and 38 (95%) completed the post-intervention questionnaire after 12 weeks; the remaining two participants were not able to complete the online questionnaire within the assessment window.

Family functioning

Table 6.2 presents family functioning changes over time. When adjusting for baseline values, differences between the enhanced and standard group in communication, incendiary communication, family cohesion and emotional involvement yielded moderate effect sizes. These changes were not in the expected direction among participants in the enhanced group when compared to participants in the standard group. Communication among the enhanced group decreased (β = -0.40, t (1) = -1.93, p=0.06, d=0.64) compared to the standard group. Incendiary communication, however, increased in the enhanced group (β =-1.07, t (1) = -1.33, p= 0.19, d=0.44) compared to the standard group. Similarly, in the enhanced group, family cohesion (β = 4.10, t (1) = 2.20, p= 0.03, d=0.76) and emotional involvement (β = 2.81, t (1) = 2.17,

p=0.04, d=0.77) decreased over 12 weeks whereas these variables did not change in the standard group. There were no differences between groups in the other family functioning variables.

Social Support, Self-Regulation and Self-efficacy

Table 6.2 also presents changes in social support, self-regulation, and self-efficacy. There were no differences between groups in the different dimensions of social support, self-regulation or self-efficacy for eating.

Associations between Social Support and Weight in Study Sample

Weight loss was associated with social support effectiveness (r=-0.44, d= 0.008), as well as several of its subscales including task support effectiveness (r=-0.32, p=0.05), emotional support effectiveness (r=0.25, p=0.14), and negative effects of social support (r= -0.34, p=0.04). Social support for eating discouragement was associated with weight loss (r= -0.32, p=0.06). In contrast, informational support effectiveness was not related to weight loss (r=-0.18, p=0.28).

VI.D. Discussion

The primary purpose of this paper was to examine the effect of a spousal support-enhanced behavioral weight loss program on psychosocial variables that were targeted by the intervention. This study explored the relationships between the intervention and aspects of family functioning (e.g., communication, problem solving communication, cohesion, perceived criticism and emotional involvement), social support (e.g., social support effectiveness and social support for eating and exercise), self-efficacy for eating and exercise, and self-regulation behaviors for weight loss among Black men. In this intervention, couples attended groups together and worked on communication. Findings revealed that, compared to a standard behavioral weight loss intervention, the spousal support enhanced behavioral weight loss

program produced greater negative effects on aspects of family functioning such as family communication, cohesion, and emotional involvement compared to a standard treatment where men attended weight loss groups without their spouse.

Unexpectedly, we found that Black men who participated with their partners were more likely to report worsening in their functioning with their partner compared to Black men who participated alone. For example, family cohesion and emotional involvement decreased in the enhanced group and were lower than in the standard group. Incendiary communication, a communication characterized with inflaming an already bad situation, increased in the enhanced group and was higher than in the standard group. Thus, while this study showed that participating with a partner produced an additional 1 kilogram of weight loss in the men (d=0.18) and 2 kgs in their partners compared to the standard, the enhanced intervention appeared to decrease couple functioning. The shift to unhealthier functioning, however, is perhaps understandable. Initial weight loss may have resulted in more arguments or contentious interaction within romantic relationships. One study found an association between increases in depressive symptoms and increases in eating restraints at 10 kg of weight loss in a sample of men who were obese.[188] Among a study sample of patients who had experienced a myocardial infarction and/or coronary artery bypass graft surgery, a spouse/partner's attempts at support may have facilitated or interfered with patient behavior change.[189] Communicating about lifestyle change was interpreted as undesired control or criticism by patients or resulted in patients feeling empowered through collaborating with their partners to take control of their health. An individual’s coping strategies can influence their partner’s coping strategies, meaning a man experiencing stress from attempting weight loss may engage negatively with his partner. The partner may or may not communicate or interact negatively in response.[190] The potential negative

byproducts of weight loss can strain a relationship; positive dyadic coping strategies can preserve couple dynamics and long-term satisfaction.[190] Partners can also be a source of negative interaction. Weight loss is a sensitive topic and requires consistent focus on changing diet and activity behaviors. Partners who cohabitate may witness their significant other's failure to make the necessary changes to facilitate weight loss. In such relationships, there are increased opportunities to point out or acknowledge a partner's behavior and this may not always be welcomed.

Given the short-term nature of the study, it is not known whether the effects of the intervention are lasting or dissipate over time as the desired behaviors change and the desired goals are achieved. An increase in incendiary communication may not only be unavoidable but also may provide some benefit. While the intervention resulted in poorer family functioning, an increase in incendiary communication may suggest there was an increase in or shift to more open and honest communication. Over communication increased in the enhanced group. It has been suggested that negative behaviors (e.g., negative or incendiary communication) can help partners resolve problems and lead to long term relationship satisfaction. Wives' "anger" can motivate "partners to bring about desired change."[191-193] Some Black men have adopted hypermasculine traits in response to the stressful environment created by society;[194] this hypermasculinity can discourage the collaborative problem solving and communication needed to foster acceptance of healthy ideas and address health concerns.[195] However, results from this study suggest that Black men engaged in collaborative problem solving. Incendiary communication, a subscale of the FEICS measure, suggests problem solving among enhanced couples increased but through negative communication. Masculinity, however, is a trait more generally common among all men. Many studies have found men self-disclose less about personal problems when compared to

women.[196] It is unknown whether a spousal support enhanced intervention aimed to improve couple functioning would produce similar results in non-Black men.

The TEAM Couples Skills Training specifically addressed one potential negative effect of partner involvement–social control, where a partner attempts to influence or regulate one's behavior can be positive or negative. Social control can lead an individual to perform the desired behavior change; however, it may also be accompanied by expressions of negative emotions and attempts to make the person feel bad for his or her health behavior, e.g., through criticism and guilt. Some research suggests that positive social control is associated with engagement in health enhancing behaviors and negative social control is associated with health compromising behaviors. However, these associations may be mediated by an individual's readiness to change.[197,198] Participants' decisions to enroll in a weight loss program can be an indicator of readiness. The increase in incendiary communication in the enhanced group, despite aspects of the couples' communication session and weekly activities that focused on active listening and avoiding negative socially controlling behaviors, may have been more positively received by the individual because he was ready to lose weight. The enhanced intervention employed one communication skills training session prior to beginning the 12-week weight loss program and integrated weekly at-home and group session activities which focused on communal coping and transformation of motivation concepts. It is possible that this was an insufficient dosage of exposure to content and skill building to result in the desired improvements in family functioning. While attendance at the training session was measured, completion of at-home couples' activities was not assessed. Future studies should consider ways to measure dose received or extent to which intervention components are completed at home and also increase training in reducing social negative control or address perceived criticism in the communication

exercises. Lastly, future studies may also address strategies to encourage open and honest dialogue in less incendiary environments.

Family or partner cohesion, the emotional bond family members have for each other, appears to have decreased in the enhanced group. However, the decline in cohesion remains within the range of "connected" (33.01-39.19) on the cohesion spectrum; the spectrum ranges from disengaged (10.00-26.81) to enmeshed (39.20-50.00). "Connected" family cohesion suggests functioning with a balance of togetherness and separateness; this represents optimal functioning or "balanced" family functioning when assessed as the curvilinear relationship proposed by Olsen. Functioning at either extreme category (e.g., disengaged or enmeshed) may predict long term problems.[199] The factors of cohesion are the I-We balance, closeness, loyalty and independence/dependence scale; the "connected" ness in this study suggest enhanced couples were not fully transformed in their motivation to work together because they were not operating as "We," yet. Couples also showed moderate to high closeness, high loyalty and interdependence, more specifically, expressing more dependence than independence. The negative shift toward "separated" cohesion suggest these Black couples enrolled with optimal functioning at baseline. In other research, family cohesion has been found to be a predictor of successful weight loss among Blacks. [13] This association was not present among Whites. Preserving the existing cohesion present among Blacks or identifying the strategy to enhance or shift couples to functioning as "We" would be the next step in couples-based weight loss program. However, as stated previously, identifying the dose enacted of intervention components would be useful in determining if the intervention did not address the importance of working together to achieve weight loss.

Cohesion has also been found to be associated with emotional involvement and social support;[200] thus, the apparent decline in emotional involvement in the enhanced group was unexpected. It is unclear whether high levels of emotional involvement, a dimension of the Expressed Emotion (EE) Theory, is important for successful weight from the perspective of the individual attempting to lose weight.[200] There are some circumstances where a high level of emotional involvement is needed and others where it is not needed.[200] Men in the standard group reported a potential increase in emotional involvement from their partner despite men in the enhanced reporting a slight advantage in weight loss with a potential decline in emotional involvement. This suggests that couples in the enhanced group may have communicated that there was less of a need for emotional involvement and partners made adjustments, given communication increased in the enhanced group. Other measures have evaluated emotional overinvolvement, suggesting emotional involvement can produce negative effects. Research has shown that families with high levels of expressed emotion can be more critical and intrusive in face to face interaction.[200] The decline in emotional involvement may represent a shift to more "balanced" functioning. A qualitative analysis assessing the potential shifts in cohesion and emotional involvement, would help with the interpretation of these results.

The conceptual framework for the intervention targeted improvements in family functioning as a means to achieve greater social support and social support effectiveness. There were no between group differences on these aspects of social support. Lack of improvement in family functioning described above may provide one explanation for the lack of improvement in social support measures. Improvements in communication between couples and improvements in cohesion and emotional involvement were proposed to facilitate the couple's ability to request and provide the needed support in ways that were most beneficial to the recipient. Rini suggests

dispositional characteristics (e.g., poor relationship quality or long-standing patterns of ineffective support) would reduce the effectiveness of partner support.[181] However, couples who decide to enroll in a weight loss intervention as a team may already be fairly high functioning and supportive compared to couples who would not consider enrolling together. Therefore, these couples should possess the dispositional characteristics needed as a precursor to provide support effectively. This is one explanation for the lack of improvements in social support among both groups. Another potential explanation given the potential for high functioning couples, it that the approach used here, to improve family functioning as a means to increase support may be more effective for men with low social support at baseline (Appendix D). For social support effectiveness, participants in both groups with low social support at baseline, on average lost 2 kg more than participants categorized with high social support effectiveness as baseline.

Though the intervention did not result in the desired differential changes in social support overall, the importance of social support in health behavior change is well documented[201] and identifying strategies to enhance social support and the way it is delivered is important. More specifically, identifying the types of social support that are most predictive of healthier habits may be a useful direction for future research. This investigation attempted to distinguish which types of effective support (e.g., the skill in which support is provided and its appraisal by the recipient) are important. As individuals provide more than one type of support at a time, distinguishing between the contribution of each type of support has been difficult.[87] The Social Support Effectiveness questionnaire that assesses both the quality and quantity of functional support, i.e., task, (instrumental/tangible), emotional, and informational, may be useful in weight loss studies to help enhance skills for providing support, translating to better outcomes. Social support effectiveness describes how well the types of support provided meet the needs of the

recipient. It also addresses whether the recipient experienced negative byproducts of receiving support, for example, guilt. In this study, most types of effective social support were associated with weight loss. Informational support from partners, however, was not associated with weight loss. This may suggest that information does not need to be provided skillfully, but simply provided. Informational support is a predominate form of support in weight loss. Behavioral interventions are designed to provide information for behavior change to facilitate weight loss. Therefore, informational support from a partner may not be as important because information is both being obtained from other sources and it is meeting the needs of the recipient. This may be a first step to look at ways to increase quality of provision of those types of support by partners in weight loss.

This study had several strengths. The data for this analysis were from a randomized controlled pilot study allowing us to infer causal relationships between changes in theoretical constructs and the intervention. Also, we included multiple measures of social support to assess support from different dimensions. The Sallis Social Support for Eating and Exercise survey, a valid and reliable measure of social support, was used in addition to a measure of social support effectiveness. The Social Support Effectiveness questionnaire examined different types of social support and the quality and quantity of support given. The study and results add to the paucity of research literature evaluating behavioral and theoretical constructs among Black men attempting weight loss.

However, this study had several limitations. First, this study used novel, though untested measures for theoretical construct of transformation of motivation because, to our knowledge, published measures were unavailable. Previously, researchers have used in-depth interviews to access transformation of motivation and communal coping between partners. Therefore, this

study cannot be compared to results from other studies. Second, we did not include qualitative methods to investigate the shifts in family functioning. A short semi-structured interview pre- and post- intervention would provide insight to the shift in family functioning in both groups. Additionally, all measures were self-report. There is a potential for recall bias and social desirability in reporting dietary and physical activity behaviors and family functioning.

This study adds to the limited literature on the psychosocial factors influenced by partner involvement in weight loss interventions. More importantly, to our knowledge, it is the first evaluation of family functioning measures in weight loss among a study sample where the index partners were all Black men. The changes observed resulted in a 1% greater increase in weight loss among participants who participated with their partner. Together these findings suggest future research should 1) investigate strategies to improve or preserve those aspects of family/couple functioning associated with weight loss such as communication and cohesion, 2) assess the long-term impact of the intervention on family functioning, and 3) use a mixed - method approach to assess shifts in family functioning. A logical next step may be to try to anticipate and address the negative effects of partner involvement with a more intensive intervention.

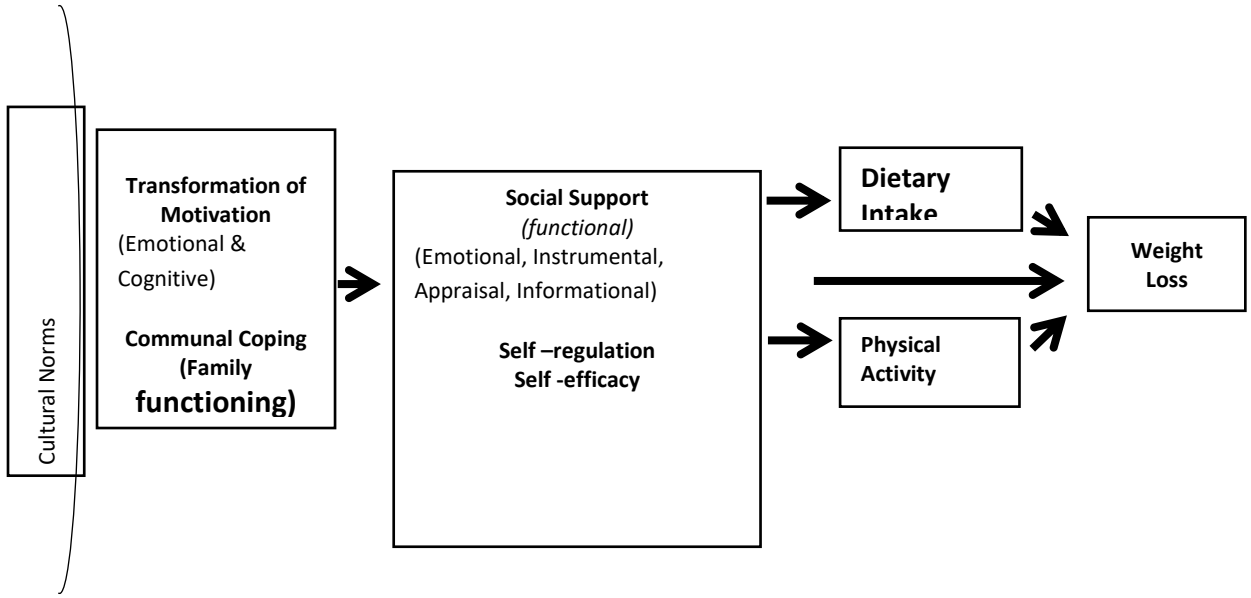

Figure 6.1 Conceptual Model

Table 6.1 Baseline characteristics of TEAM Male Participants

Variable	All (n=40)	Standard Treatment (n=19)	Enhanced (n=21)	p-value
Age, years	47.4 ± 11	46.0 ± 12	49.0 ± 10	0.43
Education level, n (%)				0.91
Less than College	13(32.50)	6 (31.58)	7(33.33)	
College or more	27(67.50)	13 (68.42)	14(66.67)	
Marital Status, n (%)				0.33*
1=Married	36(90.0)	16 (84.21)	20 (95.24)	
6=Living with Partner	4(10.0)	3(15.79)	1(4.76)	
Employment, n (%)				0.21*
Working full-time	34(85.0)	15(78.95)	19(90.48)	
Working not-time	6(15.0)	4(21.05)	2(9.52)	
Income, n (%)				0.41*
less than $60,000	12(30.0)	6(31.58)	6(28.57)	
$60,000 or more	24(60.0)	10(52.63)	14(66.67)	
Prefer not to answer	4(10.0)	3(15.79)	1(4.76)	
Tobacco User, n (%)				1.00*
Yes	1(2.50)	0 (0)	1(4.76)	

No	39(97.50)	19(100)	20(95.24)	
Weight, kg	112.7 ± 22.8	114.2±20.8	111.3 ± 24.9	0.69
BMI, kg/m^2	35.0± 6.1	35.2± 6.2	34.9± 6.2	0.85
Energy intake, kcal/day	N=37 2219.0± 1037.2	N=18 2344.8±1171.3	N=19 2099.8±908.3	0.48
Energy Expenditure, kcal/ week	938.6 ± 1387.2	1423.4±1822.0	500.0±582.7	0.05
FAD: Communication	2.18 (0.53)	2.12 (0.66)	2.22 (0.40)	0.57
FPSC: Incendiary communication	4.18 (2.51)	3.95 (2.83)	4.38 (2.22)	0.59
FPSC: Affirmatory communication	11.25 (3.32)	10.89 (3.96)	11.57 (2.68)	0.53
FACES III: Cohesion	36.55(6.50)	37.71 (5.28)	35.62 (7.34)	0.33
FEICS: Emotional Involvement	14.50 (4.60)	16.12 (3.46)	13.19 (5.06)	0.05
FEICS: Perceived Criticism	6.11 (4.74)	5.65 (4.86)	6.48 (4.72)	0.60
Social Support Effectiveness	52.62(9.42)	50.22 (9.55)	54.67 (9.04)	0.14
Task Support	12.13 (2.58)	11.17(2.73)	12.95 (2.18)	0.03
Informational Support	12.23(1.72	11.89(1.53)	12.52 (1.86)	0.26
Emotional Support	12.31(2.55)	12.06(2.48)	12.52 (2.64)	0.57
Negative effects of Support	12.95 (5.18)	15.11(5.50)	16.67 (4.91)	0.36

Social Support Eat: Encouragement	14.95 (5.92)	13.58(6.26)	16.00 (5.50)	0.20
Social Support Eat: Discouragement	14.33 (5.13)	13.37(4.56)	15.19 (5.56)	0.27
Social Support Exercise: Participation	24.80 (9.78)	25.00(8.96)	24.62 (10.69)	0.90
EBI	72.05 (8.13)	72.37 (8.31)	71.76 (8.15)	0.82
WEL	155.83 (32.63)	158.1 (32.24)	153.8 (33.65)	0.69
PACE Self-efficacy	3.89 (0.80)	4.15 (0.54)	3.66 (0.92)	0.05

Table 6.2 Unadjusted and Adjusted Changes in Psychosocial Variables

	Unadjusted					Adjusted^				
	Change from Baseline to 12 weeks		Pooled Diff	p-value	Effect size	Change from Baseline to 12 weeks		Pooled diff	p-value	Effect size
Family Functioning	**Standard N=16**	**Enhanced N=21**				**Standard N=16**	**Enhanced N=21**			
FAD: Communication	-0.12 (1.09)	0.19 (0.37)	-0.31 (1.21)	0.25	0.38	-0.17 (0.60)	0.23 (0.65)	0.04 (0.65)	0.06	0.64
FPSC: Incendiary communication	-0.44 (3.31)	0.43 (2.27)	0.49 (1.98)	0.35	0.31	-0.55 (2.43)	0.52 (2.43)	0.05 (2.43)	0.19	0.44
FPSC: Affirmatory communication	0.25 (1.81)	-0.24 (2.10)	0.49 (1.98)	0.46	0.25	0.15 (1.85)	-0.16 (1.85)	-0.03 (1.84)	0.61	0.17
FACES III: Cohesion*	1.43 (6.12)	-2.10 (6.12)	3.52 (6.12)	0.10	0.58	1.77 (5.38)	-2.33 (5.38)	-0.69 (5.37)	0.03	0.76
FEICS: Emotional Involvement*	0.50 (4.13)	-1.29 (3.78)	1.79 (3.92)	0.20	0.45	1.12 (3.68)	-1.70 (3.65)	-0.57 (3.59)	0.04	0.77
FEICS: Perceived Criticism*	0.71 (2.95)	0.52 (4.49)	0.19 (3.95)	0.89	0.33	0.64 (3.70)	0.57(4.53)	0.60 (3.70)	0.96	0.02

	Change from Baseline to 12 weeks		Pooled diff	p-value	Effect size	Change from Baseline to 12 weeks		Pooled diff	p-value	Effect Size
Social Support	**Standard N=15**	**Enhanced N=21**				**Standard N=15**	**Enhanced N=21**			
Social Support Effectiveness	4.00 (11.22)	2.05 (8.25)	1.95 (9.58)	0.55	0.20	3.29 (9.67)	2.56 (9.61)	2.86 (9.46)	0.83	0.08
Task Support	1.13 (3.16)	-0.29 (2.61)	1.42 (2.85)	0.15	0.56	0.82 (2.91)	-0.06 (2.88)	0.31 (2.80)	0.39	0.30
Informational Support	0.53 (2.80)	0.67 (2.35)	-0.13 (2.55)	0.88	0.05	0.50 (2.61)	0.69 (2.60)	0.61 (2.58)	0.83	0.07
Emotional Support	1.27 (3.41)	1.19 (3.01)	0.08 (3.18)	0.94	0.20	1.12 (3.00)	1.30 (3.00)	1.22 (2.99)	0.86	0.06
Negative effects of Support	1.07 (6.67)	0.48 (4.98)	0.59 (5.73)	0.76	0.10	0.34 (4.84)	0.99 (4.83)	0.72 (4.79)	0.70	0.13
Social Support Eat: Encouragement	3.63 (5.51)	1.76 (5.50)	1.86 (5.51)	0.32	0.34	2.68 (4.82)	2.48 (4.79)	2.57 (4.71)	0.90	0.04
Social Support Eat: Discouragement	-0.31 (4.77)	-2.00 (6.66)	1.69 (5.93)	0.40	0.29	-0.86 (5.07)	-1.59 (5.07)	-1.27 (5.04)	0.67	0.14
Social Support Exercise: Participation	4.63 (9.78)	5.71 (8.98)	-1.09 (9.33)	0.73	0.12	4.45 (8.77)	5.85 (8.77)	5.24 (8.77)	0.63	0.16

	Change from Baseline to 12 weeks		Pooled Diff	p-value	Effect size	Change from Baseline to 12 weeks		Pooled diff	p-value	Effect size
Other Psychosocial Variables	**Standard N=16**	**Enhanced N=21**				**Standard N=16**	**Enhanced N=21**			
EBI	12.50 (8.85)	9.90 (12.35)	2.60 (10.99)	0.48	0.24	12.31 (10.86)	10.05 (10.85)	11.03 (10.84)	0.53	0.21
WEL	1.38 (17.78)	4.90 (21.30)	-3.53 (19.86)	0.60	0.18	1.82 (19.13)	4.57 (19.12)	3.38 (19.10)	0.67	0.14
PACE Self Efficacyɨ	-0.09 (0.62)	0.32 (0.87)	-0.41 (0.77)	0.13	0.54	0.09 (0.64)	0.19 (0.64)	0.15 (0.62)	0.66	0.16

^ Adjusted for baseline values

***N=14**

ɨN=15

Table 6.3 Pearson Correlation Coefficients Changes

	Social Support Effective	Task Support	Informatio nal Support	Emotional Support	Negative Support	Social Support for Earing Encourage	Social Support for Eating Discourage ment1	Social Support for Exercise Participatio	Weight Loss
Social Support Effective									
Task Support	**0.69** **<.0001**								
Informational support	**0.53** **0.0009**	**0.51** **0.002**							
Emotional Support	**0.73** **<.0001**	**0.50** **0.002**	**0.50** **0.002**						
Negative Support	**0.68** **<.0001**	**0.15** **0.38**	**-0.09** **0.59**	**0.19** **0.26**					
Social Support for Eat Encouragement	**0.38** **0.02**	**0.39** **0.02**	**-0.03** **0.84**	**0.13** **0.44**	**0.37** **0.03**				
Social Support for Eat Discouragement	**0.23** **0.19**	**0.06** **0.72**	**-0.03** **0.85**	**0.10** **0.58**	**0.31** **0.07**	**0.13** **0.45**			

Social Support for Exercise Participation	**0.06** **0.72**	**0.13** **0.44**	**0.04** **0.82**	**-0.07** **0.70**	**0.06** **0.75**	**0.33** **0.04**	**0.46** **0.004**		
Weight Loss	**-0.44** **0.008**	**-0.32** **0.05**	**-0.18** **0.28**	**-0.25** **0.14**	**-0.34** **0.04**	**0.15** **0.39**	**-0.32** **0.06**	**-0.12** **0.48**	

CHAPTER VII: SUMMARY AND RECOMMENDATIONS

VII.A. Summary of Findings

The goal of this research was to evaluate whether the involvement of a romantic partner is an effective strategy to produce significantly more weight loss among Black men compared to a traditional weight loss intervention with no partner involvement. Major findings of this dissertation are as follows: 1) Black men and women in romantic relationships report similar triggers and barriers/facilitators to weight loss as other Black populations and the general population; therefore, findings did not support the need to adopt different language or messages to recruit and engage this population for weight management research; 2) from a retrospective view, partner involvement facilitates weight loss and improvements in healthy eating and physical activity through the provision of support; 3) there is a preference for working together to improve diet, but not for increasing physical activity, among Black romantic couples; 4) a spousal support-enhanced weight loss program was effective for producing a 1% difference (though non-significant) in weight loss and improving other outcomes (e.g., female partner weight loss, energy expenditure); 5) the program demonstrated the feasibility for retaining 100% of Black male participants; 6) there was a positive correlation between partners' weight losses and male's weight loss; and 7) a spousal support-enhanced weight loss program unexpectedly produced a shift to more unhealthy relationship functioning among couples. The spousal support-based program did not produce significantly greater weight loss than a standard weight loss intervention among Black men, however, findings suggest that participation as a couple is

beneficial given the positive weight loss among participants and significantly greater weight loss observed in their female partners. Men participating without their partners also lost weight over time. Thus, this research demonstrates the feasibility of either approach, providing an alternative to Black men who prefer to participate with or without a partner, as both study groups showed improvements in percent weight loss that would confer CVD benefits.

Current efforts to reduce the disparities in rates of mortality and morbidity Black men experience need to be expanded. In 2009, among non-Hispanic Blacks, age 20 years and older, 44.4% of Black men had CVD.[145] In 2014, the rate increased to 46.0%.[202] CVD caused 46,334 deaths among Black men in 2009, and 49,210 deaths in 2014. The rates of weight-related chronic conditions have increased and additional efforts are needed to reduce these disparities. NHANES II, to our knowledge, the most recent dataset to report consumption for race by gender, suggest Black men are not meeting the recommendation for fruit and vegetable intake [203] and are less active than White men. Taking these factors into consideration and the current prevalence of obesity among this population, Black men would benefit from enrollment in behavioral interventions. Behavior interventions that consider sociocultural factors (e.g., the value of family and its association with interdependence) have the potential to have long-term effectiveness compared to interventions that do not.[16,17,164,165] Such programs may increase the percentage of Black men in study samples because they are more attractive to the population, and may also increase the efficacy of evidence-based programs.

It is not clear whether involving a family member, more specifically, a romantic partner, is more effective than approaches that have previously achieved weight loss in Black men (e.g., participating alone, participating with a group of peers, online programs). Although evidence from this study did not show greater weight loss among male partners participating with their

spouse, this dissertation research holds appeal from a qualitative perspective, based on interviews conducted retrospectively with romantic partners. Both groups included men who had a supportive partner; therefore, it is unknown whether the positive weight losses could be attributed to a weight loss program designed specifically for Black men or for men who have supportive partners at home, regardless of whether they participated or not. Additionally, our sample was not representative of the general population of black males as the men did not present with chronic conditions and thus may be considered the worried-well. They were also highly educated. Thus, additional intervention research is necessary with supported and non-supported men from a more diverse population of Black men.

Because participation in behavioral weight loss interventions is low among Black men,[4-6] very little is known about this population. The information in the dissertation contributes to the design and delivery of weight loss interventions for Black men in four ways. First, it contributed to our understanding of the motivations and perceived facilitators/barriers associated with successful weight loss among Black men and their partners. Second, it demonstrated the feasibility of retaining Black men in a behavioral weight loss intervention enhanced with a couple's component. Third, it assessed the preliminary efficacy of an enhanced, theory-based, couples-centered intervention on weight and weight-related variables compared to a standard behavioral weight loss program. Fourth, it provided insights into the effects of the intervention on changes in family functioning and other psychosocial factors.

In the first aim presented in Chapter IV, we conducted a formative evaluation using in-depth interviews of Black men and their romantic partners (female) to identify triggers to weight loss and barriers/facilitators for improving weight-related behaviors (e.g. healthy eating and being active) and couple functioning within the context of one or both attempting to lose weight.

Motivation for losing weight included health scares, disease risk reduction and prevention, and sustaining optimal daily functioning, which are similar to other reported motivations or triggers for weight loss among other samples of Blacks and the general population.[131] Being in a committed relationship was an additional reason to lose weight; individuals desired to improve their lifestyle or daily functioning to be their best for their partner. Partners reported being both supportive and unsupportive. In very few cases, only one partner was attempting or had lost weight. Both men and women reported common barriers and facilitators to weight loss and changing behavior (e.g. partner involvement, time, availability/choice, discipline, and knowledge). When reporting instances of negative effects of partner involvement, men reported instances of nagging and women reported instances of sabotage or encouragement for engagement in behaviors not in line with goals.

Overall, both men and women reported a preference for working with their partner to improve eating habits, but were indifferent or preferred not to work together to become more active. These findings helped identify the appropriate language to engage this population to participate in weight loss interventions by referencing those factors most important to them from their perspectives. It also provided specific examples of partner involvement that were considered helpful (and not helpful), which were incorporated into activities and tips in the pilot study. For example, partners were considered helpful when providing emotional support through "lip service" or when taking care of children, while the other partner takes time to exercise. However, some partners brought home tempting foods or were not interested in riding bikes with their partner; these are instances where partners wished for more support, providing specific examples of behaviors to avoid. Examples of partner involvement cited from the interviews did

not reflect partner preferences; taking into consideration these participants were successful in losing weight, preference may be less important than needs.

In the second aim (Chapter V), we designed and evaluated the feasibility and tested the preliminary efficacy of a spousal support weight loss intervention (TEAM) for Black men and their romantic partners compared to a standard behavioral weight loss intervention. Black men and their partners (n=80 or 40 pairs) were successfully recruited primarily through face-to-face contact (e.g., attendance at a community presentation or referral from a current participant). Consenting participants were randomly assigned to one of two groups and either participated in a couples' skills training and subsequent weight loss group sessions with their romantic partner (enhanced group) or participated in weight loss sessions alone, without their partner or the couples' skills training (standard group). Each group received feedback on weight and weight related behavior progress and weekly lessons and were instructed to self-monitor using an online/mobile diary over the course of 12 weeks. We objectively measured body weight, blood pressure, and waist circumference, self-reported weekly energy expenditure, and daily caloric intake, Interdependence and Social Cognitive Theory (SCT) variables, and process-related variables. We hypothesized that participants in the enhanced group would report more weight loss at 12 weeks relative to the standard group.

Although percent weight loss over 12 weeks was significantly reduced from baseline in both groups (standard: -3.0% (6.0), p=0.05; enhanced: -4.0% (5.0), p=0.001), there was no significant difference between groups. Waist circumference also decreased significantly in both groups (standard: 2.9 cm (4.0), p=<.0001, enhanced: 4.7cm (5.3), p=<.0001) with no difference between groups. However, only participants in the enhanced group had significant improvement in diastolic blood pressure (9.35 mmHg (8.47), p=0.004), and weekly energy expenditure (826.1

kcal/ week (806.4), p=0.001). Enhanced group participants experienced a moderate reduction in daily caloric intake (593.843 kcal/day (1101), p=0.06). Partner weight loss was also examined as household obesity risk is a metric of interest to the field and may be important for long-term maintenance. In the enhanced group, partners had a significant decrease in weight (2.24%) compared to a non-significant weight reduction in the standard group (0.15%).

In the third aim (Chapter VI), we explored the psychosocial factors that were targeted by the intervention such as family functioning, social support, self-regulation and self-efficacy. We found that factors of family or couples functioning may have shifted in unexpected directions among the enhanced group. Family cohesion and emotional involvement may have decreased and incendiary communication may have increased over time in the enhanced group compared to the standard group. There were no between-group differences over time in social support effectiveness, social support for eating encouragement, or social support for exercise participation; similar findings were found with self-regulation and self-efficacy. We hypothesized that changes in family functioning would result in changes in social support. The lack of an intervention effect on weight described in aim 2 may partly be explained by the lack of change or change in the unexpected direction in psychosocial constructs targeted by the enhanced intervention from baseline to 12 weeks.

VII.B. Recommendations

Aim 1

The results from Aim 1 highlight the supportive behaviors which facilitate weight loss reported by Black men and women in committed romantic relationships. These specific behaviors may not have been identified without a qualitative approach. Our use of in-depth

interviews allowed for a better understanding of the perspectives of both Black men and women who have attempted and succeeded in losing weight. When compared to focus groups, in-depth interviews permit interviewers to discuss more sensitive topics like weight loss at length with individual participants, allowing for a comprehensive understanding. The information gained from in-depth interviews provided a detailed exploration of individual experiences during weight loss while being in a committed relationship. A potential next step would be to conduct focus groups to gather more in-depth information on these perspectives from a larger and more diverse sample of Black men and women on whether these experiences and perspectives are common among Black men and women in committed relationships and explore any latent variables (e.g., gender, body perception, socioeconomic factors) that may reveal themselves from rich discussion.

Results from this qualitative analysis achieved the overall study goal of understanding the motivations, salient factors, supportive behaviors, and preferences associated with weight loss among Black couples. In particular, the collected information provides a framework for designing weight loss interventions by suggesting the use of partners as a source of social support and highlighting barriers to eating, physical activity, and weight loss to be addressed through the provision of tips and strategies in study materials. Interventions that highlight reported motivations (e.g., improvements in physical appearance, reduction or prevention of disease and improvements in quality of life) for weight loss may better attract this underserved group and also facilitate program engagement and retention. Focused problem solving on reported barriers like time management, navigating availability of bad food choices or not having multiples choices to engage in physical activity, and explicit instructions to enrolled partners on ways to be supportive, might increase intervention effects on primary outcomes.

Furthermore, our study is the first to suggest preferences for working together by weight-related behavior: partners reported a desire to work together to improve eating but cited differences in exercise goals as reasons for being indifferent or not wanting to become more active together. Differences in preferences by behaviors reveal implications for making recommendations or required tasks for involved partners; weight management interventions may design components to assist couples to improve their eating habits together (e.g., joint cooking classes, grocery store tours, meal prep instructions), or assist partners in developing individual activity plans to achieve personal goals.

Finally, while quantitative studies have yielded inconsistent results, this qualitative investigation confirms the benefit of partner involvement and suggests additional efforts are needed to further understand the mechanisms that maximize the advantage of partner participation. However, there are potential limitations. Including only successful weight losers provides limited perspective on couple functioning as it relates to behavior change and weight loss. In the study cited previously of patients who had experienced a cardiac event, communication support from partners was reported as empowering to some patients and undermining to other patients undergoing lifestyle changes in response to a health scare.[189] Including participants unsuccessful at weight loss may provide a comprehensive examination of couple interactions during weight loss. This information could be used to modify the current intervention by addressing reported conflicts or behaviors and providing recommendations or training to cope more efficiently and effectively with similar situations.

We have demonstrated the utility of in-depth interviews to build a framework for spousal support-enhanced weight loss intervention from a sample representing a metropolitan area in North Carolina. However, this limits our information to Black men and women in committed

relationships in other areas. Increasing the geographical representativeness of the sample would elucidate whether the findings of our investigation are present in other areas. Compared to other Southern states (i.e., Georgia, South Carolina, Tennessee and Alabama), a lower percentage of North Carolina adults report consuming fruit less than one time daily (43.7% - 55.6% vs 39.8% - 43.6%, respectively).[204] Similar to other Southern states, North Carolina reports the lowest quantile percentage of adults reporting usually biking or walking to work in the last week (1.2-2.6%) compared to other regions (i.e., Western and Northeastern states), with the majority of the states reporting higher percentage quantiles (3.7% - 4.4 % and 4.5% - 16.9%).[204] Couples in other regions and states may report different needs and barriers for eating healthy and being active based on the norms and practices in their areas, suggested by the differences in lifestyle behaviors reported in North Carolina compared to other states and regions. Continuing to conduct in-depth interviews over the phone is an appropriate method to explore these factors in a more diverse sample. It is cost-effective and increases the ability to reach geographically dispersed potential participants.[205]

As stated previously, most interviewed couples were individuals where both had attempted weight loss, meaning the experiences of individuals where only one partner had attempted to lose weight may not be representative of others' experiences. This limits our generalizability to couples where both individuals have attempted and succeeded in losing weight. These individuals may not report the adverse experiences and instances of negative social control and the negative aspects associated with social support provision that surfaces in times of co-management of diseases or care after a health scare.[206] Making a partner feel judged or guilty for needing to lose weight or acknowledging failures to change behavior are examples of undesired outcomes in relationships where one partner is or has to make lifestyle adjustments

for health reasons. In diabetes self-management where typically one individual has diabetes and a spouse/partner is present to assist in diabetes control, responses to spousal assistance have varied.[207] Some diabetic partners are grateful for spousal efforts, however, others view spousal efforts as annoying and could even promote the unhealthy behaviors.[207] Appraisal support, often grouped with informational, instrumental and emotional, is the form of support characterized by affirmations, feedback, and social comparison and is not always well received by the recipient.[207] Constant reminders of avoiding certain foods or indicators of lack of trust or confidence in a partner's ability to management their health issues can be perceived as offensive or negative.[207] Negative spouse behavior is associated with lower self-efficacy but not well-being or outcome in diabetes self-management.[208] This might explain the 1% greater weight loss among enhanced group male participants who reported shifts to unhealthy relationship functioning when compared to standard group males in the randomized control pilot in AIM 2. Of the three cases where only one partner attempted weight loss in AIM 1, more than half reported the other partner displayed sabotaging behavior. For example, partners brought unhealthy foods home or encouraged excessive drinking. One partner reported their partner nagged as a reminder to stay focus on weight loss goals. In couples where both attempted weight loss, similar behaviors were reported; however, the unsupportive behavior appeared to vary by the level of commitment to weight loss of the negative partner. Measuring level of commitment or motivation to weight loss at baseline may mediate the relationship between support and weight loss among index partners.[208] Recruiting a sample of couples with multiple weight loss outcomes would be advantageous. For example, including couples where: 1) both lost weight successfully, 2) only one couple member attempted and succeeded in losing weight, but also couples where 3) one or both were unsuccessful in losing weight would also determine whether the findings of our

investigation are supported. Asking additional questions evaluating level of commitment to lose weight or assist in weight loss, dedicating additional time to explore negative aspects of weight loss and partner involvement would provide additional information to assist in modification of the current enhanced lifestyle program. Modifications may include increasing participants's awareness of potential negative byproducts, and providing skills to tackling these problems as they arise.

Given the theoretical framework proposed in this study, the use of a dyadic approach to weight loss and investigating relational dynamics and functioning would be informative in identifying the characteristics present or not present in a relationship that facilitates weight loss. For example, prompting participants to discuss verbal and non-verbal communication in soliciting or receiving support or developing interview guides to explore only the negative aspects of weight loss while being in a romantic relationship would help characterize which types of relationships promote positive weight loss experiences. The latter, however, increases negative risks associated with participation; reflecting on negative experiences may strain romantic relationships. Such investigations would need to be limited to being conducted with in an in-depth interview. However, the former can be explored within a focus group as it is a less sensitive topic and would provide the opportunity for fruitful discussion. Guidance from a therapist specializing in couples' processing would be useful in both developing the interview guide and the delivery of the interviews. The current investigation explored partner involvement; the next should gather insight to the dispositional factors (e.g., relationship quality and patterns of support) [181] that make supportive behaviors possible within a relationship.

Aims 2 and 3

Randomized controlled trials on weight loss specifically among Black men to our knowledge are not published. Reduced efficacy and low engagement suggest additional research is needed to identify the strategies to help reduce the disparities in chronic diseases related to obesity among Black men. Interventions targeting Black men have attempted to increase physical activity, explore increasing vegetable intake, and increase adherence to diabetes self-management, but have not evaluated strategies to help men lose weight. Though we did not find significant differences between groups over time on the primary outcome of weight loss as a result of the enhanced partner intervention, this research represents a meaningful step toward understanding partner involvement for social support for weight and weight-related behaviors.

Design

The use of a randomized controlled trial helped to determine the preliminary efficacy of this spousal support enhanced intervention; these types of trials provide the strongest evidence for a treatment's or intervention's efficacy when compared to other study designs. Objectively measuring weight and assessing theoretical constructs targeted by intervention components at baseline and post- intervention helped to examine the intervention's effects on these measures. This study, however, did not include a true control group. The standard group received a standard behavioral weight loss program for two reasons, 1) there are limited data on Black men enrolled in weight loss programs; thus, this research also determined the efficacy of a standard program on weight loss among Black men, and 2) it is considered somewhat unethical to include a non-treatment control which would withhold standard treatment commonly prescribed for individuals with overweight and obesity. Ultimately, our research sought to determine whether there was an added benefit to involving a partner to a standard weight loss program. The benefit

was small and not statistically significant, but given the short time frame of the study (3 months), a 1% better weight loss may be meaningful over time. Future studies of a more typical intervention length, perhaps 6 months, might allow greater weight loss to accrue. Further, spousal support might be beneficial in weight loss maintenance. Partners are present to help reinforce and provide direct assistance long after the accountability of being in a weight program no longer existence. Including additional time for follow-up after the initial weight loss phase and the termination of weight loss booster sessions would elucidate the effects of partner involvement long term.

Weight and other clinical outcomes

We found that both interventions produced significant weight losses over 12 weeks; however, there were only small between-group effects. In our study, weight reductions in both groups compared favorably to other interventions that had mixed race/gender enrollment but that reported weight losses among Black men.[4-6] Compared to a study of older Black adults, our enhanced group lost a sizeable amount (-4.7 kg vs -2.2. kg, respectively).[152] However, it is difficult to make comparisons with other interventions because studies with samples of Black men do not have weight change as a primary outcome, sample sizes, are small and partners have not been included in the studies.

More importantly, there were improvements in other outcomes (e.g., waist circumference in both groups and in the enhanced group, diastolic blood pressure, and energy expenditure). These findings demonstrate that both the enhanced and standard interventions can be used to facilitate weight loss in Black men. The improvements in waist circumference are meaningful because it is an indicator of central adiposity. Individuals who carry weight around their waist are at an elevated risk for developing type 2 diabetes and heart disease.[209] Based on self-report,

these participants did not have diabetes or indicators of heart disease; enrollment in this study may have delayed the onset of diabetes and/or heart disease in this sample. In future studies, it would be beneficial to have medical records from a primary care physician to assess the health of the sample at baseline using objective information. Self-reported medical history may have resulted in participants being enrolled who may have been diagnosed with conditions affecting the primary outcome. This could have biased the preliminary efficacy of the intervention.

In addition, with the provision of additional resources, it would be possible to examine other clinical measures objectively through blood work (e.g., hemoglobin A1c, body composition, and blood lipids such as triglycerides, total cholesterol, high density lipids (HDL) and low-density lipids (LDL)). Weight loss interventions have been shown to produce weight losses large enough (e.g., >5%) to improve these indicators of health.[6] Adding these measures would provide additional evidence of the effects of weight loss and related behaviors on health, and this information would facilitate the personalization of health risks (e.g., developing type 2 diabetes, high cholesterol) to participants. Personalization of risks for participants can provide additional motivation to adhere to study guidelines and to set personal goals. In the enhanced group, the average percent weight loss was 4%, which may have directly resulted in the improvements observed in diastolic blood pressure. In the landmark intensive behavioral intervention of the Diabetes Prevention Program, data suggest a 5–7% weight loss could reduce diabetes risk by >90%. [210] A more typical intervention length (6 months), similar to the Diabetes Prevention Program, would allow additional time for weight loss to accrue and potentially yield greater improvements in clinical outcomes.

The lack of desired intervention effect on weight compared to the standard group may be a result of the smaller than anticipated between group difference and a larger within-group

variability in the standard group. The lack of changes to family functioning may also provide an explanation for the null results. In the conceptual model, it was hypothesized that increases in weight loss would be a function of improvement in relationship functioning and dynamics and in turn result in an increase in social support effectiveness. Changes in theoretical constructs like family functioning will be discussed later in this chapter.

Partner involvement

Results from Aim 2 suggest a potential advantage for partner involvement, despite the lack of statistically significant increases. Importantly, romantic partners in the enhanced group also lost weight, significantly more than those in the standard group. Thus, taken together family-level obesity risk would be reduced more among Black men who participate with their partner compared to Black men who participate without their partner. Because treatment was delivered in a group setting, the cost of treatment delivery does not increase when the partner participates alongside their spouse or partner. The implications for reducing household or family level obesity among Blacks is noteworthy because of the disparities in obesity and obesity-related conditions[141-144,211] this population experiences overall. Impacting family-level obesity may translate to reduction in child obesity[212] and obesity among other members of the family that may reside within the home. As previously mentioned, multigenerational and extended family are commonly present in one household.[82] Measuring changes in behaviors or weight status of others in the household (e.g., children) who do not actively participate in the intervention would provide insight on the most effective approach to address family level obesity.

In SHARE, an intervention targeting Black adults for weight loss using family and friends as support providers, it was found that partner success with weight loss was associated

with greater index participant weight loss.[17] In PALS, a weight loss intervention targeting Black adults with type 2 diabetes, a family partner was also used as a source of support. In this particular study, the family partner had to be overweight or obese; theoretically, family partners with overweight or obesity would be more likely to engage in weight loss activities compared to a family partner with normal weight.[213] The results were consistent with SHARE, where these data showed more partner engagement (e.g., number of sessions attended together and when family members lost more weight) was associated with greater weight loss in the index participant. [16] In the present research study, partners were not required to lose weight nor did they have to be overweight. Given previous findings, excluding Black men with a normal weight partner may have resulted in greater weight loss and between group differences. However, due to the nature of engaging and retaining this population, inclusion and exclusion criteria were selected to balance the need to include as many willingly and consented Black couples as possible and upholding the integrity of an efficacy trial. Future studies may characterize the weight status of partners to determine if previous findings hold when the index participant is male, examining the effects or association of partner weight category on index partner's weight loss. Study samples of Blacks in these programs are majority female,[16,214] it is unknown whether greater partner participation is associated with greater weight loss among male index participation through co-attendance at group sessions or the amount of partner weight loss.

Theoretical Constructs

Results from Aim 3 provide evidence for relationships that should be further explored. Though the targeted constructs, cohesion and emotional involvement did not move in the expected direction; reported associations between family functioning and social support indicate improvements in these constructs may improve weight losses. We hypothesize the lack of

changes in the intended constructs may be a result of low intervention dose or inappropriate measurement of theoretical constructs. Our findings are consistent with other research on spousal support or couples-based approaches, suggesting a benefit for the index participant when a partner is involved (d=0.18); however, earlier studies reported greater effect sizes post intervention (d=33).[15]

Antecedents to transformation of motivation were used to assess changes in transformation of motivation and communal coping. Transformation of motivation activates communal coping.[80] Communal coping in the literature has been measured in general but not specific to weight and related behaviors. Using the Communal Coping Scale in future studies, though not specific to weight loss, could help identify whether communal coping strategies are being used among couples. [215] Measuring additional potential moderators in a larger sample could also help explain study results, more specifically, null results. Relationship quality and satisfaction are dispositional factors that may moderate coping processes and explain some participant's response to delivered interventions.

Given the lack of changes in the targeted constructs, more process measures would provide insight to the effects or lack thereof on the primary outcome and theoretical targets. The TEAM intervention consisted of multiple components (e.g., couples' skill training, at-home couples' activities, group sessions, online self-monitoring, lessons, individual feedback, digital scales) that were specifically selected to change or influence specific theoretical constructs (e.g., communication, collaborative problem solving, self-regulate). For example, mastery of skills is a method that has been proven to increase self-efficacy; participants practiced skills and techniques (i.e., skill building) during group sessions like tracking calories and setting goals to increase self-efficacy for eating healthy (Table 5.1). At-home activities and weekly lessons targeted improving

behavioral capability, self-efficacy, and precursors to social support (e.g., communication). The extent of completion of the at-home couple's activities and weekly assignments, in addition to the degree that weekly lessons were read and referred to in response to high risk situations, was not assessed. Identifying methods to evaluate whether components are being used as intended that are unobtrusive and objective is imperative in deciding if different approaches are needed to evaluate the role of family functioning in relation to partner involvement.

The conceptual model for this study would predict that a shift to unhealthier functioning among couples would reduce weight loss. The shift to more unhealthy relationship functioning among the enhanced group; however, did not produce lower weight loss. There are several possible explanations for the unexpected finding. First, people in committed relationships experience bouts of negative functioning; they may have small arguments or disagreements at times, but this does not affect working together to achieve a goal or desired outcome, in this case weight loss. The mechanism of this relationship dynamic is unclear; however, it appears this is an example of a pro-relational functioning, where accomplishing the goal is more important than winning an argument or being right. Further investigations of the unexpected shifts in constructs revealed that couples still on average were classified as being "connected" on the cohesion scale of the Family Adaptability and Cohesion Evaluation Scale III (FACES III). "Connected" means couples retained a level of dependence, loyalty, and closeness to function optimally in the enhanced group.[178,199] However, being labeled "connected" is still characterized as "I-We" on the "I-We" balance; transformation of motivation requires couples to view themselves as "We" in order to effectively cope with a health concern.[80] Second, the intervention allowed participants to address issues they had not discussed previously. Shedding light on problems areas is uncomfortable (particularly when they are about potentially sensitive topics such as weight), but

is necessary for behavior change to occur and be maintained. Third, the measures used may not have appropriately captured the intended constructs. Measures for transformation of motivation have not been published. The measures selected evaluated constructs that were precursors to transformation of motivation. Taken together, identifying strategies to cope with or reduce the negative aspects of weight loss initiation may produce the intended shifts in family functioning and ultimately result in greater weight loss among this sample. Additionally, developing a scale or measure with appropriate construct validity for transformation of motivation in this population would allow researchers to explore these constructs in practice and not just in theory.

The dimensions of social support did not change as expected in the enhanced group. The lack of improvements in social support may be that participants may have started with a higher overall level of both social support and social support effectiveness. In this study, low social support effectiveness at baseline resulted in greater weight loss among men when compared to men with high support at baseline within each study group. This suggests men with low support at baseline benefited the most from the study. We would expect greater weight loss among Black men participating with a spouse/partner. However, weight loss among men with high support at baseline in the enhanced group only lost half as much as low support men. This suggests that another factor may be responsible for the differences in weight loss between group, confirmed with lack of increases in social support.

Black men who enrolled in the study had to enroll with a partner committed to participation as well. Some interested subjects were not eligible to participate in the study because their partners could not or would not commit to participation. Thus, among eligible individuals, the index partner's perception of partner social support may be elevated by his partner's willingness to commit to participation. Additionally, the willingness of a partner to

commit to participation suggests a desire to help or support. These women are looking for ways to be more supportive to their partners; their ability to match the quality and quantity of support provided with the needs of their partner may be greater than women or partners not willing to commit to participation or who are unable to commit. The intervention may not be as effective on these types of couples. Another explanation for the lack of improvements in support is the unexpected shift in family functioning previously described. It was hypothesized that improvement in family functioning would prime couples in the enhanced group to be more supportive. As stated earlier, inclusion of appropriate process measures will determine if the null results are in response to insufficient enacted dose or inappropriate strategies to change these constructs. Together, these limitations hinder our ability to draw clear conclusions about the effects of spousal support.

Measurement

Measures were selected according to certain factors: 1) ability to measure the intervention effects on intended constructs (e.g., EBI measured self-regulation); 2) ability to compare results with other studies, (e.g., Sallis' measures of social support are commonly used); and 3) providing the most objective measurement as possible (e.g., weight measured on-site at clinic). There were certain limitations with the measures in practice. The Automated Self-Administered 24-hour (ASA24®) dietary assessment tool was used as a gold standard for measuring dietary intake. During assessments, participants had difficulty logging in to the website, using the application, and complained about the length of time to complete the assessment. Participants often completed only one dietary recall of the two recommended recalls to assess usual intake. While the tool was able to theoretically assess dietary intake using the multiple pass approach, participant burden was high. There is a possibility, participants experienced fatigue while

completing the recalls and were not as accurate in their responses. Food frequency questionnaires may be better suited to assess intake, but for a longer period of time (e.g., over a week). Participant and researcher burden is fairly low when using food frequency questionnaires and they still provide detailed dietary information, provided the appropriate questions (e.g., portion size) are ascertain during administration.

Assessments included online questionnaires as well. On average, the baseline online questionnaire was completed in approximately 40 minutes and the online questionnaire administered at 12 weeks was approximately 57 minutes. This was longer than the approximated 15-20 minutes outlined in the informed consent forms. Participants may have experienced response fatigue. This can cause measurement error; questions asked towards the end of a survey have a higher probability of measurement error. Future studies should reduce the number of questions during assessments. Identifying or selected difference measures that assess similar constructs may reduce participant burden.

Different measures for certain constructs may need to be selected for the population, as the internal reliability for communication subscale of the McMaster Family Assessment Device (Cronbach's $\alpha = 0.54$) and incendiary communication of the Family Problem-Solving Communication Index (Cronbach's $\alpha = 0.54$) were not acceptable; meaning they are not measuring the constructs well. The elimination or dropping certain items off scales may improve the measures reliability; these items or questions may not be factor in assessing this construct in the population. Or items that are more associated with the construct, but do not add redundant items to the measure, might increase the reliability.

VII.C. Future Directions

This dissertation addressed multiple gaps in the weight loss literature. First, we retrospectively explored social support for weight loss among Black heterosexual couples, documenting their experiences and the factors within and outside their relationships that helped them successfully lose weight. We then demonstrated that it is feasible to implement a spousal support enhanced weight loss program for Black men, retain the entire male study sample, and observe improvements in weight and other health indicators. We also demonstrated the feasibility of a dyadic approach to weight loss among couples and observed weight loss success in female partners. Finally, we confirmed relationship functioning in a romantic relationship is associated with weight loss.

While the results of this research are encouraging, additional investigation is needed to establish how to capitalize on the benefit of partner involvement during weight loss. There are several gaps that still need to be addressed. Based on: 1) the unrepresentativeness of the sample in the in-depth interviews; 2) the low study power observed from the small differences in weight loss between groups and high variability within groups; 3) the unexpected shifts in theoretical constructs; 4) the lack of change in dimensions of social support; and 5) the effects of the intervention on partners' weight, the recommendations for possible areas of future research are as follows:

1. A qualitative investigation on weight loss experiences and perspectives among Black couples with different weight experiences (e.g., couples where both attempted and successfully lost weight, couples where only one attempted and successfully lost weight, couples were both attempted and were unsuccessful and couples were only one individual attempted weight loss and as unsuccessful) would be more representative of all types of

weight loss experiences among romantic couples, and help to validate or add additional information to our study findings. An investigation may examine these experiences in other race/ethnicities that represent different cultural values along the individualism - collectivism continuum. For example, conducting these interviews in Hispanic/Latino relationships, (another collectivistic culture), and Whites relationships, (a traditionally individualistic culture), to identify similarities in experiences and perspectives would assess if there are cultural differences in approaches to weight loss among couples.

2. A longer version of this study, at least 6 months in duration to reflect typical treatment, with modified components to reflect lessons learned from the pilot (e.g., content on coping with negative byproducts of partner involvement, more group sessions and selecting a different self-monitoring tool), should be conducted in the future that enrolls a larger sample size and better uses process measures to evaluate the adherence to the intended usage on the intervention components. Increasing the sample size would increase the power to detect the intervention's efficacy or lack thereof. Most importantly, a longer study, more specifically, the ability to follow-up for time periods greater than post-intervention, we may observe the true effects of partner involvement. Partners are important in weight loss in that they are able to provide the necessary support beyond the clinical setting and long after weight loss programs have ended. The inclusion of more appropriate process measures will provide evidence for whether shifting towards improving strategies for adherence is needed.
3. Future research should build on the methods and results of this study to examine the temporal nature of the negative relationship functioning observed in the enhanced group.

If the negative effects of the intervention are long term, intervention components should better address coping skills to reduce or prevent these effects.

4. Investigating the changes in family functioning from the perspective of the support partner, as in a recent weight loss study of Black adults who had type 2 diabetes, [16] would explain if there are differences in the perception of functioning in response to a stressful event (e.g., attempting to lose weight) and whether this influences the primary outcome.
5. Examination of the effects of partner involvement on other individuals within the home. For example, evaluating changes in behavior and weight status in children residing in the home as well as examining the effects of changes made with in the home and the association with the primary outcome

In summary, this study is an informative first step in partner involvement to promote weight loss and related behaviors among Black men. The research sets the stage for the continuation of this in work in several areas, such as the long-term effects of partner involvement and the effects on family level obesity. While the research provides a glimpse of the potential benefit of partner involvement in weight loss among Black men, additional research is warranted. Future research should build on these findings. Recruiting a larger sample, inclusion of longer follow, and the use of appropriate process measures will provide additional evidence of the benefit of a spousal support approach for Black men and their families.

APPENDIX A. EVIDENCE TABLE FOR COUPLES BASED WEIGHT LOSS

Supplemental Table A.1 Evidence Table for Couples Based Weight Loss

Study (Author/year)	Type of Intervention	Sample Population N(Percent AA)	Theories Used	Intervention	Duration of intervention/ follow-up	Spousal Support	Measure of Spousal Support	Primary Outcome (Measures)	Secondary Outcomes/Covariates (Measures)	Findings
O'Neil (1979)[183]	Observational	Individuals who 9-14 months previously completed treatment sessions @ the WMC @ MUSC. **20**(NA)	Self-monitoring, stimulus control	4 arms: sex vs treatment (male vs female and with/without spouse)	2 weeks/9-14 month FU	Spouses present at all sessions; given suggestions for ways of providing support. Weighed weekly, and encouraged to use the behavioral techniques along with the weight loser.		Weight loss (absolute body weight change, weight change as a percent of pretreatment weight, and the Reduction Index)		Spouse involvement in this study had no effect on weight loss.
Samuel-Hodge et al (2010)[13]	**Observational** ancillary to the Weight Loss Maintenance Trial	Bi-ethnic sample (African Americans and Whites); overweight or obese adults BMI of 25–45 kg/m2 **217**(75%)		20 weekly group sessions	26 weeks			WL success (losing at least 5% of initial weight)	6 family constructs- Family APGAR, McMaster Family Assessment Device, Family Adaptability and Cohesion Evaluation Scale III, Family Emotional Involvement and Criticism Scale	AA: 5.8 kg with a spouse vs. 3.9 kg without a spouse; p=0.02). AA males with a spouse WL of 6.3 kg vs. 1.9 kg with no spouse.(80%) included a spouse, AA had larger families that included a spouse less often, Family emotional involvement higher in families with a spouse, WL associated with

										having a spouse, the presence of a spouse in AA households was also positively associated (p=0.02) with WL success,
Streja et al (1982)[216]	Ouasi-experimental one group pre and post test	100 (82 women and 18 men aged 19 to 64 years); 65 completers (NA)	Self- control strategies, coping	12 group sessions and 2 booster sessions	20 weeks	Perceptions of spouse's support and of spouse's weight	Supportive or unsupportive, overweight or not overweight	Weight loss and Attrition (completion of the program)	Skinfold test, BP, cholesterol, triglycerides, and uric acid	Completing the program resulted in weight reduction. Perceiving having a supportive spouse resulting in more weight loss. Subjects who perceived their spouse as supportive lost more weight. Perception represents actual support.
Black et al (1989)[217]	Pre Post	8 men and 18 women, aged 28 to 62, 16.6% to 59.8% overweight, 25 subjects were married, 1 cohabitating for 3 years **26** (NA)		Graduated two-step program in which the intensity of the intervention was increased depending on the subject's weight loss progress.	1 year/ 3 month FU	Partners encouraged to assist subjects in losing weight; not required to nor expected to lose weight. verbal guidelines for weight reduction		Weight loss (Pounds lost and percentage overweight lost)	Skinfold test	Sig. diff. lbs lost, F (1, 21) = 4.57, p < .05, & diff % overweight approached significance, F (1, 21) = 2.96, p = .lO. Groups with normal weight partners > weight (lbs) with overweight partners (1/4 more post treatment and 1/3 more at follow up

Brownell et al (1978)[101]	Randomized control trial (stratified sampling)	Obese couples **29** (NA)	Self-monitoring, stimulus control, self-reinforcement (SCT?)	intensity of the intervention was increased depending on the subject's weight loss progress.	10 week treatment, 6 month maintenance	Couple's training: Attend meetings, model behavior, be supportive	Self -Report of Spouse's Behavior vs Rating of Spouse's behavior	Weight change and % overweight		no sig. post-treatment diff. among groups for any measure of weight change. CS > NCS & SA . @ IO-week post-treatment no (CS-CT) WL 19.5 lbs (SD = 11.7), % overweight 14.6 (SD = 8.7). CS-SA subjects and NCS subjects. WL 14.8 lbs (SD = 6.4) and 11.5 Ibs (SD = 7.6),% overweight 10.5 (SI) = 4) and 8.7 (SO = 4.9). Sig. dif @ 3 & 6 month FU
Wilson et al (1978)[168]	2 x 2 randomized control trial	Women, a minimum of 15% overweight **32** (NA)	Self- control	4 arms: (with/ without family member, with/without booster session) Partners all husbands (except 3). Partners attend sessions	8 weeks/ 3- & 6- month FU	partner present- (1) acquaint with principles of behavior change/weight reduction treatments; (2) cease criticism; (3) provide positive reinforcement and (4) assistance.	***no measure of partner cooperation***	Weight loss		No significant diiferences between groups
Zitter (1978)[169]	Randomized control trial	48 females and 8 males, aged 18 to 49, from 133.0 to 245.0 pounds, and %	Stimulus control	3 arms: individual consequation, partner consequation , and minimal	6 weeks/ 6 month FU	Each subject earned $I .00 for losing at least 1 pound and $1.00 each week when their partner		Weight Change (Reduction quotient RQ [pounds lost/pounds overweight x 100])		At post-treatment, sig. diff. both lbs lost (F(2,52) = 6.06, p < .01) & RQ (F(2,53) = 5.06, p < .01). I (p < .01) & p (p < .05) sig > WL & sig. > reduction

		overweight from 10 to 68%. University students 80% of sample, 20% community residents **56** (NA)		treatment control		lost 1 pound or more in addition to the $1.50 for weekly attendance. Identify ways to control each other's eating & exercise behaviors				quotient than control group; I = P @ 6-week FU, sig. diff. for lbs lost (F(2,41) = 5.43, p <.01) & RQ (F(2,42) = 3.56, p < .05) I sig. > WL (p < .01) & sig.> RQ (p < .05) than the control group. I--> sig. (p < .10) compared P on WL. The partner consequation and control groups did not differ on either measure.@6 month, I > WL & RQ than the other two treatments (p< .05).
Saccone (1978)[170]	Randomized control trial	48 overweight women and 1 man, 16 to 56 years of age, 16 to 100% overweight **59** (NA)	Reinforcement and stimulus control	7 arms: No-treatment control, Program only-monitoring weight, Program only-monitoring behavior, Program with reinforcement by therapist for weight loss, Program with reinforcement by therapist for eating behavior change, (Program with reinforcement by significant other for weight loss, or Program with reinforcement	9 weeks	Attend 3rd session, monitor & record weight/behavior and pay according to reinforcement schedule. Received $5		Weight loss		Mediation of reward by a significant other lead to greater weight loss than mediation of reward by the therapist approached significance, t(42) = 1.60, p < .06.

				by significant other for eating behavior change						
Weisz (1980)[218]	Randomized control trial (stratified sampling)	Married females, ages 18 to 50, living with their spouses, more than 20% over their ideal body weight **20** (NA)	Self- control	3 arms: individual, couples group and untreated group	7 weeks/2 month FU	Husband instructed to respond positively, trained to reinforce, to cue, and to consult with the therapist.		Weight change (weight and percent over ideal weight)	The Short Marital Adjustment Test, Eating Patterns Questionnaire, Beck Depression Inventory	Post treatment The couples group and self-control group combined lost significantly more weight than the assessment/control group ($p < .01$). Dif. Bt the couples group and the self-control group was not significant. C:f 4.0 kgs (8.8 lbs). SC: 2.2 kgs (4.8 lbs), AC: 1.9 kgs (4.2 lbs). FU C: 1.1 kg SC: .9 kg, AC: .2 kg sig. ($p < .001$).
Brownell et al (1981)[219]	Randomized control trial 3 x 2	Obese men and women Williamsport, PA 20% overweight **124** (NA)		6 arms: (3x2) 3 spouse conditions, 2 medication condition; mutual behavior change	16 weeks, 2 months maintenance/	Meeting attendance, mutual behavior change, social support, monitoring and modeling. Supportive methods of communicating, increase patient's motivation		Weight loss(change in body weight, change in percentage above ideal weight, weight reduction index, change in BMI)	Locke-Wallace Marital Adjustment Test and Beck Depression Inventory	Patients with obese spouses loss more weight than patients with non-obese spouses. no difference in spouse groups.
Pearce	Randomized control trial	Overweight women age	Stimulus control,	5 arms: cooperative spouse, wives alones, non -	10 weeks/ 3,6 12 month FU	Spouses attended all treatment sessions and		Weight loss (weight reduction quotient)		No sig. diff. in WL among any of the groups. The cooperative

(1981)[102]		20-60 **68** (NA)	reinforcement, modeling	participating spouse, alternative treatment, delayed treatment control		were asked to participate fully to help their obese partner lose weigh				spouse group lost significantly more weight than the alternative treatment at the 3-, 6-, and 12-month FUs and sig. more weight than the wives-alone group at the final FU.
Murphy et al (1982)[220]	Randomized control trial 2 x 2	Obese adults in Baton Rouge, LA **72** (NA)	Self-control, self-reinforcement, and self-punishment	6 arms: factor 1: subject attendance (with or without spouse) factor 2: contract condition (one or two party contigency contracts), attention placebo group (subject without spouse and no contract) and wait list control group	11 weeks/r 2 year FU	Attendance at the group sessions, interdependence of the couple and mutually beneficial two-party contracting.		Weight loss (actual, percent excess weight loss, weight reduction index)		Neither the main effect nor the intervention achieved signficance. Spouses impact greatest during 2 yr FU
Black et al (1984)[171]	Randomized control trial (replication for Murphy)	10%> overweight married women aged 23-53 **36** (NA)	Self-regulation	3 arms: husband contracting, husband not contracting, husband absent (30-90 mins)	10 weeks/1, 3 and 4 yr FU	Contract with instruction of how to provide support		Weight change		Women did better without husbands at 1 yr FU, no dif post (husband may not feel important in the process?)
Dubbert et al (1984)[221]	Randomized control trial (stratified)	Married and currently living with spouse, ≥ 15 lb overweight & ≤100%	Goal setting, social support and relapse-prevention strategies in addition to the usual	4 arms: Couples/Weekly Goals, Couples/Daily Goals, Individual/Weekly Goals,	19 weeks/ 6 months FU	Attend sessions, monitor, model and reinforce, and contract form	20-item Spouse Behavior Checklist (SBC) assess cooperative spouse behaviors	Weight	Height, cardiovascular fitness , skinfold, cf(resting hear rate, resting blood pressure, aerobic fitness, Locke-Wallace	All TX groups sig. reduced W, % overweight & % body fat, post/6-month FU. Including participants' spouses in the

		overweight; 48 females, 14 males (7 couples with both participating) **62** (NA)	behavioral self-control methods.--> social learning theory	Individual/Daily Goals.			(Dubbert, Wilson, Augusto, Langenbucher and McGee, 1981)		Marital Adjustment Test, The Beck Depression Inventory, The Binge Scale (BS),	program did not result in greater WL @ TX nor FU (No main effect but cooperation by spouses, or perceived spouse support did influence TX outcome.
Gorin et al (2005)[213]		25–50 years old and 14–32 kg overweight **109** (11.8)			6, 12, and 18 months FU			Weight	Height, Block Food Frequency Questionnaire, Paffenbarger Activity Questionnaire	WL at 6, 12, & 18 months not associated w/ # of partners (0 –3) but associated w/ WLs success of the partners. Involving support partners in obesity treatment is only successful when the support partners themselves successfully loss weight
Kumanyika et al (2009)[17]	Randomized control trial 2 x 2	90% AA female, 35 or older, 23 were husband and wife out of 281 randomized **344** (100)		4 arms: family/friend high support, family/friend low support, individual high support, individual low support	2 years	Attend & participate in Tx sessions, provide social support and work together		Weight		Family index participants weight loss was greater when partners attended sessions and if partners also loss weight
Golan et al (2010)[98]	Randomized control trial (ancillary)	Wives of husbands randomized in the DIRECT-Spouse study		3 arms: Low-fat, Mediterranean or Low-carbohydrate	6 months/2 year FU	Monthly support meetings separate from husbands		Weight loss		Wives who took part in the group support sessions was -5.2 kg, compared to -3.5kg among the 248 DIRECT participants

		(Israel) **74** (NA)								whose wives did not take part in these sessions (P=020).
Trief et al (2011)[99]	Randomized control trial	Patients with T2D and their partners both 21 years of age, had been married or partnered for 1 year, index Type 2 diabetes in poor glycemic control **60 couples** (NA)	Interdependence theory (dyads)	3 arms: couples intervention, individual intervention, or individual diabetes education.	3 months/6 month FU	collaborative communication and problem solving			Blood pressure, total and LDL cholesterol (finger stick blood test), and waist circumference	Individual intervention should better improvements in measures than couples intervention
Gorin et al (2013)[12]	Randomized control trial	21 and 70 years old, have a body mass index (BMI) between 25 and 50 kg/m2, and have a household member willing to participate in the study as a support partner **201** (NA)	Social ecological models	2 arms: BWL or to BWL plus home-environment changes (BWL H)	18 months	Attend sessions, make the same diet & exercise changes. Given a 10% WL goal, expected to use the same behavioral tools, and model healthy behaviors in the home	Sallis Social Support Scales	Weight loss	Household Food Inventory, Block Food Frequency Questionnaire, Exercise Environment Questionnaire, Paffenbarger Activity Questionnaire	BWL +H produced better 6-month WL than BWL (p .017). At 18 months, no weight-loss diff observed (p .19) and rates of regain were equivalent (p .30). Tx response moderated by gender (6 m, p .011; 18 m, p .006). Women lost more weight in BWL+H than BWL at 6 and 18 m, men in BWL lost more weight than

										those in BWL H at 18 m.

APPENDIX B: SUPPLEMENTAL TABLES FOR INTERVENTION DESIGN FOR CHAPTER III

Supplemental Table B.1 Group Session Schedule

Minutes	Session Outline
10	Weigh In
20	Open Discussion: Reporting back, Review of self-monitoring records, problem solving
20	Presentation of Topic: demonstrations, etc
20	Activity: Group Work (Skill Building)
10	Goal Setting: Diet, Physical activity and Weight

Supplemental Table B.2 Couples' Skills Training Objectives

Topics	Overview	Objectives
Topic 1: You Are Important to Me: Commitment	Couples are introduced to our couple-enhanced intervention for weight loss, are oriented to how weight management is affected by peer relationship functioning, and are led in a discussion of their commitment to each other and the program.	1. Describe the importance of partner relationships and health status 2. Define commitment 3. Confirm commitment to relationship and weight loss program 4. Identify ways to strengthen commitment
Topic 2: I Hear you: Being an Active Listener	Couples are taught the importance of communication in a relationship; focusing on listener-speaker skills, non-verbal communication and identifying go-to techniques/strategies for Communication toolbox	1.Define supportive communication 2. Understand how important attitude is for successful communications 3. Identify and practice speaker skills 4. Identify and practice listener skills by actively listening to others and asking effective questions to ensure understanding 5.Make deposits in the Emotional Bank Account 6. Identify non-verbal communication 7. Develop a communication tool kit

Topic 3: In it to Win It: Being A Supportive Partner: Emotional Support	Couples will learn how to be supportive to each other emphasizing effective social support.	1. Identify a supportive and non-supportive partner in different circumstances 2. Identify strategies to support their partner from their perspective 3. Identify strategies to cope with an unsupportive partner

Supplemental Table B.3 Core Behavioral Lesson Topics

• Self-monitoring • Healthy food choices • Physical activity • Stimulus control • Eating patterns • Lifestyle activity • Thoughts and weight control • Changing the quality of your diet: fat and fiber • Problem solving	• Eating in social situations • High-risk situations • Restaurant eating • Assertiveness training • Recipe modification • Stress management • Motivation enhancement • Relapse prevention

Supplemental Table B.4 Notebook Contents

Component	Description	Example
Overview	This section included the details of the program e.g. the objectives, coordinating institution, personnel, program structure, timeline and expectations	
Behavioral Lessons	12 Core weight loss lessons targeted diet, physical activity and behavioral modification including the importance of self-monitoring, calorie balance, maintenance, etc.	Lesson 1: Welcome to the TEAM program Lesson 2: Keeping Track: The Importance of Self-monitoring
Diet Plan	Participant were encouraged to self-monitor via MyFitnessPal.	Self-monitoring all calories with my fitness pal and eating foods of their choice
Physical Activity Plan	Participants were provided a physical activity plan based on which one is most appropriate for their current physical activity level and will allow them to lose 1 to 2 pounds per week.	Plan A: Low Active: < 60 minutes per week Plan B: Somewhat Active: 60-150 minutes per week Plan C: Highly Active: >150 minutes per week

At- Home Couples Activities	12 weekly pro-relationship activities	Example:

Supplemental Table B.5 Message Algorithm

Components	Welcome/ salutation	Weight loss	Diet Plan Adherence	Physical Activity Plan Adherence	Content Match
Week 3 Ex. ***Weight loss good, diet bad, PA, good***	Good day [name],	Congratulations on achieving your weekly weight loss goal.	Sticking to your diet plan will help you continue to lose weight.		Research has shown that monitoring both your diet and PA daily directly influence weight loss helping you achieve your goals. Keep at it!
	Include Participant's name	Bad=Weight loss <1 lb Good= Weight loss ≥1	Good= meeting weekly goal Bad- no meeting weekly goal	Good= meeting weekly goal Bad- no meeting weekly goal	Self-Monitoring, Self-efficacy Social Support

* Diet and/or Physical Message optional when GOOD (Hawkins et al, 2008)[222]

Supplemental Table B.6 Measures

Measure	Number of items	Baseline	6 Weeks	12 Weeks	Type
Weight		X	X	X	Objective
Demographics		X	---	---	
Physical Measurements		X	---	X	Objective
Locke Wallace Marital Adjustment test *Marital Satisfaction	15	X		X	Self-Report
Automated Self-Administered 24-hour dietary recall (ASA)	Varies	X	---	X	Self-Report
Eating Behavior Inventory (EBI) *Self- Regulation Items	26	X	---	X	Self-Report
Paffenbarger Physical Activity Questionnaire (PAF)	7	X	---	X	Self-Report
Social Support and Eating Habits Survey	10	X	X	X	Self- Report
Social Support and Exercise Survey	13	X	X	X	Self- Report
Social Support Effectiveness	25	X	X	X	Self- Report
Weight Efficacy Life-Style Questionnaire (WEL) *Self-Efficacy	20	X	---	X	Self- Report
Patient-centered Assessment & Counseling for Exercise	6	X	---	X	Self- Report

(PACE+) Adult Diet and Physical Activity Measure *Self- Efficacy					
***Family Context (,* communication- *the McMaster Family Assessment Device, family cohesion- Family Adaptability and Cohesion Evaluation Scale III, emotional involvement and criticism-* Family Emotional Involvement and Criticism Scale)**	35	X	X	X	Self- Report
Process Measures					
Group Session Attendance					
Self-monitoring via My Fitness Pal					

APPENDIX C: SUPPLEMENTAL TABLES FOR CHAPTER V

Supplemental Table C.1 Outcomes at Baseline and 12 weeks for male participants

Outcome Variable Group	Baseline Mean (SD)	12 weeks Mean (SD)	p-value within group
Weight, kg			
Standard	114.2 (20.8)	110.8(21.7)	0.6207
Enhanced	111.3 (24.9)	106.6 (25.4)	0.5468
% Weight change			
Standard		3.0(6.0)	0.0491
Enhanced		4.0 (5.0)	0.0010
BMI			
Standard	35.2 (6.2)	34.0(5.7)	0.5591
Enhanced	34.9(6.2)	33.3 (6.4)	0.3927
Waist circumference, cm			
Standard	111.3 (12.8)	107.7 (12.0)	<.0001
Enhanced	113.2(15.2)	108.4 (16.7)	<.0001
Systolic Blood Pressure, mmHg			
Standard	131.6(39.3)	134.0(25.3)	0.8320
Enhanced	136.1(21.9)	129.2(19.4)	0.2905
Diastolic Blood Pressure, mmHg			
Standard	83.3(27.8)	78.0(12.6)	0.4628
Enhanced	86.7(11.5)	76.2 (10.4)	0.0042
Energy Intake (kcal/day)			
Standard	N=18 2344.8(1171.3)	N=16 1952.8(908.8)	0.2882
Enhanced	N=19	N=18	0.0557

	2099.8(908.3)	1572.0(692.7)	
Energy Expenditure (kcal/week)			
Standard	1423.4 (1822.0)	1412.2 (1076.6)	0.9821
Enhanced	500.0 (582.7)	1363.8 (866.8)	0.0010
Partner's Weight			
Standard	86.5(16.4)	N=18 86.5(17.3)	
Enhanced	94.0(23.7)	91.5(22.1)	
Partner's % Weight change			
Standard		0.00150 (0.0621)	
Enhanced		0.0224 (0.0343)	

APPENDIX D: SUPPLEMENTAL TABLES FOR CHAPTER VI

Supplemental Table D.1 Baseline level of Support and weight loss

	Standard				**Enhanced**			
	Low Support	**High Support**	**P-value**	**Effect size**	**Low Support**	**High Support**	**p-value**	**Effect size**
Social Support Effectiveness	N=10 -6.23 (4.38)	N=9 -0.35 (10.16)	0.14	0.75	**N=7** -6.46 (7.09)	**N=14** -3.85 (5.31)	0.35	0.42
Social Support for Eating Encouragement	N= 8 -2.90 (4.90)	N=11 -3.84 (9.95)	0.79	0.12	N=6 -3.63 (6.85)	N=15 -5.16 (5.70)	0.60	0.24
Social Support for Eating Discouragement	N=12 -4.25 (9.52)	N=7 -2.06 (4.90)	0.58	0.29	N=10 -7.46 (5.99)	N=11 -2.24 (4.84)	0.04	0.96
Social Support for Exercise Participation	N=8 -5.39 (7.44)	N=11 -2.03 (8.50)	0.38	0.42	N=13 -6.80 (6.21)	N=8 -1.36 (3.60)	0.04	1.07

Supplemental Table D.2 Pearson Correlation Coefficients

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Commuication																				
Affimatory	0.08 0.65																			
Incendiary	0.28 0.09	-0.20 0.22																		
Cohesion	-0.06 0.74	0.17 0.33	-0.35 0.04																	
Emotionall nvolvemen t	-0.04 0.82	-0.28 0.11	-0.0004 1.00	0.20 0.26																
Perceived Criticism	0.33 0.06	0.05 0.79	0.17 0.32	-0.52 0.002	0.06 0.75															
SS Effective	0.11 0.51	-0.03 0.88	-0.26 0.13	-0.10 0.55	0.09 0.59	0.05 0.77														
Task Support	0.36 0.03	-0.05 0.79	-0.25 0.14	0.05 0.77	0.26 0.13	0.22 0.20	0.69 <.0001													
Informatio nal support	0.37 0.03	-0.08 0.63	0.19 0.27	-0.15 0.40	0.11 0.53	-0.02 0.89	0.53 0.0009	0.51 0.002												
Emotional Support	0.30 0.08	0.02 0.92	-0.17 0.31	-0.12 0.51	-0.02 0.92	-0.06 0.72	0.73 <.0001	0.50 0.002	0.50 0.002											
Negative Support	-0.32 0.06	0.01 0.97	-0.30 0.08	-0.07 0.68	-0.01 0.93	0.02 0.91	0.68 <.0001	0.15 0.38	-0.09 0.59	0.19 0.26										
Eat Encourage ment	-0.09 0.60	0.03 0.87	-0.34 0.04	0.18 0.30	0.25 0.15	0.20 0.25	0.38 0.02	0.39 0.02	-0.03 0.84	0.13 0.44	0.37 0.03									
Eat Discourag ement	-0.26 0.12	0.05 0.75	0.16 0.35	-0.43 0.01	-0.19 0.27	0.18 0.30	0.23 0.19	0.06 0.72	-0.03 0.85	0.10 0.58	0.31 0.07	0.13 0.45								
Exercise Participati on	-0.01 0.95	-0.001 0.99	0.13 0.43	-0.590.0002	0.07 0.69	0.51 0.002	0.06 0.72	0.13 0.44	0.04 0.82	-0.07 0.70	0.06 0.75	0.33 0.04	0.46 0.004							
EBI	-0.17 0.31	-0.09 0.59	-0.05 0.77	-0.10 0.56	0.16 0.37	0.09 0.60	0.43 0.008	0.22 0.20	-0.01 0.96	0.06 0.75	0.5900 02	0.25 0.13	0.22 0.18	0.33 0.05						
WEL	-0.13 0.44	0.25 0.14	-0.25 0.14	-0.03 0.85	-0.17 0.33	0.01 0.97	0.31 0.06	0.19 0.28	0.05 0.78	-0.02 0.89	0.42 0.01	0.27 0.12	0.15 0.39	0.17 0.33	0.5700 02					
Pace Self_Effica cy	-0.13 0.44	-0.12 0.49	-0.07 0.69	-0.01 0.94	0.02 0.93	-0.03 0.89	0.01 0.97	-0.05 0.76	-0.02 0.89	0.06 0.74	0.01 0.93	0.14 0.41	0.07 0.68	-0.10 0.56	0.16 0.36	0.14 0.40				
Diet	-0.24 0.18	-0.13 0.47	-0.18 0.30	-0.06 0.73	0.25 0.16	0.29 0.11	0.28 0.12	0.26 0.14	0.02 0.93	0.03 0.88	0.31 0.08	0.53 0.001	0.13 0.45	0.52 0.002	0.42 0.01	0.23 0.20	-0.02 0.93			
Energy Expenditur e	0.03 0.88	0.02 0.89	-0.05 0.77	-0.09 0.63	-0.19 0.31	0.04 0.84	-0.14 0.45	-0.10 0.59	-0.12 0.49	-0.14 0.44	-0.04 0.80	-0.34 0.04	0.004 0.98	-0.11 0.53	0.03 0.86	0.01 0.97	0.25 0.15	-0.05 0.77		

Weight	-0.20 0.22	- 0.18 0.28	0.07 0.68	0.17 0.32	0.09 0.59	-0.04 0.84	-0.44 0.008	-0.32 0.05	-0.18 0.28	- 0.25 0.14	- 0.34 0.04	0.15 0.39	-0.32 0.06	- 0.12 0.48	- 0.44 0.00 6	- 0.17 0.31	- 0.25 0.14	-0.006 0.97	- 0.27 0.11

Supplemental Table D.3 Pearson Correlation Coefficients by Group

Prob > |r| under H0: Rho=0
Number of Observations

Standard Group

Standard Group	Weight	Dietary Change	Energy Expenditure	Communication (FAD)	Affimatory Communication	Incendiary Communication	Family Cohesion	Emotional Involvement	Perceived Criticism	Social Support Effective	Task support	Informational Support	Emotional Support	Negative Effects of Support	SS Eating Encouragement	SS Eaing Discouragement	SS Exercise Participation	EBI	WEL	PACE	Enhanced Group
Weight		0.24674 0.2809 21	0.14889 0.5195 21	-0.13807 0.5506 21	0.09559 0.6802 21	0.36335 0.1054 21	0.00539 0.8164 21	0.13969 0.5459 21	0.04183 0.8571 21	0.1886 0.4129 21	0.15512 0.502 21	0.04744 0.8382 21	0.13564 0.5577 21	0.14961 0.5175 21	-0.20438 0.3742 21	-0.03417 0.8831 21	-0.15136 0.5125 21	0.23171 0.3398 19	-0.07679 0.762 18	-0.29928 0.1875 21	**PACE**
Dietary Change	0.3677 0.1612 16		**0.63065** **0.0022** **21**	0.12059 0.6026 21	0.09267 0.6895 21	**0.46438** **0.0339** **21**	**0.5421** **0.0111** **21**	0.05177 0.8236 21	0.08018 0.7297 21	0.34667 0.1237 21	**0.4784** **0.0282** **21**	0.01937 0.9336 21	-0.28396 0.2122 21	0.06818 0.769 21	**-0.50056** **0.0208** **21**	**0.46449** **0.0339** **21**	-0.30323 0.1815 21	0.03658 0.8818 19	0.40383 0.0965 18	-0.32461 0.1511 21	**WEL**
Energy Expenditure	0.07914 0.7708 16	-0.27648 0.3185 15		0.38237 0.0871 21	0.01884 0.9354 21	0.34542 0.1251 21	**0.7038** **0.0004** **21**	0.15116 0.5131 21	0.07803 0.7367 21	**0.49857** **0.0214** **21**	**0.65974** **0.0011** **21**	0.16867 0.4649 21	0.25303 0.2685 21	-0.10461 0.6518 21	-0.34793 0.1222 21	-0.12652 0.5847 21	-0.21834 0.3417 21	0.31854 0.1838 19	**0.65507** **0.0032** **18**	**-0.51966** **0.0158** **21**	**EBI**
Communication (FAD)	-0.28529 0.2364 19	-0.36385 0.1659 16	0.04219 0.8767 16		**0.52369** **0.0148** **21**	0.19776 0.3902 21	0.3476 0.1225 21	0.10934 0.6371 21	0.25079 0.2728 21	**0.45685** **0.0373** **21**	**0.46571** **0.0334** **21**	**0.68435** **0.0006** **21**	0.13575 0.5574 21	**-0.80766** **<.0001** **21**	0.12639 0.5851 21	0.11042 0.6337 21	0.12499 0.5893 21	-0.00259 0.9916 19	0.44987 0.061 18	**-0.45176** **0.0398** **21**	**SS Exercise Participation**
Affimatory Communication	-0.10986 0.6854 16	-0.24011 0.3684 16	0.08034 0.7759 15	0.1658 0.5394 16		0.15543 0.5011 21	0.2201 0.3376 21	0.22185 0.3338 21	-0.05423 0.8154 21	0.29895 0.1884 21	0.29291 0.1976 21	0.24399 0.2865 21	-0.12297 0.5954 21	**-0.45589** **0.0378** **21**	0.09913 0.669 21	0.18622 0.419 21	-0.28392 0.2123 21	0.17521 0.4731 19	0.22036 0.3796 18	-0.33313 0.14 21	**SS Eating Discouragement**
Incendiary Communication	-0.13519 0.6176 16	-0.38128 0.1451 16	0.07376 0.7939 15	0.32203 0.2238 16	-0.13668 0.6137 16		**0.4607** **0.0355** **21**	0.07832 0.7358 21	0.23301 0.3094 21	**0.46834** **0.0323** **21**	**0.52118** **0.0154** **21**	0.15907 0.491 21	0.17666 0.4436 21	0.01413 0.9515 21	-0.24746 0.2795 21	0.02519 0.9137 21	-0.10757 0.6426 21	-0.14888 0.543 19	0.41222 0.0892 18	-0.00587 0.9799 21	**SS Eating Encouragement**
Family Cohesion	0.05665 0.8475	0.19946 0.4942	-0.04733 0.8788	0.31786 0.2681	**0.72691** **0.0032**	-0.3483 0.2223		0.04037 0.8621	-0.23351 0.3083	0.25734 0.2601	**0.63282** **0.0021**	0.01513 0.9481	0.0129 0.9557	-0.09033 0.697	**-0.54991** **0.0098**	0.10732 0.6433	-0.35044 0.1194	0.27412 0.2561	**0.6645** **0.0026**	-0.39794 0.074	**Negative Effects of**

	14	14	13	14	**14**	14		21	21	21	**21**	21	21	21	**21**	21	21	19	**18**	21
Emotional Involvement	0.48472 0.079 14	0.31458 0.2733 14	-0.50364 0.0793 13	0.14053 0.6318 14	-0.07518 0.7984 14	-0.007575 0.9795 14	0.1947 8 0.5046 14		0.41895 0.0587 21	0.40813 0.0663 21	**0.6379** **0.0019** **21**	0.09582 0.6795 21	-0.27156 0.2337 21	-0.39502 0.0764 21	0.08254 0.7221 21	-0.14306 0.5362 21	0.36233 0.1065 21	0.13931 0.5695 19	0.10005 0.6929 18	-0.12825 0.5797 21
Perceived Criticism	0.43364 0.1214 14	0.30413 0.2904 14	0.11164 0.7165 13	0.47163 0.0887 14	-0.30494 0.2891 14	0.019 69 0.9467 14	0.0 4568 0.768 14 14	-0.13915 0.6352 14		**0.57813** **0.006** **21**	**0.48013** **0.0276** **21**	0.1499 0.5166 21	0.11798 0.6105 21	-0.16547 0.4735 21	0.30888 0.1731 21	-0.04734 0.8385 21	0.4117 0.0637 21	-0.15801 0.5182 19	0.18643 0.4589 18	0.08906 0.7011 21
Social Support Effective	-0.48725 0.0654 15	-0.08277 0.7693 15	-0.45094 0.1056 14	0.17039 0.5438 15	-0.05284 0.8516 15	-0.260 47 0.3484 15	0.0 224 8 0.9392 14	0.12717 0.6649 14	-0.157 24 0.5914 14		**0.7854 8** **<.0001** **21**	0.2522 9 0.2699 21	0.1735 8 0.4518 21	-0.2176 4 0.3433 21	-0.0289 2 0.901 21	-0.0770 5 0.7399 21	0.1023 0.659 21	0.2435 3 0.3151 19	0.3529 0.1509 18	**-0.4725 9** **0.0305** **21**
Task Support	-0.16519 0.5563 15	0.16473 0.5574 15	-0.31391 0.2744 14	**0.6779** **0.0055** **15**	-0.0658 8 0.8155 15	-0.364 47 0.1817 15	0.2059 0.4801 14	0.25135 0.386 14	0.1872 0.5216 14	**0.61669** **0.0143** **15**		0.1666 8 0.4702 21	-0.0027 5 0.9906 21	-0.3147 0.1647 21	-0.2226 8 0.3319 21	-0.0253 5 0.9132 21	0.0706 0.7611 21	0.2470 5 0.3079 19	**0.6071 6** **0.0075** **18**	-0.4109 9 0.0642 21
Informational Support	**-0.54219** **0.0368** **15**	-0.22242 0.4256 15	-0.11376 0.6986 14	0.31927 0.2461 15	-0.1279 9 0.6494 15	0.069 58 0.8054 15	-0.1 602 9 0.5841 14	0.08609 0.7698 14	-0.397 72 0.159 14	**0.589 02** **0.0209** **15**	0.484 0.0675 15		0.1416 9 0.5401 21	**-0.8128 4** **<.0001** **21**	0.2809 0.2174 21	0.1786 6 0.4384 21	0.27301 0.2312 21	-0.0109 3 0.9646 19	0.2844 3 0.2527 18	-0.2254 1 0.3259 21
Emotional Support	-0.42306 0.1161 15	-0.08204 0.7713 15	-0.45487 0.1022 14	0.23607 0.397 15	0.2486 8 0.3715 15	-0.445 61 0.096 15	0.2 242 5 0.4409 14	0.27652 0.3386 14	-0.427 59 0.1272 14	**0.830 52** **0.0001** **15**	0.6260 7 0.0125 15	0.5973 0.0187 15		0.1088 4 0.6386 21	0.1546 3 0.5033 21	**-0.4505 1** **0.0404** **21**	-0.17348 0.452 21	0.185 0.4483 19	0.2627 8 0.2921 18	-0.1570 5 0.4966 21
Negative Effects of Support	-0.29731 0.2819 15	-0.08192 0.7716 15	-0.33341 0.2441 14	-0.28923 0.2958 15	-0.1311 3 0.6413 15	-0.066 75 0.8131 15	-0.0 960 2 0.744 14	-0.07006 0.8119 14	0.024 81 0.9329 14	**0.717 78** **0.0026** **15**	0.0402 2 0.8868 15	0.0362 1 0.8981 15	0.3381 6 0.2177 15		-0.2378 4 0.2992 21	-0.1772 3 0.4422 21	-0.32264 0.1537 21	0.0105 5 0.9658 19	-0.1755 1 0.486 18	0.2630 7 0.2493 21
SS Eating Encouragement	0.38159 0.1447 16	**0.7289** **0.0014** **16**	**-0.55393** **0.0322** **15**	-0.10587 0.6964 16	-0.0234 2 0.9314 16	-0.397 4 0.127 4 16	0.3 326 8 0.2452 14	0.27472 0.3418 14	0.307 2 0.2853 14	0.204 98 0.4636 15	0.2378 9 0.3932 15	-0.3518 5 0.1984 15	-0.2042 9 0.4652 15	0.2752 7 0.3207 15		-0.2506 8 0.2731 21	0.24511 0.2842 21	-0.3095 1 0.1972 19	0.0233 8 0.9266 18	0.2747 6 0.2281 21
SS Eating Discouragement	-0.29331 0.2702	0.01754 0.9486	-0.15035 0.5928	-0.31901 0.2285	-0.2841 2 0.2862	0.324 67 0.2199	**-0.5 578 9** **0.0382**	-0.45253 0.1042	-0.056 39 0.8482	0.125 62 0.6555	-0.4074 4 0.1317	0.0083 0.9766	-0.1158 4 0.681	0.46 0.0845	0.0206 0.9396		-0.03532 0.8792	0.0110 8 0.9641	-0.0299 8 0.906	-0.2268 0.3228

	PACE	WEL	EBI	Social Support Exercise Participation	Social Support Eating Discouragement	Social Support Eating Encouragement	Negative effects of support	Emotional Support	Informational Support	Task Support	Social Support Effectiveness	Perceived Criticism	Emotional Involvement	Family Cohesion	Incendiary Communication	Affirmatory Communication	Communication (FAD)	Energy Expenditure	Dietary Change	Weight	
SS Exercise Participation	16	16	15	16	16	16	**14**	14	14	15	15	15	15	15	16		21	19	18	21	**Communication(FAD)**
	0.33362	0.58638	-0.29574	-0.09357	-0.14148	0.12659	-0.16653	0.06006	0.06711	-0.31409	-0.18657	-0.19362	-0.26982	-0.22022	**0.53164**	0.41609		-0.09387	-0.07432	0.1324	
	0.2067	0.017	0.2845	0.7303	0.6012	0.6404	0.5693	0.8384	0.8197	0.2543	0.5056	0.4893	0.3308	0.4294	**0.0341**	0.1089		0.7023	0.7695	0.5673	
	16	16	15	16	16	16	14	14	14	15	15	15	15	15	**16**	16		19	18	21	
EBI	-0.30351	0.04544	-0.36759	-0.18881	-0.06665	0.36554	-0.17167	-0.08103	-0.23514	0.14212	-0.26388	-0.14424	-0.10615	0.47883	0.04371	**0.70621**	0.2757		0.06526	**-0.54479**	**Energy Expenditure**
	0.2531	0.8673	0.1777	0.4837	0.8063	0.1638	0.573	0.783	0.4184	0.6134	0.3419	0.6081	0.7065	0.071	0.8723	**0.0022**	0.3013		0.797	**0.0159**	
	16	16	15	16	16	16	14	14	14	15	15	15	15	15	16	**16**	16		18	**19**	
WEL	0.09869	-0.02755	-0.13771	0.00266	-0.11307	-0.02651	-0.12781	0.06701	-0.01441	0.15987	0.04186	0.00176	-0.13185	0.31574	0.01378	0.31348	0.22292	0.51071		-0.27298	**Dietary Change**
	0.7161	0.9193	0.6245	0.9922	0.6767	0.9224	0.6633	0.82	0.961	0.5693	0.8822	0.995	0.6395	0.2516	0.9596	0.2371	0.4066	0.0432		0.2731	
	16	16	15	16	16	16	14	14	14	15	15	15	15	15	16	16	16	16		18	
PACE	-0.16532	0.12534	0.09407	-0.2046	-0.25426	-0.0664	-0.11585	-0.02899	-0.23205	-0.14035	-0.27917	-0.15592	-0.06679	-0.00422	-0.10469	0.1656	-0.07421	0.31865	-0.14742		**Weight**
	0.5611	0.6563	0.7491	0.4645	0.3605	0.8141	0.6933	0.9216	0.4247	0.6179	0.3136	0.579	0.813	0.9881	0.7104	0.5553	0.7927	0.247	0.6001		
	15	15	14	15	15	15	14	14	14	15	15	15	15	15	15	15	15	15	15		

Enhanced Group

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