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THE USE OF MOTIVATIONAL INTERVIEWING TECHNIQUES
TO ENHANCE THE EFFICACY OF GUIDED SELF-HELP
BEHAVIORAL WEIGHT LOSS TREATMENT

by

ILYSE DOBROW DIMARCO

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ABSTRACT OF THE DISSERTATION

The Use of Motivational Interviewing Techniques to Enhance the Efficacy of Guided Self-Help Behavioral Weight Loss Treatment

By ILYSE DOBROW DIMARCO

Dissertation Director:

G. Terence Wilson, Ph.D.

This study assessed whether motivational interviewing (MI), applied as part of a standard guided self-help (GSH) behavioral weight loss treatment, reduced attrition rate and improved participant weight loss and other eating-related and general psychological measures. The study also included assessments based on two theories of motivated behavior, to assess whether these measures predicted treatment outcome and whether MI increased participant motivation. Thirty-nine overweight patients (7 males, 32 females) were randomized to receive either 6 sessions of traditional GSH and 2 traditional motivation-focused sessions (GSH); or 6 GSH sessions and 2 sessions utilizing an MI approach to motivation (MI/GSH). In intention-to-treat and completer analyses, significant differences were found in the areas of eating concern and control over eating, favoring MI/GSH. Between-group effect size estimates indicated a small to medium

advantage for MI/GSH over GSH in weight loss, as well as on a number of secondary eating-related measures. Analyses of motivational measures indicated no significant differences by treatment group, but suggested that individuals who were more confident in their abilities to change and endorsed more extrinsic reasons for change lost more weight than other participants. Implications and future directions are discussed.

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Introduction

Obesity is one of the leading public health problems in the United States. Estimates of the prevalence of obesity indicate that approximately 65% of adults in the US are overweight or obese (body mass index [BMI] ≥ 25 kg/m²), and approximately 30% are obese (BMI ≥ 30 kg/m²) (Flegal, Carroll, Ogden, & Johnson, 2002; Hedley et al., 2004). Overweight and obese individuals have been found to be at increased risk for a number of significant health problems, such as diabetes, high blood pressure, high cholesterol, and certain cancers, and studies have shown that mortality risk increases with increasing BMI (National Heart, Lung, and Blood Institute [NHLBI] Obesity Education Initiative Expert Panel, 1998). In addition, obese individuals have been found to be the victims of discrimination in areas such as employment, education, and medical care (Puhl & Brownell, 2007). It has been demonstrated that a decrease of 7-10% of an individual's body weight can lead to significant improvements in health status (NHLBI Obesity Education Initiative Expert Panel, 1998).

Given the significant costs associated with obesity, much research has focused on evaluating novel weight loss and lifestyle change interventions (see Wadden & Stunkard, 2002). The current study evaluated whether the efficacy of a guided self-help (GSH) behavioral weight loss (BWL) treatment could be enhanced with the addition of two treatment sessions conducted in the motivational interviewing (MI) style (Miller & Rollnick, 2002). In order to provide a background for this study, relevant treatment literature will be reviewed. First, studies of self-help and GSH behavioral weight loss protocols will be discussed. Second, the motivational interviewing approach will be briefly described, and studies examining the application of MI to weight loss, dietary, and

exercise interventions will be reviewed. Third, two theoretical models of motivation, the transtheoretical model of behavior change (Prochaska, DiClemente, & Norcross, 1992) and self-determination theory (SDT; e.g., Deci & Ryan, 2000, Ryan & Deci, 2000), and their potential relevance to MI-informed behavioral weight loss, will be outlined.

Drawing on these findings, the treatment approach and design for the current study will be delineated.

Behavioral Weight Loss and Guided Self-Help

The most widely studied treatment for weight loss is behavioral weight loss (BWL) (Wing, 2002). BWL programs vary in terms of the specific dietary and exercise prescriptions they provide (Wing, 2002), but generally incorporate strategies such as self-monitoring of food intake, problem solving, cognitive restructuring, social support initiatives, education about nutrition and physical activities, and the use of stimulus control techniques and reinforcement (Wadden, Crerand, & Brock, 2005; West, Gore, & Leuders, 2007). Most studies of BWL have used a group treatment format, typically lasting for 16-26 weeks and including 10-20 participants (Wadden & Osei, 2002). Taken together, results from studies of group BWL suggest that individuals in such groups lose approximately 9-10% of their initial body weight (Wadden & Foster, 2000; Wing, 2002). This represents a clinically significant weight loss (NHLBI Obesity Education Initiative Expert Panel, 1998). However, weight maintenance has been more elusive. Long-term maintenance of weight loss among individuals in BWL groups has been found to be poor (Jeffery et al., 2000; Latner & Wilson, 2007).

In addition to studies of group BWL, some studies have examined BWL in a self-help or guided self-help (GSH) format (Butryn, Phelan, & Wing, 2007). Self-help or

GSH is significantly less costly and time-intensive than is group treatment. In addition, group BWL is only available at a small number of specialized obesity research clinics; self-help interventions are thus a more feasible option for most overweight/obese individuals (Wadden & Osei, 2002). In their review of studies of self-help and GSH approaches to weight loss, Butryn and colleagues (2007) observed that individuals who received some form of guidance along with a weight loss manual experienced more significant weight losses than those following a manual on their own. The authors hypothesized that regular contact with a professional may cause participants to feel “accountable” to someone for their behaviors, and therefore serves to increase their motivation to follow the prescribed program.

Of the few studies of BWL/GSH, most utilized a well-known BWL manual, the *LEARN Program for Weight Management, 10th Edition* (Brownell, 2004). LEARN, which stands for lifestyle, exercise, attitudes, relationships, and nutrition, is frequently employed in research on both group and self-help behavioral weight loss treatment (e.g., Andersen et al., 1999; Foster et al., 2003; Wadden, Berkowitz, Sarwer, Prus-Wisniewski, & Steinberg, 2001; Wadden, Foster, & Letizia, 1994; Wing, Venditti, Jakicic, Polley, & Lang, 1998; Womble et al., 2004).

Two of the studies of LEARN/GSH evaluated overweight and obese participants without significant psychopathology. Womble et al. (2004) randomly assigned 47 overweight women to receive a one-year membership to an internet-based weight loss program, or the LEARN manual. Participants in both groups also met with a psychologist for 5 brief (~20 minute) visits, during which time participants’ progress through and satisfaction with the program was discussed. In a study by Gardner and

colleagues (Gardner et al., 2007), 311 overweight women were randomly assigned to follow one of four weight loss manuals: LEARN, *Dr. Atkins' New Diet Revolution* (Atkins, 2002), *Enter the Zone* (Sears & Lawren, 1995), or *Eat More, Weigh Less* (Ornish, 2001). All women attended eight 1-hour classes which covered the content of their respective manuals, led by a registered dietician.

Both Womble et al. (2004) and Gardner et al. (2007) reported mean weight losses at a one-year follow-up. In the Womble et al. (2004) study, the LEARN group lost 4 kg (8.82 lbs.). Individuals in Gardner et al.'s (2007) study were less successful; they reportedly lost 2.2 kg (4.85 lbs.) at 12 months. In addition, intention-to-treat (ITT) analyses from both studies indicated that at 12 month follow-up, individuals in the LEARN program lost comparable amounts of weight to those in the relevant comparison programs. Based on these results, there is room for improvement in GSH/LEARN treatment.

One additional study (Grilo & Masheb, 2005) is notable for the development and implementation of a more structured GSH protocol to accompany the LEARN manual, for individuals with obesity and Binge Eating Disorder (BED). Participants in the treatment met for 6 brief (15-20 minute) sessions with psychologists. In these sessions, the psychologists reviewed relevant materials from the self-help manual and discussed any problems or questions participants might have had. When this treatment was compared to GSH utilizing a cognitive-behavioral (CBT) manual for binge eating (Fairburn, 1995) and a self-monitoring-only control group, it was found that none of the treatments were associated with significant weight loss. Individuals in the CBT group had significantly higher rates of remission from binge eating than those in the LEARN

group. Attrition rate was significantly lower in the CBT group than in the LEARN group. The results of this study cast doubt upon the efficacy of LEARN/GSH treatment for obese patients with BED.

In summary, the few extant studies of LEARN as GSH suggest that such treatment is associated with modest weight losses at best. It has been proposed (DiLillo, Siegfried, & West, 2003) that both the shorter and longer-term efficacy of BWL could be improved by incorporating motivational interviewing strategies (MI; Miller & Rollnick, 2002) into standard BWL treatment programs.

Motivational Interviewing and its Application to Behavioral Weight Loss

Motivational Interviewing: An Overview

As described by Miller and Rollnick (2002), MI is less a collection of specific therapeutic techniques and more a “spirit” that guides therapeutic action. MI is defined as “a participant-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence” (Miller & Rollnick, 2002, p. 25). Miller (1983) originally developed MI for use with alcoholic participants, arguing that typical confrontational forms of therapy were ineffective. Miller (1983) proposed that alcoholics were typically ambivalent about changing, recognizing both the benefits and drawbacks of ending their dependence on alcohol. Therapists would be better served, he suggested, by encouraging participants to explore their ambivalence, and to decide for themselves whether the benefits of change outweighed the drawbacks. Once such a decision was made, participants would be responsible for initiating change themselves, motivated by the reasons for change that they themselves articulated.

Fundamental to the “spirit” of MI are four general principles: expressing empathy, developing discrepancy, rolling with resistance, and supporting self-efficacy. The first principle, expressing empathy, dictates that MI therapists must attempt to understand how participants are feeling, without imposing any value judgments on participants or blaming participants for their actions (Rogers, 1951). In “developing discrepancy,” therapists aim to help participants articulate the discrepancy between their present state and the way they ideally want things to be. The principle of “rolling with resistance” dictates that instead of opposing participants’ resistance to change, or arguing with resistant participants, MI therapists should convey that ambivalence is understandable, and encourage participants to explore this ambivalence. Finally, therapists must emphasize that participants are responsible for changing their own behaviors.

Aside from these four guiding principles, a number of more specific strategies are used by MI therapists. Some of these strategies are borrowed directly from client-centered therapeutic approaches (and are common to many different therapeutic modalities), such as asking open-ended questions, reflective listening, affirming and supporting participants, and utilizing summary statements. Others are common to cognitive-behavioral approaches. For example, MI therapists often ask participants to complete a decisional balance exercise, in which they articulate both the benefits and drawbacks of maintaining their problematic behavior and/or of changing their behavior. This provides participants with a summary of their ambivalence; therapists can then reiterate this summary, while gently encouraging participants to “tip the balance” (e.g., DiLillo et al., 2003, p. 128) in favor of change.

A meta-analysis (Hettema, Steele, & Miller, 2005) evaluated controlled trials employing the MI style in the service of treatment and/or prevention of a number of different health behaviors. Results supported the efficacy of MI in areas such as alcohol use, treatment compliance, and diet and exercise. Relevant to the current study, the four diet and exercise MI interventions that were examined had an average between-group effect size (over all follow-up points) of .78.

Whereas MI is clearly efficacious, there has been little research exploring the mechanisms by which it exerts its effects (Burke, Arkowitz, & Dunn, 2002). Some work has suggested that the degree to which participants utilize commitment language in session may predict MI treatment outcome (Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003). Commitment language refers to any utterances by the participant that can be considered to fall under one of these categories: commitment (participant makes a verbal commitment to change), desire (participant articulates a desire to change), perceived ability (participant states that he/she has the ability to change), need (participant notes that he/she needs to change), readiness (participant expresses a readiness for change), and reasons (participant articulates reasons why he/she needs to change).

Motivational Interviewing in Behavioral Weight Loss Treatment

Obesity treatment researchers have long noted that adequate motivation is required for successful implementation of the dietary and exercise changes necessary for weight loss. In fact, in their comprehensive summary of the nature and treatment of obesity, the National Heart, Lung, and Blood Institute (NHLBI) Obesity Education Initiative Expert Panel (1998) underscored the importance of motivation in weight loss treatment, recommending that “Practitioners need to assess the participant’s motivation to

enter weight loss therapy; assess the readiness of the participant to implement the plan and then take appropriate steps to motivate the participant for treatment” (p. xxiii).

DiLillo and colleagues (DiLillo, Siegfried, & West, 2003) present a compelling argument for using MI to target motivational issues of participants in BWL treatment programs. The authors maintain that weight loss, like other behavior change processes, is typically associated with a great deal of ambivalence. There are a number of potential sources of this ambivalence: throughout the course of weight loss treatment, weight losses may “wax and wane (p. 120);” participants in weight loss programs may have a prior history of unsuccessful attempts at weight loss; and behavioral weight loss treatments require a substantial number of complicated behavioral changes (DiLillo et al., 2003; see also Shepherd, 2002; Sparks, Conner, James, Shepherd, & Povey, 2001; Windhauser et al., 1999). Ambivalence may also stem from the discrepancy between participants’ ideal weight loss goals and the actual weight loss they are able to achieve (see Foster, Wadden, Vogt, & Brewer, 1997; Wadden et al., 2003). As described, MI is specifically designed to help individuals resolve ambivalence about change.

In addition, DiLillo et al. (2003) argue that MI may be valuable because it tailors standard behavioral treatment to the goals of individual participants. Instead of just following a treatment protocol, participants are able to explore their own change process, and the specific problems or concerns they may have. This may increase participants’ feelings of control over the treatment process and in turn enhance their satisfaction with treatment results.

Goldberg and Kiernan (2005) extended the argument for adding MI to BWL by suggesting that MI can address one specific, crucial component of these programs:

participant retention. On average, the attrition rate in behavioral weight loss treatments is 32% (Davis & Addis, 1999); thus, a third of participants do not receive the full treatment package. These authors maintain that MI can serve to effectively target the ambivalence that so often causes participants to drop out prematurely.

A small number of researchers have attempted to empirically evaluate the use of MI in the context of BWL. The first of such groups (Woollard, Beilin, Lord, Puddey, & Rouse, 1995) designed an uncontrolled study to assess whether general practice nurses could implement a dietary/lifestyle intervention with hypertensive participants. To meet these goals, nurses utilized both the motivational interviewing style and specific strategies aimed at enhancing participant self-efficacy. Half of the participants received one in-person counseling session and five telephone sessions (“low intervention”); the other half received six in-person sessions (“high intervention”). After 18 weeks, participants in the high intervention group experienced significant decreases in blood pressure and weight, and participants in the low intervention group experienced significant decreases in alcohol use and salt intake. These findings suggest that an MI-informed intervention, whether given in “high” or “low” doses, can positively impact dietary and weight loss outcomes.

West and colleagues have designed two studies to evaluate the addition of MI to BWL groups for diabetic women: a smaller pilot study with 22 participants (Smith, Heckemeyer, Kratt, & Mason, 1997), and a larger trial with 217 participants (West, DiLillo, Bursac, Gore, & Greene, 2007). In the pilot study, participants received either 16 weeks of group BWL alone or 16 weeks of group treatment plus three sessions of MI with a psychologist. In the larger trial, participants were randomized to receive either

five individual sessions of MI (at baseline, 3, 6, 9, and 12 months), or five sessions of health education (discussion of women's health care topics), in addition to the group treatment (which met weekly for 6 months, biweekly for 6 months, and monthly for 6 months). In both trials, the MI intervention incorporated many of the core strategies of MI (Miller & Rollnick, 2002): therapists asked participants to discuss pros and cons of behavior change, helped participants formulate behavioral goals, and aided in problem solving. Objective behavioral feedback was also utilized in the service of developing discrepancy between current behaviors and future goals.

In both trials (Smith et al., 1997; West et al., 2007), women receiving MI reported greater treatment adherence (e.g., session attendance, number food diaries submitted) than did women receiving no treatment or a health education control. In addition, in the larger trial, MI participants lost significantly more weight at 6, 12, and 18 months than did women in the control. Mediation analyses revealed that session attendance and completion of food records mediated the relation between treatment condition and weight loss, suggesting that MI was associated with improved adherence, which was then associated with greater weight loss.

Goldberg and Kiernan (2005) conducted a trial in which group-based MI was used to target retention among individuals in BWL treatment. Participants ($N = 159$) were randomized to one of three conditions: control (in which they were told to join a community BWL treatment group) and two BWL conditions. Prior to randomization, all interested participants were asked to attend a group orientation session in which they were instructed to engage in a decisional balance exercise concerning the pros and cons of assignment to the control condition versus the active conditions. A group facilitator

led a discussion of these pros and cons utilizing the MI listening style. The session also included psychoeducation about the benefits of losing a modest amount of weight, what the trial would entail, and how dropping out of an RCT could bias study results.

Goldberg and Kiernan created this intervention to differ from the “typical health education approach” (p. 4), in which clinicians emphasize only the benefits of behavior change.

When the data from all three cohorts of study participants were combined, it was found that 98% of the total participants (159) completed the 6-month visit, 97% completed the 12-month visit, and 96% completed the 18-month visit. Dropout rate did not differ by study condition. This obviously represents a substantial improvement over retention rates in earlier BWL trials, and provides evidence that asking participants to generate their own arguments for and against treatment participation, rather than simply encouraging participants to complete the full course of treatment, may significantly affect their desire to drop out.

Finally, Carels et al. (2007) evaluated the use of MI as part of a stepped-care approach to BWL treatment. Fifty-five overweight participants were randomized to receive group treatment only (24 weeks of LEARN), or group treatment plus the option of weekly individual MI sessions, if they failed to meet weight loss goals. Analyses compared individuals who received MI to individuals from group treatment-only who failed to meet treatment goals. Results indicated that individuals in the MI group lost significantly more weight (12.79 lbs. vs. 8.38 lbs.) and reported significantly more weekly exercise at post-treatment than did those in group treatment-only. However, it is

impossible to determine whether it was the MI specifically, or the increased contact with a therapist more generally, that was associated with improved outcome.

Whereas only a handful of researchers have attempted to integrate MI into BWL treatment, other researchers (Bowen et al., 2002; Resnicow et al., 2001, 2004, 2005) have reported positive findings from trials using MI strategies as an adjunct to large-scale prevention programs aimed at improving dietary habits. Resnicow and colleagues (Resnicow et al., 2001, 2004, 2005), for example, have incorporated MI-informed phone calls into prevention programs aimed at promoting fruit and vegetable intake (Resnicow et al., 2001, 2004, 2005) for large groups of African-American churchgoers. Results from studies of these programs indicated that groups receiving MI-informed phone calls reported significantly greater intake of fruits and vegetables at 6 months (Resnicow et al., 2004) and 1 year (Resnicow et al., 2001, 2005) relative to those in a control intervention (Resnicow et al., 2001, 2004, 2005) and those receiving the same self-help materials but no MI phone calls (Resnicow et al., 2001, 2005).

In Bowen et al.'s (2002) study, half of the participants enrolled in a large study of group psychoeducation and behavioral treatment for dietary modification were randomly assigned to receive three sessions of dietician-conducted MI. At a one year follow-up, the MI participants decreased their consumption of dietary fat, whereas the control participants reported increased fat consumption. There was a nonsignificant trend for MI participants to complete more self-monitoring records and attend more sessions than control participants. Bowen et al.'s (2002) results are, however, limited because analyses were conducted on treatment completers only. In addition, it is impossible to determine

whether it was the MI specifically, or the increased therapist contact more generally, that accounted for the better outcomes in the MI group.

One additional study utilized a core strategy of MI, but not MI per se, in an effort to enhance weight loss in participants in group BWL. Finch and colleagues (2005) randomized overweight individuals to attend 1 of 2 types of group treatments for weight loss: an “optimistic” treatment group, in which they were encouraged to consider only the beneficial aspects of weight loss; and a “balanced” group, in which they were encouraged to consider both the benefits and challenges (e.g., sweating while exercising, depriving oneself of certain foods) associated with trying to lose weight. These treatment groups were informal; each of the 8 weekly sessions began with a presentation from a trained group facilitator and was followed by a group discussion. Homework assignments were given which stressed either the benefits of weight loss (in the optimistic condition) or the benefits and drawbacks (in the balanced condition). Results indicated no significant differences between groups in weight loss at post-treatment or at 6 or 18-month follow-up. However, it should be noted that Finch and colleagues (2005) did not intend their treatment to be an MI intervention, and that the facilitators did not employ MI. As Markland and colleagues note (Markland, Ryan, Tobin, & Rollnick, 2005), merely exploring the pros and cons of behavior change may not be enough to facilitate change; it may be that such an exploration should occur in the context of a supportive, empathic environment, in which the individual’s personal choice to make changes is emphasized.

All of the studies reviewed above explored the use of MI in the context of group BWL treatments. No study to date has examined MI as an adjunct to individual GSH weight loss protocols. There has been one study in the eating disorders field that utilized

MI with GSH; Dunn, Neighbors, and Larimer (2006) examined the addition of a one-session MI intervention to standard self-help treatment for binge eating (Fairburn, 1995), but not weight loss. In the MI intervention, participants were provided with feedback regarding their responses to questionnaires about their eating and motivation to change and encouraged to complete a decisional balance exercise about their desire to change. MI was found to increase readiness to change relative to the control intervention, and more individuals who received MI were abstinent from binge eating four months after receiving the manual.

Motivational predictors of weight loss

Preliminary studies have provided suggestive evidence that adding MI, a motivation-focused intervention, to BWL programs serves to enhance weight loss outcomes and improve treatment adherence. Notably, these studies have not examined potential motivational predictors of weight loss or adherence. Three potential predictors of motivation will be described below, as they will be the subject of exploratory analyses in the current study.

Arguably the most popular theory of motivated behavior is the transtheoretical model of behavior change (TTM), or the stages of change model (Prochaska et al., 1992). According to the TTM, individuals progress through a series of stages as they change a behavior: precontemplation, contemplation, preparation, action, and maintenance. The developers of the TTM (DiClemente & Velasquez, 2002) have argued that MI is a “natural fit” (p. 203) with the TTM, because MI can be used to help move individuals into more action-oriented stages of change. They further argue that MI strategies should be matched to the stage of change in which individuals find themselves (DiClemente &

Velasquez, 2002). However, a number of studies, including those examining weight loss (Jeffery, French, & Rothman, 1999; Macqueen, Brynes, & Frost, 2002) and dietary modification (Resnicow, McCarty, & Baranowski, 2003) have shown that individuals' baseline stage of change does not predict treatment outcome, thus casting doubt on the basic assumption of the TTM. Stage-matched treatment interventions have not been found to be any more effective than interventions that are not matched to stage of change (Project MATCH Research Group, 1997; see also Wilson & Schlam, 2004 for a critique of the application of the TTM to eating and weight disorders).

An alternative to the TTM is Deci and Ryan's self-determination theory (SDT; e.g., Deci & Ryan, 2000, Ryan & Deci, 2000). According to SDT, motivation for a task can be either intrinsic (inherently enjoyable or interesting) or extrinsic (performed in order to achieve an outcome that is separate from the activity itself). In order for an extrinsically motivated behavior (e.g., dietary and exercise modification) to become autonomously regulated—that is, performed willingly and without coercion—three basic needs must be met: autonomy, competence, and relatedness (Ryan & Deci, 2000). In other words, individuals must feel that they have freedom to choose to participate in an activity; that they are able to adequately perform that activity; and that the activity is supported by significant others.

Studies of health care behaviors such as weight change (Williams, Grow, Freedman, Ryan, & Deci, 1996), adherence to a diabetes-specific diet and exercise regimen (e.g., Williams, Freedman, & Deci, 1998; Williams, McGregor, Zeldman, Freedman, & Deci, 2004), and adherence to an exercise regimen (e.g., Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997) have provided evidence for the predictive power of the

various tenets of SDT. Specifically, both the extent to which a behavior is autonomously regulated (Williams et al., 1996; Williams et al., 1998; Williams et al., 2004) and the degree to which an individual feels competent to perform a given behavior (Ryan et al., 1997; Williams et al., 1998; Williams et al., 2004) have been shown to predict treatment outcome. In addition, self-efficacy has been shown to predict weight loss treatment outcomes, although generalized self-efficacy has been a more consistent predictor than eating- or exercise-specific self-efficacy (Teixeira, Goings, Sardinha, & Lohman, 2005).

A number of authors (Foote et al., 1999; Ginsburg, Mann, Rotgers, & Weekes, 2002; Markland et al., 2005; Vansteenkiste & Sheldon, 2006) have argued for an integration of SDT and MI, noting that SDT might serve as the theoretical framework for understanding how MI works. According to these groups (Foote et al., 1999; Ginsburg et al., 2002; Markland et al., 2005; Vansteenkiste & Sheldon, 2006), MI is by design supportive of SDT's three basic needs: competence (via educating the participant, helping the participant select appropriate goals, and providing positive feedback and supporting participant self-efficacy), autonomy (avoiding confrontation, "rolling with resistance," giving the participant the power to choose what and how to change), and relatedness (avoiding confrontation, providing empathy, validating the participant's concerns). These authors call for an empirical examination of the relationship between MI and SDT; and, more specifically, studies that examine "whether motivational interviewing impacts on perceptions of support for autonomy, competence, and relatedness; actual satisfaction of these needs; autonomous motivation for change; and subsequently on behavior change and maintenance" (Markland et al., 2005, p. 826).

Thus far, only one study has addressed this question. In their study of a prevention program for fruit and vegetable intake, Resnicow and colleagues (2004) reported that individuals in the MI group experienced significantly larger increases in autonomous reasons for behavior change (as measured by the Treatment Self-Regulation Questionnaire; TSRQ, Williams & Deci, 2001; Williams et al., 1998) than did those not receiving MI.

The Current Study

In the current study, individuals receiving GSH treatment (using the LEARN manual; Brownell, 2004) were randomized to receive one of two types of additional interventions: an MI-informed intervention (GSH/MI), or a control intervention, which consisted of a traditional health educational approach to motivation (this will be referred to as “GSH”) (Goldberg & Kiernan, 2005). Participants received the first of these interventions at the start of treatment, and the second at mid-treatment.

It was hypothesized that GSH/MI would be superior to GSH in weight loss (which was measured as BMI change) and treatment adherence. Treatment adherence was defined by participant dropout status (whether or not participants completed all 8 sessions of treatment) and by the percentage of self-monitoring records that participants completed. It was also expected that participants in GSH/MI would report greater improvements in secondary measures of eating behavior (Eating Disorder Examination-Questionnaire, Fairburn & Beglin, 1994; Three Factor Eating Questionnaire, Stunkard & Messick, 1985) from baseline to post-treatment than would participants in GSH. The LEARN (Brownell, 2004) manual teaches strategies for addressing problematic eating behaviors (e.g., overly-focusing on shape and weight, eating in secret, eating in a

disinhibited fashion). As it was hypothesized that participants in GSH/MI would be more adherent to treatment (the manual) than those in GSH, it was also believed that they would experience greater changes in eating behaviors than those in GSH. Participants in each treatment group also completed general measures of mood and quality of life, to explore whether MI impacted these broader areas of functioning.

In addition, based on previous work examining the relationship of stages of change and the tenets of SDT (specifically autonomy and competence) to weight change and to adherence to dietary and exercise regimens, it was hypothesized that feelings of autonomy and competence, and not stage of change, would predict BMI change at post-treatment as well as treatment adherence. Further exploratory analyses assessed whether participants who received GSH/MI scored higher on measures of motivation (autonomy, competence and/or stage of change) at mid-treatment than did individuals in GSH.

Method

Participants

The majority of participants were recruited through an advertisement for the study that appeared in a faculty/staff human resources email digest at a large northeastern university. In addition, some participants responded to flyers about the study that were posted in local businesses (e.g., libraries, supermarkets, laundromats) and around the university campus. Participants eligible for inclusion in the study included those who were 18 to 55 years old, were available for treatment for 12 consecutive weeks, and had a body mass index (BMI) between 27 and 40 kg/m². This BMI range was selected to capture individuals who were significantly overweight or obese, but not so obese (e.g., individuals who have a BMI of 40 or above are considered to have “extreme obesity;” NHLBI Obesity Education Initiative Expert Panel, 1998) that they would not receive any benefit from a BWL treatment.

Exclusion criteria included the following: participation in another weight loss program, history of weight loss surgery, having medical conditions known to affect weight (e.g., diabetes, thyroid problems), adherence to a special diet, inability to perform moderate exercise, being pregnant or planning to become pregnant, and having clinically significant symptoms of depression (as measured by a Beck Depression Inventory [BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961] score of over 18) or drug or alcohol abuse (as assessed in the pre-treatment phone screen). Individuals taking blood pressure, cholesterol, or hormone medications could participate in the study, as long as they had been on a stable dosage of these medications for at least 3 months prior to study entry. In addition, individuals who reported clinically significant purging behaviors (vomiting,

laxative abuse, or diuretic abuse, occurring more than once per month for the prior 6 months) were excluded from the study.

Measures

BDI

The Beck Depression Inventory (BDI; Beck et al., 1961) is a widely used 21-item measure assessing cognitive, physical, affective and motivational symptoms of depression and feelings of suicidality experienced over a one-week period. The BDI has consistently been shown to be reliable and valid for both psychiatric and non-psychiatric populations (Beck, Steer, & Garbin, 1988). The BDI was administered at baseline and post-treatment.

Demographics Questionnaire

Each participant completed a short demographics questionnaire at baseline, with items assessing the respondent's age, date of birth, gender, racial/ethnic background, educational level, marital and family status, and employment status.

EDE-Q

The Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994) assesses for the presence of common behavioral features of eating disorders, such as overeating, loss of control over eating, vomiting, using laxatives or diuretics, and participating in driven exercise. The EDE-Q includes four subscales relating to various features of eating disorders, including dietary restraint, eating concern, weight concern, and shape concern. Participants rate responses on a scale from 0 (not at all; or, no performance of the behavior in question) to 6 (markedly; or, performance of the behavior in question every day). The internal consistency, test-retest reliability, and convergent

validity of the EDE-Q have been well documented (Black & Wilson, 1996; Fairburn & Beglin, 1994; Luce & Crowther, 1999). The EDE-Q was administered at baseline and post-treatment.

Perceived Competence Scale

Consistent with self-determination theory (SDT; Deci & Ryan, 2000, Ryan & Deci, 2000), the Perceived Competence Scale (PCS; Williams & Deci, 1996; Williams et al., 1998) was used to assess participants' confidence in their ability to make treatment changes. The PCS asks four questions (rated on a scale from 1, "not at all true," to 7, "very true") that focus on individuals' perceptions of their ability to control their treatment outcomes. This measure has been found to have favorable internal consistency and validity when applied to such behaviors as management of glucose levels by diabetics (Williams et al., 1998; Williams et al., 2004), and learning of new course material by medical students (Williams & Deci, 1996). For the current study, the PCS was modified to assess perceived competence for weight loss and dietary/exercise change. The PCS was administered at baseline and after the first and second GSH/MI or GSH motivational sessions.

Quality of Life

The Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form (Q-LES-Q-SF; Endicott, Nee, Harrison, & Blumenthal, 1993) was used to measure the overall quality of life of study participants. The full Q-LES, of which the Q-LES-Q-SF is one subscale ("general activities"), has been found to be a reliable and valid measure of various aspects of quality of life (Endicott et al., 1993). The Q-LES-Q-SF was administered at baseline and post-treatment.

Self-monitoring

As part of their treatment, participants were asked to complete a self-monitoring form every day. Based on the various self-monitoring forms included in the LEARN manual, this form included space for participants to record what specific foods they ate throughout the day and the calorie values of these foods. Participants also recorded where they ate each of these foods and what if any activities they initiated during the day. These forms served as a measure of participant adherence to the treatment protocol. Participants who recorded what they ate for 50% or more of their meals and snacks each day were said to have completed their records for that day. Therapists were responsible for determining and recording the number of self-monitoring records participants completed.

Stage of Change (Change Questionnaire)

A set of three statements, based on those used in a study of stages of change in women in treatment for bulimia nervosa (Wolk & Devlin, 2001), were used to assess participants' readiness to change their eating and exercise behaviors and lose weight. These statements were: "I intend to make changes to my diet and exercise routine and lose weight in the next 6 months."; "I intend to make changes to my diet and exercise routine and lose weight in the next 30 days."; and "In the past year, before coming for treatment, I have had definite plans to change my diet and exercise routine and lose weight (either on my own or with outside help) and I have actually attempted to carry out these plans." Participants were asked to report on the degree to which they agreed with these statements, using a 5-point scale. Wolk and Devlin (2001) developed a rubric for how to assign individuals to a stage of change based on their responses to these

statements. The stage of change measure was administered at baseline and after the first and second MI/traditional motivational sessions.

TFEQ

The Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985) is a reliable and valid measure of problems associated with eating (Foster et al., 1998). The initial version of the measure included 3 subscales, cognitive restraint (restriction of food intake), disinhibition (unrestrained eating), and hunger (feelings of hunger and associated behavioral consequences). Westenhoefer, Stunkard, and Pudel (1999) suggested that the Restraint subscale is better represented as two separate scales: Flexible Control and Rigid Control. “Flexible control” reflects a flexible approach to dieting and eating, in which unhealthy foods are eaten in small amounts without any accompanying guilt. “Rigid control” refers to an “all or nothing” approach to dieting (Westenhoefer et al., 1999). These two subscales, along with Disinhibition and Hunger, were utilized in the current study. The TFEQ was administered at baseline and post-treatment.

Treatment Self-Regulation Questionnaire

In order to assess feelings of autonomy among individuals receiving weight loss treatment, two versions of the Treatment Self-Regulation Questionnaire (Williams et al., 1996) were employed. The first version (entitled, “Treatment Questionnaire-I”) presents individuals who are about to start a weight loss program with a number of statements regarding their decision to enter the weight loss program, their likely motivation(s) for remaining in treatment, and the reasons why they are planning to lose weight. Each statement is rated on a 7-point scale, from 1 (not at all true) to 7 (very true). Some of these statements reflect Autonomous Regulation (intrinsic reasons for change), while

others reflect Controlled Regulation (extrinsic reasons for change). The Autonomous items represent one subscale of the measure; the Controlled items represent the other subscale. The second version, designed for participants who are already enrolled in a weight loss treatment (entitled, “Treatment Questionnaire-II”), presents the statements in the first version of the subscale, modified to refer to mid-treatment. The two subscales of the TSRQ for weight loss have been found to have adequate internal consistency and validity (Williams et al., 1996). The TSRQ was administered at baseline and after the first and second MI/traditional motivational sessions.

Procedure

Individuals who called the Rutgers Eating Disorders Clinic to inquire about study participation heard a standard description of the study and answered questions from a semi-structured standardized telephone screen. Those who were found to be eligible for the study based on this screen participated in an in-person evaluation. At this evaluation, participants read and sign an informed consent form, and their height and weight were taken. In addition, they completed a number of self-report questionnaires, including: the BDI (Beck et al., 1961); EDE-Q (Fairburn & Beglin, 1994); TFEQ (Stunkard & Messick, 1985); Q-LES-Q-SF (Endicott et al., 1993); and a demographics questionnaire. They also completed the three motivational measures: the TSRQ (Williams et al., 1996), PCS (Williams & Deci, 1996; Williams et al., 1998), and Change Questionnaire (Wolk & Devlin, 2001).

If based on this evaluation participants were found to be eligible for the study, they were randomly assigned to one of two conditions, GSH or GSH/MI, and were assigned a therapist. The first treatment session, which lasted one hour, focused on

participant motivation for weight loss. In GSH/MI, it followed an MI-inspired format; whereas in GSH, it followed the typical motivational format used in BWL treatment. See below for a more detailed description of the GSH/MI and GSH treatment manuals. At the end of this session, participants were provided with their self-help treatment manual, *The LEARN Program for Weight Management, 10th edition* (Brownell, 2004).

This first session was followed by three weekly individual sessions. Each of these sessions lasted approximately 20-30 minutes. These sessions were designed to review important information that participants read in their self-help weight loss manual and pinpoint any problems they might be having as they tried to implement the guidelines of the manual. In addition, participants' weight was measured at each session. These sessions were manualized and closely followed the format of the manual created and utilized for Grilo and Masheb's (2005) study. At the beginning of the second session, participants completed questionnaires assessing motivation for treatment, including the TSRQ (Williams et al., 1996), PCS (Williams & Deci, 1996; Williams et al., 1998), and Change Questionnaire (Wolk & Devlin, 2001).

In the week after the third GSH treatment session, participants completed a second hour-long session focused on motivation. In GSH/MI, this session followed an MI-inspired format; whereas in GSH, this session followed the typical motivational format used in BWL treatment (for more information about the MI and traditional GSH treatment manuals, see below). Following this second longer session, participants attended three more sessions, which occurred every other week. Each of these sessions was again based on a protocol modeled after that used by Grilo and Masheb (2005). Participants were also weighed at each of these sessions. At the beginning of session 6,

participants completed questionnaires assessing motivation for treatment, including the TSRQ (Williams et al., 1996), PCS (Williams & Deci, 1996; Williams et al., 1998), and Change Questionnaire (Wolk & Devlin, 2001). At the final session, participants completed the BDI (Beck et al., 1961), EDE-Q (Fairburn & Beglin, 1994), TFEQ (Stunkard & Messick, 1985), and Q-LES-Q-SF (Endicott et al., 1993).

Treatment protocols

LEARN

The LEARN Program for Weight Management, 10th Edition (Brownell, 2004) is popular with both clinicians and participants and is often employed in university-based clinics (Andersen et al., 1999; Foster et al., 2003; Womble et al., 2004). LEARN stands for lifestyle, exercise, attitudes, relationships, and nutrition. The manual aims to promote gradual weight loss by fostering changes in each of the areas cited above. Specifically, each of the 12 chapters includes information and advice on topics such as proper nutrition, incorporating regular exercise into one's life, including family and friends in one's weight loss plan, and changing one's attitudes towards food and weight. Readers are encouraged to monitor both their food consumption and their activity level throughout the course of treatment, and to set weekly goals.

The six standard GSH sessions in the current study (sessions 2, 3, 4, 6, 7, and 8) were modeled after those created by Grilo and Masheb (2005) for their study of LEARN/GSH. At each session, therapists followed a series of steps, including: reviewing self-monitoring forms from the previous week/two weeks; discussing any problems participants may have encountered; going over set topics from the readings

assigned at the previous session; and setting new reading assignments and homework tasks for the following session.

Motivational interventions

Traditional GSH intervention. Sessions 1 and 5 in the GSH intervention focused solely on the benefits of making changes in exercise and diet and losing weight. This is the typical motivational strategy utilized in behavioral weight loss programs (Goldberg & Kiernan, 2005). The first session began with a description of the LEARN manual and how treatment would progress. After hearing this description, participants enumerated the possible benefits of losing weight. Participants then described their history of weight loss attempts, and participants who had successfully lost weight in the past described any benefits from weight loss that they experienced.

Session 5 focused largely on participants' progress to date. Participants discussed any changes they had made successfully, and the benefits they noticed from making those changes. Participants also noted any changes they still wished to make, and why they perceived that those changes might be beneficial.

Motivational interviewing intervention. For sessions 1 and 5 in the MI condition, therapists employed the MI style (Miller & Rollnick, 2002) in the service of increasing participants' motivation for change. The choice to provide two MI sessions over the course of treatment was informed by previous studies of the use of MI in BWL, which typically include an introductory MI session prior to the beginning of treatment and one or more mid-treatment MI sessions. Because there was a relatively small number of sessions in the current study, it was considered appropriate to include only one mid-treatment MI session. The MI intervention was based on the models of Goldberg and

Kiernan (2005) and West and colleagues (Smith et al., 1997; West et al., 2007), and is consistent with the principles highlighted in Miller and Rollnick's (2002) book, *Motivational Interviewing*. It was developed under the guidance of Thomas Morgan, Psy.D., a psychologist trained in MI (see "training/supervision" section below). In the two MI sessions, participants were given the opportunity to voice their ambivalence about change in a supportive therapeutic atmosphere, and to develop a concrete plan for change. Therapists utilized the MI therapeutic style (e.g., asking open-ended questions, reflective listening) while encouraging participants to consider the pros and cons of making changes in diet and exercise and losing weight.

As in the traditional GSH intervention, the first motivational session began with a description of the LEARN manual and how treatment would progress. Therapists next engaged participants in a discussion of their past attempts at weight loss, prompting participants to focus on how the current attempt might differ from those past attempts. Next, participants enumerated both the pros and cons of making the lifestyle changes that would be required of them as part of their participation in LEARN treatment. Once these pros and cons were articulated, therapists summarized them, highlighting the reasons *for* change that participants provided.

In the second motivational session, participants discussed any progress they had made to date, and how these changes affected them. Next, participants and therapists reviewed a pros/cons goal sheet that the participants completed for homework. Again, once these pros and cons were articulated, therapists summarized them, while amplifying the "pros." Finally, therapists and participants drew up a change plan for the remainder of treatment. It should be noted that throughout both MI sessions, MI techniques such as

reflective listening, asking open-ended questions, and making summary statements were employed.

Therapists/Training

Four therapists (I. Dobrow DiMarco, D. Klein, V. Clark, K. Elber), all of whom were in training in doctoral programs in Clinical Psychology, provided the GSH and GSH/MI in this study. Three of these therapists (ID, DK, VC) were advanced graduate students; the fourth (KE) was a first-year graduate student. All of the therapists saw participants in both treatment conditions. Therapist assignments were as follows: ID (10 GSH/MI, 8 GSH), DK (6 GSH/MI, 6 GSH), VC (3 GSH/MI, 2 GSH), and KE (1 GSH/MI, 3 GSH).

Study therapists participated in training workshops with Thomas Morgan, Psy.D. (at the Rutgers Center of Alcohol Studies) and Deborah Van Horn, Ph.D. (at the 2005 Association for Behavioral and Cognitive Therapies conference). Both workshops were designed to teach the basics of MI and give future therapists the opportunity to watch and conduct role plays. Dr. Morgan's two workshops, each three hours in duration, were specifically tailored to the study manual and addressed the use of MI in the context of weight loss treatment.

To ensure adequate implementation of the treatment, each therapist treated a pilot participant prior to the study. Both initial and mid-treatment MI sessions with this pilot participant were audiotaped, and Dr. Morgan listened to these tapes to assess adherence to the MI approach. In his second workshop, Dr. Morgan specifically addressed the challenges that therapists experienced during these pilot sessions. Over the course of the study, study therapists met for weekly group supervision with the supervisor of the study,

G. Terence Wilson, Ph.D., during which they addressed any ongoing therapeutic issues and resolved any potential problems. In addition, the Principal Investigator listened to every Session 1 and 5 tape, to ensure that therapists adhered to their assigned treatment conditions. She provided detailed feedback to the therapists on each of these tapes.

Data Analytic Plan

Preliminary analyses examined whether individuals in the GSH/MI and GSH groups differed at baseline on any demographic or clinical variables. Analysis of variance (ANOVA) was utilized to examine potential baseline differences in continuous variables, and chi square analysis was utilized to explore baseline differences in categorical variables. If the expected cell count frequency in any chi square tests was less than 5 participants, the Fisher's exact test was used to replace the chi square. Analyses revealed no statistically significant differences at baseline between the treatment groups. However, a larger number of men was randomized to GSH/MI ($n = 6$) than the GSH group ($n = 1$), even though this difference did not achieve statistical significance according to the Fisher exact test. Accordingly, gender was included as a covariate in all analyses involving treatment condition.

ANOVAs and chi square analyses were employed to determine whether individuals who dropped out of the study (defined as those who did not complete the 8 sessions of treatment) differed from those who completed the study on any baseline demographic or clinical variables. The only variable that differed between the two groups was baseline perceived competence scale (PCS) score, with completers scoring more highly on this measure than dropouts. Baseline PCS score was therefore utilized as a covariate in all analyses utilizing dropout status as the outcome measure.

To assess whether GSH/MI and GSH participants differed on any of the continuous outcome measures, including the primary outcome measure of BMI change and the secondary measures (EDE-Q subscales, TFEQ subscales, BDI score, Q-LES-Q score), repeated measures ANCOVAs were conducted. Treatment condition (MI, control) represented a two-level, between-participants factor, and time (baseline, post-treatment) represented a two-level within-participants factor. As discussed above, gender was included as a covariate. Where necessary, statistically significant results were followed up with post-hoc tests (e.g., paired samples t-tests). All of these ANCOVAs were conducted twice: in an intention-to-treat (ITT) sample and a completer sample. It is important to note that the variable of binge eating frequency, measured in the EDE-Q, was not included in analyses, given the small number of individuals who reported clinically significant binge eating ($n = 5$) and the suspected lack of reliability of participant reports of binge eating.

Following the completion of these ANCOVAs, between-groups effect sizes (Cohen's d) were calculated for BMI change and all of the other secondary measures. Effect sizes were computed using mean change scores and pooled standard deviations. These ESs were calculated twice: once for the ITT sample, and once for the completers only. Cohen's (1988) guidelines for magnitude of effect sizes are: small = 0.20, medium = 0.50, and large = 0.80.

Analyses of treatment adherence were supposed to explore both participant attrition and completion of self-monitoring records. However, exploratory analyses revealed that there was not enough variance in the measure of "completion of self-monitoring records" to allow for meaningful data analyses; it appeared that as long as

participants remained in the study, they consistently completed 90-100% of their records, with few exceptions. Thus, analyses had to focus solely on dropout status. In order to ascertain whether there was a difference in the number of dropouts in GSH/MI and GSH, a logistic regression was conducted, with baseline PCS score as a covariate. Logistic regression was chosen over chi square analysis because it was believed that an odds ratio (OR) with a 95% confidence interval would provide more detailed information about the relationship between treatment condition and dropout than would a simple crosstabulation statistic.

An exploratory aim of the study was to examine whether participants in GSH/MI reported a greater degree of competence (as measured by the PCS) or autonomy (as measured by the TSRQ subscales of Autonomous and Controlled) and/or a more advanced stage of change for weight loss (as measured by the Change Questionnaire) than did participants in the GSH group. Initial analyses of the data revealed that there was virtually no variance in participants' responses to the Change Questionnaire at baseline and at the other two assessment time points (session 2, session 6); a large majority of participants rated themselves to be in the "action" stage of change at baseline and sessions 2 and 6. This could not be remedied with log or square root transformations of the measure. Thus, it was decided that the Change Questionnaire would not be included in further data analyses.

Repeated measures ANCOVAs were conducted utilizing the other three variables (TSRQ Autonomous, TSRQ Controlled, PCS). Treatment condition (GSH/MI, GSH) represented a two-level, between-participants factor, and time (baseline, session 2, session 6) represented a three-level within-participants factor. Gender was included as a

covariate. Where necessary, statistically significant results were followed up with post-hoc tests. Since not all participants completed session 6 motivational measures (12 had dropped out by that point), these repeated measures analyses were only conducted with 27 participants. In order to maximize the number of participants included in the repeated measures analyses of the motivational variables, additional ANCOVAs were calculated which utilized only the baseline and session 2 TSRQ Autonomous and Controlled scales and PCS. These analyses included 37 participants (two participants dropped out prior to session 2). Following the completion of these ANCOVAs, between-groups effect sizes (Cohen's d) were calculated for change in TSRQ Autonomous, TSRQ Controlled, and PCS score from baseline to session 6, and from baseline to session 2. Effect sizes were computed using mean change scores and pooled standard deviations.

Finally, regression analyses were used to examine the three motivational measures as potential predictors of BMI change and dropout status. In preliminary correlational analyses, it was found that there was a highly significant correlation between baseline and session 2 PCS score ($r = .75$), baseline and session 2 Autonomous score ($r = .64$), and baseline and session 2 Controlled score ($r = .65$). Thus, it was decided to average these scores and use the averages in regression analyses predicting BMI change and dropout status. This decreased the number of regressions necessary for analysis. Two linear regressions were conducted: one utilizing the combined baseline and session 2 scores as predictors of BMI change, and the other utilizing the session 6 scores as predictors. It was decided not to complete an ITT version of the combined baseline-session 2 regression, as only two participants did not complete session 2 measures. Their baseline values were utilized in the analysis. For the regression utilizing

the session 6 measures, only those participants who completed both the session 6 measures and the study as a whole (so that they had a post-treatment BMI measurement) were included. The one participant who dropped out after session 6 was not included in this analysis.

A logistic regression analysis was computed to indicate whether any of the motivational measures predicted study dropout status. Only one regression was conducted, which utilized the averaged baseline and session 2 scores as predictors. As with the linear regression, the researcher decided not to complete an ITT version of the combined baseline-session 2 regression, as only two participants did not complete session 2 measures. Their baseline values were utilized in the analysis. Session 6 scores were not examined as a potential predictor of dropout, since all but one of the participants who completed the session 6 measures completed the study. Thus, session 6 measures were more a proxy for treatment dropout rather than a predictor of dropout.

Results

Participant Enrollment

See Illustration 1 for a flow diagram of study enrollment and participation. Of the 217 individuals who called to inquire about the study, 172 were found to be ineligible based on their phone responses. The most common reason for ineligibility was a lack of interest in the study after hearing details about the study procedure ($n = 56$). Other reasons for exclusion included: having a BMI higher than the eligibility cutoff ($n = 30$), being older than 55 years ($n = 23$), having significant medical problems ($n = 13$), taking psychotropic medications ($n = 12$), living over 30 minutes from the Rutgers Eating Disorders Clinic ($n = 11$), having a BMI lower than the eligibility cutoff ($n = 8$), participating in other weight loss treatment ($n = 5$), taking non-psychotropic medications that could interfere with weight loss ($n = 4$), being unable to obtain transportation to the Eating Disorders Clinic ($n = 3$), being unavailable for treatment sessions ($n = 3$), or other reasons ($n = 4$).

Of the 45 individuals who participated in an in-person baseline assessment, six were found to be ineligible. The most common reason was having a BDI score over 18 ($n = 5$). The other individual was measured at a weight considerably higher than her self-reported weight and thus had a BMI higher than the study cutoff. In total, then, 39 participants enrolled in the study, with 20 randomly assigned to GSH/MI and 19 to GSH. In terms of treatment adherence, individuals labeled as treatment completers were those who completed all 8 study treatment sessions. There were 15 completers in GSH/MI, and 11 in GSH.

Preliminary Analyses

Tables 1 and 2 indicate baseline demographic and clinical variables for the sample as a whole, and for individuals in GSH/MI and GSH. The two treatment groups were equivalent at baseline on all demographic and clinical variables. Thirteen of the initial 39 participants in the study did not complete all 8 sessions of treatment, and were considered treatment dropouts. Dropouts were not found to be significantly different from completers on any baseline demographic or clinical variables except perceived competence scale (PCS) score: $F(1, 37) = 5.82, p = .02$. Dropouts had a significantly lower baseline PCS score ($M = 4.42, SD = 1.22$) than did completers ($M = 5.30, SD = .99$).

Analysis of Treatment Outcomes

BMI change. The first question of interest was whether individuals in the GSH/MI group experienced significantly larger changes in BMI over the course of treatment than did those in the GSH group. There was a statistically significant effect of time, suggesting that individuals in both treatment conditions experienced significant changes in BMI from baseline to post-treatment; however, neither treatment condition nor the interaction of time and treatment condition were found to be statistically significant (see Table 3). In addition, a one-way ANCOVA was conducted utilizing percentage weight loss as the dependent variable and treatment group as the independent variable; results were then compared with those from the repeated-measures ANCOVA examining BMI change. Although GSH/MI had a higher mean percentage weight loss (4.38%) than GSH (2.50%), this difference was not statistically significant, $F(1, 36) = 1.45, p = .24$.

Table 4 reports the between-groups effect size (ES) calculation for BMI change. The ES (Cohen's d) for GSH/MI relative to GSH was .73, representing a medium effect (bordering on a large effect, as Cohen's [1988] cutoff for a large effect is .8) favoring the GSH/MI group. However, this effect size might be attributable to the effect of gender, as there were significantly more men than women in the MI group, and the 7 men in the study lost a significantly larger amount of weight than the 32 women in the study. Thus, an effect size for BMI change was calculated again, including only the 32 women in the study. This ES was .47, a small effect favoring GSH/MI.

Results in the completer sample matched those from the ITT sample; see Table 5. Again, there was a significant main effect of time, but neither treatment condition nor the interaction of time and treatment condition were found to be statistically significant. A one-way ANCOVA was conducted utilizing percentage weight loss as the dependent variable and treatment group as the independent variable; results were then compared with those from the repeated-measures ANCOVA examining BMI change. Although GSH/MI had a higher mean percentage weight loss (5.84%) than GSH (4.31%), this difference was not statistically significant, $F(1, 23) = 1.18, p = .29$. Table 6 reports the between-groups ES for the completer sample. As in the ITT sample, the between-groups ES favored the GSH/MI group; in the completer sample, the effect classifies as large (.81). When this ES was re-calculated using only women, however, it dropped down to a small effect, .42 (see Table 4).

Secondary eating and psychological measures. A more exploratory area of interest concerned whether individuals in the GSH/MI group improved more on eating and weight-related and general psychological measures over the course of treatment than

did individuals in the GSH group. The eating and weight-related outcome measures analyzed included four subscales of the EDE-Q (Restraint, Eating Concern, Shape Concern, Weight Concern) and four subscales of the TFEQ (Disinhibition, Hunger, Flexible Control, Rigid Control). Psychological outcome measures included the BDI and the Q-LES-Q-SF (see Table 3).

Table 3 presents the results of these analyses in the ITT sample. There was a significant interaction between time and treatment condition for the Eating Concern subscale of the EDE-Q. Paired t-tests revealed that there was a significant decrease in Eating Concern scores from baseline to post-treatment in the GSH/MI group ($t(19) = 2.48, p = .02$). In contrast, there was not a significant decrease in Eating Concern scores over time in GSH ($t(18) = -.97, p = .35$); and in fact, Eating Concern score increased over time in this group. There was also a significant main effect of treatment condition for TFEQ Disinhibition, with GSH participants scoring more highly on this measure than GSH/MI participants. Follow-up ANOVAs revealed that the difference between TFEQ Disinhibition score in the GSH/MI and GSH groups approached significance at baseline: $F(1, 37) = 4.00, p = .053$. At post-treatment, this difference was statistically significant: $F(1, 37) = 6.99, p = .012$. Finally, there was a main effect of time for EDE-Q Shape score and the three restraint measures (EDE-Q restraint, Flexible Control, Rigid Control). EDE-Q Shape score significantly decreased over time, whereas all restraint measures significantly increased over time.

Effect sizes for the secondary outcome measures in the ITT sample are reported in Table 4. It should be noted that prior to the calculation of these effect sizes, ANOVAs were conducted to assess whether the change scores for the outcome measures differed

significantly by gender. No significant differences were found; therefore, ESs were not calculated separately by gender. As Table 4 indicates, small ESs were found for BDI score, EDE-Q restraint, Q-LES-Q score, Flexible Control, Rigid Control, Hunger, and Disinhibition, all favoring GSH/MI. Medium effects were found for EDE-Q Eating Concern (.73), EDE-Q Shape (.72), and EDE-Q Weight Concern (.59), all favoring GSH/MI over GSH.

Table 5 reports the results of the repeated measures ANCOVAs for the secondary outcome measures in the completer sample. As in the ITT sample, there was a significant time by treatment condition interaction for EDE-Q Eating Concern, and paired t-tests revealed that there was a significant decrease in Eating Concern scores from baseline to post-treatment in the GSH/MI group ($t(14) = 2.60, p = .02$). In contrast, there was not a significant decrease in Eating Concern scores over time in GSH ($t(10) = -1.11, p = .29$). Interestingly, there was no main effect of TFEQ Disinhibition in the completer sample (as there had been in the ITT sample), but there was a treatment effect for the Flexible Control subscale of the TFEQ, with the GSH/MI group scoring more highly on this measure. As in the ITT sample, there was a significant effect of time for EDE-Q Shape, EDE-Q Restraint, Flexible Control, and Rigid Control. As Table 6 indicates, ESs in the completer sample were comparable to those in the ITT sample; large ESs favoring GSH/MI were found for Eating Concern and Shape Concern, and a medium effect was found for Weight Concern. Interestingly, there was also a medium effect for BDI score, favoring GSH/MI. Small ESs were found for EDE-Q restraint, Q-LES-Q score, Flexible Control, Rigid Control, Hunger, and Disinhibition, all favoring GSH/MI.

Dropout status. The attrition rate in the full sample was 33.3%, which is comparable to most weight loss programs. In the GSH group, the attrition rate was 42.1%; in GSH/MI, it was 25%. A binary logistic regression was conducted to determine if there were significantly more treatment dropouts in GSH than in GSH/MI. Treatment condition was included as a predictor variable, along with gender and baseline PCS score. The overall model approached significance, $\chi^2(3, N = 39) = 7.43, p = .059$. When examining specific predictors, only baseline PCS score significantly predicted dropout status, *Wald statistic* $(1, N = 39) = 4.27, p = .04$; OR = 2.20 (95% CI: 1.04-4.66). This odds ratio (OR) suggests that individuals with higher PCS scores were more likely to stay in treatment than those with lower PCS scores. However, the results of this logistic regression should be viewed with caution, as the number of treatment dropouts in each condition was quite small (8 of 19 participants in GSH, 5 of 20 participants in GSH/MI).

Analysis of Motivational Measures

Treatment condition. Repeated measures ANCOVAs were conducted to explore whether individuals in the GSH/MI group reported more significant changes over time on motivational measures (TSRQ Autonomous, TSRQ Controlled, PCS) than did those in the GSH group. Treatment condition (GSH/MI, GSH) represented a two-level, between-participants factor, with time (baseline, session 2, session 6) representing a three-level within-participants factor. Gender was included as a covariate. This analysis was conducted with only those participants who had completed the session 6 motivational measures ($n = 27$). See Table 7 for the results of these analyses. There were no significant main effects of time or treatment condition or interaction effects. Effect sizes were calculated for the change in PCS, TSRQ Autonomous, and TSRQ Controlled from

baseline to session 6. Effect sizes for PCS and TSRQ Autonomous were not significant (.06 for the former, .08 for the latter). There was however a small ES for TSRQ Controlled (.30), favoring the GSH group.

Because 12 people did not complete session 6 measures and thus could not be included in the above analysis, the analysis was repeated utilizing only baseline and session 2 measures. All but two of the 39 study participants were included in this analysis (two dropped out prior to session 2 and did not complete the measures). See Table 8 for the results of these analyses. There were no significant main effects of time or treatment condition or interaction effects. Between-participants effect sizes were calculated for the change in PCS score, TSRQ Autonomous score, and TSRQ Controlled score from baseline to session 2. All three ESs were not significant (.09, .04, and .18, respectively).

BMI change. Multiple linear regressions were conducted to ascertain whether any of the motivational measures (PCS, TSRQ Autonomous, TSRQ Controlled) predicted BMI change. The first regression employed an average of baseline and session 2 scores as predictors. It was decided not to complete an ITT version of this regression analysis, as only two participants did not complete session 2 measures (their baseline values alone were utilized in the analysis). The overall regression model was not significant, $R^2 = .18$, $F(3, 35) = 2.54$, $p = .07$; see Table 9. One variable, baseline-session 2 PCS score, was found to be a significant individual predictor of BMI change ($B = -.35$, $t(37) = -2.12$, $p = .04$). However, without a significant overall regression model, this finding should be viewed with caution. To determine the unique variance in BMI change accounted for by the three motivational predictors, part correlations were computed and squared. Squared

part correlations represent a measure of effect size (Labouvie, personal communication, March 24, 2004). Results indicated that the averaged baseline-session 2 PCS score uniquely accounted for 10.56% of the variance in BMI change; baseline-session 2 Autonomous uniquely accounted for 8.47% of the variance; and baseline-session 2 Controlled uniquely accounted for 2.82% of the variance.

The second multiple linear regression analysis utilized session 6 PCS, TSRQ Autonomous, and TSRQ Controlled scores as predictors of BMI change. The analysis only included those participants who completed session 6 measures and who had a post-treatment weight measurement ($n = 26$). The overall regression model was significant, $R^2 = .31$, $F(3, 22) = 3.28$, $p = .04$. As Table 10 demonstrates, two of the motivational variables, session 6 PCS score ($B = -.53$, $t(24) = -2.80$, $p = .01$) and session 6 TSRQ Control score ($B = -.42$, $t(24) = -2.19$, $p = .04$) were significant predictors of BMI change. Note however the sign of the t values, indicating that although higher PCS scores, as expected, predicted greater BMI change scores, *higher* Controlled scores were actually predictive of *greater* BMI change scores, suggesting that the more controlled one's reasons were for weight loss, the more successful one was. Regarding effect size estimates, session 6 PCS uniquely accounted for 24.60% of the variance in BMI change, session 6 TSRQ controlled accounted for 14.98% of the variance, and session 6 TSRQ autonomous accounted for 5.15% of the variance.

Dropout status. A binary logistic regression was conducted to determine if the averaged baseline-session 2 motivational measures predicted dropout status. The overall model was not significant, $\chi^2(3, N = 39) = 6.85$, $p = .08$. Although the overall model was not significant, individual predictors were examined, as baseline PCS score had been

shown to be a significant predictor of dropout status in earlier analyses. Here, baseline-session 2 PCS approached significance as a predictor; *Wald statistic* (1, $N = 39$) = 3.80, $p = .051$; OR = 2.21 (95% CI: .995-4.90). However, these results should be viewed with caution, as the numbers of treatment dropouts in each condition were quite small (8 of 19 participants in GSH, 5 of 20 participants in GSH/MI).

Discussion

Results from this small-scale pilot study suggest a modest advantage for GSH/MI over GSH on a number of study outcome measures. In terms of BMI change, although there were no statistically significant findings, there was a small effect size favoring the GSH/MI group, in both ITT and completer samples. This is in keeping with earlier studies (with larger samples) suggesting that individuals in weight loss treatments enhanced with MI lose more weight than those in treatments without MI (e.g., West et al., 2007). Although it is difficult to compare across studies due to differences in samples and methodology, the weight losses experienced by women in the GSH/MI group over 3 months were comparable to those reported in Womble et al.'s (2004) study of GSH/LEARN and larger than those reported in Gardner et al.'s (2007) study of GSH/LEARN, even though each of the latter studies involved one year of treatment. This suggests that the LEARN manual might be most effective in a shorter-term, MI-enhanced format.

Potential differences between the GSH/MI and GSH groups were also explored on a number of eating and weight-related and general psychological outcome measures. There was a statistically significant time by treatment interaction for the Eating Concern subscale of the EDE-Q (in both ITT and completer samples) suggesting that individuals in GSH/MI changed more significantly over time on this measure than did those in GSH. The Eating Concern subscale measures preoccupation with food, eating, or calories, fear of losing control over eating, social eating, eating in secret, and guilt about eating. Principles for addressing these areas of concern are taught and reinforced in the LEARN manual; for example, individuals are taught how to better control their eating through

planning and self-monitoring, how to incorporate “forbidden” foods into their diet, and how to best navigate eating out with friends and family. It is possible that individuals in the MI group were more adherent to these principles, and thus experienced more significant changes in these areas, than individuals in the GSH group. It is important however not to overstate the case for GSH/MI, as the magnitude of the change in Eating Concern score from pre- to post-treatment was small. Nevertheless, it is an interesting finding warranting future exploration.

Two between-group differences emerged in the analyses, one in the ITT sample and one in the completer sample. In the ITT sample, the GSH/MI group reported lower TFEQ Disinhibition scores (reflecting less unrestrained eating) than the GSH group. In the completer sample, the GSH/MI group scored more highly on TFEQ Flexible Control (reflecting a flexible approach to dieting and eating). Both of these findings suggest that individuals in GSH/MI were more successful with controlled, flexible eating, another important feature of the LEARN manual, than those in GSH alone. However, it is important to note that the TFEQ Disinhibition finding is difficult to interpret, as this result was seen only in the ITT group (typically, ITT analyses are the more conservative analyses, so that one is more likely to find significant results in the completer sample than the ITT sample). It is possible that it was the imputed baseline values that drove this difference; however, it is also possible that there was simply not enough power in the completer sample to detect this difference.

No other statistically significant group differences emerged for any of the other eating and weight-related or general psychological outcome measures. However, between-group effect size estimates suggested an advantage for GSH/MI over GSH in

Eating Concern (medium effect in ITT, large effect in completer), Shape Concern (medium effect in ITT, large effect in completer) and Weight Concern (medium effect). Shape Concern focuses on feelings of dissatisfaction and preoccupation with one's figure and associated avoidance strategies; Weight Concern focuses on dissatisfaction and preoccupation with one's weight and desire for weight loss. Again, these are issues addressed by the LEARN manual. Time is spent discussing body image, self-acceptance, and what makes for a "reasonable" weight loss. Based on these effect sizes, it is possible that in a larger sample, significant between-group differences between Shape Concern and Weight Concern scores might emerge. As with Eating Concern, this could suggest that the GSH/MI group was more adherent to the lessons of the LEARN manual than was the control group.

Along with exploring post-treatment weight and eating outcomes, another aim of the study was to assess whether treatment adherence (as defined by dropout rate and percentage of self-monitoring records completed) in the GSH/MI group differed from that in GSH. As regards dropout rate, evidence (Goldberg & Kiernan, 2005; Smith et al., 1997; West et al., 2007) as well as theoretical articles (DiLillo et al., 2003) suggest that MI might have its greatest impact in the area of treatment retention. The dropout rate was larger in the GSH group (42.1%) than in GSH/MI (25%); however, this difference did not reach statistical significance in a logistic regression, perhaps due to the small sample size and small number of dropouts (5 in GSH/MI, 8 in GSH).

Regarding self-monitoring completion, there was not enough variance in this measure to allow for meaningful data analyses; exploratory analyses revealed that as long as participants remained in the study, they consistently completed 90-100% of their

records, with few exceptions. Unfortunately, the criterion set for “completion of records” was a loose one; participants were said to have completed them if they recorded 50% or more of the day’s meals and snacks. Participants who recorded what they consumed for these meals and snacks but didn’t include the calorie values of these foods were still “given credit” for completing the records, even though calorie values are essential for effective record keeping. Clearly, future studies must employ a more strict approach to assessing whether or not participants completed self-monitoring.

It is clear that the above results need to be replicated with a larger sample with adequate statistical power. Between-groups effect size estimates suggest an advantage for GSH/MI over GSH on a number of treatment outcomes; optimally, these effect sizes will be used to power a larger-scale study comparing GSH/MI and GSH. It will be impossible to make a definitive statement concerning the efficacy of GSH/MI relative to GSH until larger studies of the two treatments are conducted.

If GSH/MI is indeed shown in a larger-scale study to be superior to GSH alone, other important questions will remain. For example, what ingredients of MI might be responsible for its efficacy? It is possible that the completion of the decisional balance exercise could be responsible for improved outcomes in GSH/MI. In such an exercise, individuals are asked to articulate both the reasons for and against change, and come to their own reasoned conclusion about change, rather than having that conclusion forced upon them. According to Miller and Rollnick (2002), such an activity supports an individual’s intrinsic motivation for change, while a more confrontational approach (e.g., “You should change; here are all the reasons why”) is less effective for motivating people.

However, as discussed above, Finch and colleagues (2005) found that individuals in group BWL who were asked to consider both the benefits and drawbacks of weight loss were not any more successful with losing weight than those encouraged to think only about the benefits. This finding suggests that decisional balance exercises that are not conducted in the “MI style” might not be as effective. It is possible then that the empathic, reflective listening style adopted by MI therapists could at least partly explain MI’s efficacy. Miller’s group has conducted a number of studies suggesting that therapist empathy is directly related to treatment outcome (Miller & Baca, 1983; Miller, Benefield, & Tonigan, 1993; Miller, Taylor, & West, 1980). Another study indicated that general therapist interpersonal skill predicts patient engagement in MI sessions, even when therapists use specific techniques that are not consistent with MI (e.g., confronting patients) (Moyers, Miller, & Hendrickson, 2005). It will be important for future studies to attempt to dismantle the various components of MI, as this could have a major impact on how we view MI as a therapeutic intervention. If, for example, it is found that decisional balance is the key ingredient in MI, then there is no need for therapists to learn to implement “motivational interviewing” per se; decisional balance exercises can easily be integrated into empirically-supported CBT treatments.

Another important issue that the current study was unable to address is *how* exactly MI works. Unfortunately, the small sample size precluded mediational analyses. However, in an attempt to begin to explore the possible theoretical underpinnings of MI, participants were given a measure of stage of change, as well as three measures reflecting two major aspects of motivated behavior according to self-determination theory: autonomy (as measured by the Autonomous and Controlled Subscales of the TSRQ) and

competence (as measured by the Perceived Competence Scale). Although a number of researchers have argued that MI works by moving individuals through the stages of change (see DiClemente & Velasquez, 2002), there is scant evidence for this proposition. More recently, a number of authors have suggested that MI's impact can be explained using the principles of self-determination theory (SDT) (Foote et al., 1999; Ginsburg et al., 2002; Markland et al., 2005; Vansteenkiste & Sheldon, 2006). It was expected that individuals who received GSH/MI would score higher on autonomy and competence, but not on stage of change, than individuals who received GSH.

Results from this analysis ran somewhat counter to hypotheses. First, the stages of change measure had to be removed from the analysis because there was no variability in the measure. Nearly all participants placed themselves in the highest stage of change at baseline, session 2, and session 6. This could perhaps be seen as evidence that stage of change is not a meaningful construct by which to evaluate someone's motivation for change; although almost all participants rated themselves in the "action" stage, a number of them were clearly not truly ready for change, as many did not lose weight and/or dropped out of treatment. In addition, contrary to expectations, there were no significant between-group differences over time in autonomy or competence, in either ITT or completer samples, and between-group effect sizes were negligible. It is impossible to conclude at this point that the addition of MI conferred any benefits over GSH for increasing feelings of autonomy and competence.

Additional analyses explored whether the three SDT scales predicted BMI change and dropout status, independent of treatment group. Concerning the latter, none of the scales at any time points predicted dropout status, although small sample sizes likely

impacted upon these results. Regarding the former, averaged baseline and session 2 scores on all three of these scales failed to significantly predict BMI change. However, session 6 PCS and session 6 TSRQ Controlled were found to be significantly predictive of BMI change, suggesting that these aspects of motivation at mid-treatment might predict post-treatment weight change.

As expected, higher levels of perceived competence were associated with higher degrees of BMI change; this is consistent with the results of studies showing that higher general self-efficacy is associated with improved weight loss outcomes (Texeira et al., 2005). Surprisingly, higher levels of *controlled* motivation were also associated with higher degrees of BMI change. Further, *autonomous* motivation was not significantly associated with BMI change. According to SDT, autonomous motivation comes from within (examples from the TSRQ include, “It’s important to me that my efforts succeed;” “It feels important to me personally to be thinner”), whereas controlled motivation comes from without (examples from the TSRQ include, “People will think I’m a failure if I don’t lose weight;” “I am worried that I will get in trouble with the staff if I don’t follow all of the guidelines”). Findings from the current study therefore suggest that individuals who felt more external pressure for change actually changed more than those who did not feel such pressure.

Clearly, based on the small size of this study, it cannot be concluded that SDT does not apply to weight loss, and that external pressures for weight loss are more useful than internal ones. Due to the fact that another study found autonomy to be predictive of weight loss outcomes (Williams et al., 1996), this issue obviously requires further

investigation. Future studies of LEARN or other BWL treatments should assess the predictive power of autonomy for weight loss.

However, it is intriguing to explore the idea of external pressure for weight loss, given our current knowledge about what makes for successful obesity treatment. For example, evidence is mounting for the efficacy of the Trevoze Behavior Modification Program, a long-term, self-help group for obese individuals (see Latner, Stunkard, Wilson, Jackson, Zelitch, & Labouvie, 2000; Latner & Wilson, 2007; Latner, Wilson, Stunkard, & Jackson, 2002). Individuals in the Trevoze program must follow “specific rules that provide external contingencies for goal achievement” (Latner et al., 2002, p. 807) throughout active treatment and monthly maintenance meetings. These rules include attending every meeting, achieving specific weight loss goals, and consistently completing and submitting food records. Anyone who does not meet these requirements is removed from the program. A number of individuals do not succeed in following the rules; however, those who do have excellent outcomes. In a study by Latner and colleagues (2002), 43.8% of individuals in the program remained after 2 years, and lost an average of 19% of their body weight.

At least in Trevoze, it appears that external contingencies brought to bear by program staff propel individuals to successful weight loss. This is not necessarily evidence against SDT; SDT theorists might argue that if individuals in Trevoze come to “integrate” (Ryan & Deci, 2000) these external regulations into their own value system, then they should be able to achieve a more autonomous motivation (as opposed to being motivated simply to please study staff and follow the rules of the program). Nevertheless, Trevoze is fundamentally based on the concept of external pressure for

change. This raises the question of whether external contingencies are necessary for motivating people to achieve significant and lasting weight loss; and whether and how MI techniques can be utilized in the context of a program structured around external contingencies. These questions are important subjects for future research.

This study was subject to a number of limitations, some of which have already been discussed. The sample size was small, and more males were randomized to receive GSH/MI than to receive GSH. Although this gender discrepancy was controlled for in all analyses, future studies should utilize stratified randomization to ensure that this does not occur again. Most of the participants were highly-educated, Caucasian employees of one large university. This study must be replicated with a more diverse group of participants. In addition, only post-treatment data are presented here. Follow-up data are crucial, especially given the tendency of individuals who lose weight in a structured program to regain the weight over time. Only with follow-up data can one assess whether MI confers any benefits over GSH/MI for weight maintenance.

Another study limitation concerns how therapist adherence to MI was measured. The Principal Investigator of the study listened to all Session 1 and 5 tapes to ensure that therapists adhered to the protocol for the type of treatment they were providing (GSH/MI or GSH). However, she did not utilize any established rubrics to formally code adherence to the MI approach (e.g., Madson, Campbell, Barrett, Brondino, & Melchert, 2005; Moyers, Martin, Manuel, Hendrickson, & Miller, 2005). In addition, the MI style was often utilized in sessions other than 1 and 5, for individuals who were struggling with motivation. This “extra” use of MI was not quantified or noted in any way. It is therefore impossible to assert whether it was the two MI-focused sessions alone, or the

MI style utilized throughout the course of treatment, that were responsible for the outcomes in GSH/MI. Incidentally, it is issues like this that make it difficult to compare results across MI treatment trials; there is not one standardized method of practicing MI, and different researchers utilize MI in different ways.

A related issue, concerning standardization of MI, is the fact that in the current study the MI was manualized, with therapists following a session format that was scripted for them. In their meta-analysis of MI trials, Hettema and colleagues (2005) actually found that effect sizes for MI were smaller when manuals were utilized. In one study utilizing psycholinguistic analyses of MI sessions (Amrhein et al., 2003), the potential issue with manuals was identified: “The problem, it seems, is that the therapists did exactly what the manual instructed them to do, pressing forward to complete the change plan even if the client resisted, which is itself a violation of good MI practice” (Hettema et al., 2005, p. 105). Based on Session 1 and 5 tapes from the current study, it appeared that the therapists were adept at tailoring their use of MI to the individual client, while still staying within the bounds of the script for that session. However, it is difficult to say whether therapists would have been even more effective had they been able to be more flexible with their use of MI.

Table 1

Baseline Demographic Characteristics

Baseline Characteristics	Full Sample (<i>N</i> = 39)	MI Group (<i>n</i> = 20)	GSH Group (<i>n</i> = 19)
Gender: <i>n</i> (% female)	32 (82.1%)	14 (70%)	18 (94.7%)
Age: <i>M</i> (<i>SD</i>)	39.90 (8.84)	40.90 (8.61)	38.84 (9.19)
Age: Median	38.00	38.00	41.00
Race			
Caucasian: <i>n</i> (%)	28 (71.8%)	15 (75%)	13 (68.4%)
African-American: <i>n</i> (%)	3 (7.7%)	1 (5%)	2 (10.5%)
Hispanic/Latino: <i>n</i> (%)	2 (5.1%)	2 (10%)	0 (0%)
South Asian: <i>n</i> (%)	2 (5.1%)	0 (0%)	2 (10.5%)
East Asian: <i>n</i> (%)	1 (2.6%)	0 (0%)	1 (5.3%)
Mixed/Other: <i>n</i> (%)	3 (7.7%)	2 (10%)	1 (5.3%)
Marital status			
Single: <i>n</i> (%)	14 (35.9%)	6 (30%)	8 (31.6%)
Married: <i>n</i> (%)	15 (38.5%)	10 (50%)	5 (26.3%)
Divorced: <i>n</i> (%)	10 (25.6%)	4 (20%)	6 (31.6%)
Educational background			
High school graduate	1 (2.6%)	1 (5%)	0 (0%)
Some college	9 (23.1%)	3 (15%)	6 (31.6%)
College graduate	12 (30.8%)	8 (40%)	4 (21.1%)
Part grad/professional school	5 (12.8%)	3 (15%)	2 (10.5%)
Completed grad/professional school	12 (30.8%)	5 (25%)	7 (36.8%)
Work experience			
Wage earner	35 (89.7%)	18 (90%)	17 (89.5%)
Homemaker	1 (2.6%)	0 (0%)	1 (5.3%)
Student	3 (7.7%)	2 (10%)	1 (5.3%)

Table 2

Baseline Clinical Characteristics

Baseline Characteristics	Full Sample (<i>N</i> = 39)	GSH/MI (<i>n</i> = 20)	GSH (<i>n</i> = 19)
Body Mass Index: <i>M</i> (<i>SD</i>)	32.36 (3.05)	33.06 (3.17)	31.62 (2.81)
BDI Score: <i>M</i> (<i>SD</i>)	7.33 (4.57)	8.05 (5.06)	6.58 (3.99)
Binge Days in Past 4 Weeks: <i>M</i> (<i>SD</i>)	2.90 (3.64)	2.90 (3.45)	2.89 (3.93)
EDE-Q Restraint: <i>M</i> (<i>SD</i>)	1.53 (1.15)	1.52 (1.30)	1.55 (1.01)
EDE-Q Eating Concern: <i>M</i> (<i>SD</i>)	1.10 (.95)	1.02 (.67)	1.18 (1.18)
EDE-Q Shape Concern: <i>M</i> (<i>SD</i>)	3.55 (1.22)	3.79 (1.30)	3.31 (1.11)
EDE-Q Weight Concern: <i>M</i> (<i>SD</i>)	2.82 (.96)	2.80 (.97)	2.84 (.97)
Q-LES-Q-SF: <i>M</i> (<i>SD</i>) ^a	.75 (.10)	.74 (.11)	.76 (.10)
TFEQ Disinhibition: <i>M</i> (<i>SD</i>)	9.32 (3.30)	8.33 (3.52)	10.37 (2.77)
TFEQ Hunger: <i>M</i> (<i>SD</i>)	6.50 (3.48)	6.10 (3.25)	6.95 (3.75)
TFEQ Flexible Control: <i>M</i> (<i>SD</i>)	2.92 (1.83)	3.25 (1.92)	2.58 (1.71)
TFEQ Rigid Control: <i>M</i> (<i>SD</i>)	2.72 (1.82)	2.60 (1.88)	2.84 (1.80)
PCS: <i>M</i> (<i>SD</i>)	5.01 (1.13)	5.04 (1.27)	4.97 (1.01)
Stage of Change			
Contemplation: <i>n</i> (%)	7 (17.9%)	4 (20%)	3 (15.8%)
Preparation: <i>n</i> (%)	32 (82.1%)	16 (80%)	16 (84.2%)
TSRQ Autonomous: <i>M</i> (<i>SD</i>)	5.71 (.92)	5.68 (.88)	6.95 (3.75)
TSRQ Controlled: <i>M</i> (<i>SD</i>)	2.40 (1.07)	2.51 (.90)	2.27 (1.24)

Note. BDI = Beck Depression Inventory; EDE-Q = Eating Disorder Examination Questionnaire; Q-LES-Q-SF = Quality of Life Enjoyment and Satisfaction Questionnaire-Short Form; TFEQ = Three Factor Eating Questionnaire; PCS = Perceived Competence Scale; TSRQ = Treatment Self-Regulation Questionnaire

^aScores are percentages, with 100% = the maximum possible life satisfaction

Table 3

Means, Standard Deviations, and Group Comparisons by Treatment Condition for BMI Change, Eating and Weight Measures, and General Psychological Measures in the ITT Sample (N = 39)

	GSH/MI (n=20)		GSH (n=19)		Treatment Condition		Time		Time x Treatment Condition	
	M	SD	M	SD	F	p value	F	p value	F	p value
Body Mass Index										
Baseline	33.06	3.17	31.62	2.81						
Post-treatment	31.58	3.08	30.92	3.05	0.61	0.44	17.58	0.00**	2.68	0.11
EDE-Q Eating Concern										
Baseline	1.02	0.67	1.18	1.18						
Post-treatment	0.71	0.56	1.35	1.40	1.31	0.26	0.01	0.93	4.68	0.04*
EDE-Q Restraint										
Baseline	1.52	1.30	1.55	1.01						
Post-treatment	2.56	1.20	2.13	1.17	0.18	0.68	8.36	0.01*	0.32	0.58
EDE-Q Shape Concern										
Baseline	3.79	1.30	3.31	1.11						
Post-treatment	2.58	1.36	2.91	1.36	0.20	0.66	8.59	0.01*	3.00	0.09
EDE-Q Weight Concern										
Baseline	2.80	0.97	2.84	0.97						
Post-treatment	2.34	0.74	2.80	1.19	0.82	0.37	0.98	0.33	2.81	0.10
TFEQ Disinhibition										
Baseline	8.33	3.52	10.37	2.77						
Post-treatment	7.00	3.28	9.79	3.31	5.80	0.02*	0.01	0.93	1.55	0.22
TFEQ Hunger										
Baseline	6.07	3.25	6.95	3.75						
Post-treatment	4.78	2.43	6.68	3.51	3.43	0.07	1.21	0.28	1.11	0.30
TFEQ Flexible Control										
Baseline	3.25	1.92	2.58	1.71						
Post-treatment	4.80	1.85	3.89	2.02	2.62	0.11	7.17	0.01*	0.00	0.97
TFEQ Rigid Control										
Baseline	2.60	1.88	2.84	1.80						
Post-treatment	4.85	1.79	4.21	1.69	1.24	0.27	13.79	0.00**	0.63	0.43
BDI										
Baseline	8.05	5.06	6.58	3.99						
Post-treatment	7.05	6.18	7.00	5.25	0.03	0.87	1.02	0.32	1.00	0.33
Q-LES-Q-SF ^a										
Baseline	0.74	0.11	0.76	0.10						
Post-treatment	0.75	0.12	0.74	0.15	0.00	0.97	0.01	0.95	0.72	0.40

^aIndicates score expressed as a percentage

*p < .05, **p < .01

Table 4

Between Groups Effect Sizes for BMI Change, Eating and Weight Measures, and General Psychological Measures in the ITT Sample (N = 39)

	Between Groups Effect Size
Variable	
Body Mass Index	0.73
Body Mass Index (Female)	0.47
EDE-Q Eating Concern	0.73
EDE-Q Restraint	0.35
EDE-Q Shape Concern	0.72
EDE-Q Weight Concern	0.59
TFEQ Disinhibition	0.31
TFEQ Hunger	0.40
TFEQ Flexible Control	0.12
TFEQ Rigid Control	0.43
BDI	0.44
Q-LES-Q-SF	0.31

Note. Between groups effect size (Cohen's *d*) calculated with mean change scores and pooled standard deviations. According to Cohen (1988), magnitude of absolute value of effect sizes is as follows: small = 0.20, medium = 0.50, and large = 0.80.

Table 5

Means, Standard Deviations, and Group Comparisons by Treatment Condition for BMI Change, Eating and Weight Measures, and General Psychological Measures in the Completer Sample (N = 26)

	GSH/MI (n=15)		GSH (n=11)		Treatment Condition		Time		Time x Treatment Condition	
	M	SD	M	SD	F	p value	F	p value	F	p value
Body Mass Index										
Baseline	33.01	3.19	31.25	2.25						
Post-treatment	31.04	2.85	30.05	2.44	1.18	0.29	26.50	0.00**	2.52	0.13
EDE-Q Eating Concern										
Baseline	0.93	0.69	0.91	0.92						
Post-treatment	0.52	0.41	1.24	1.38	0.84	0.37	0.00	0.95	5.23	0.03*
EDE-Q Restraint										
Baseline	1.60	1.24	1.49	1.12						
Post-treatment	3.00	0.68	2.56	1.21	0.24	0.63	8.30	0.01*	0.05	0.83
EDE-Q Shape Concern										
Baseline	3.70	1.43	2.81	0.92						
Post-treatment	2.09	1.13	2.26	1.06	0.72	0.41	8.13	0.01*	3.55	0.07
EDE-Q Weight Concern										
Baseline	2.73	1.00	2.56	0.85						
Post-treatment	2.12	0.53	2.58	1.19	0.50	0.49	0.63	0.44	3.31	0.08
TFEQ Disinhibition										
Baseline	8.37	3.53	9.18	2.68						
Post-treatment	6.60	3.09	8.55	3.11	1.23	0.28	0.02	0.88	1.64	0.21
TFEQ Hunger										
Baseline	6.48	3.32	6.45	4.03						
Post-treatment	4.76	2.33	6.09	3.42	0.67	0.42	0.87	0.36	0.97	0.34
TFEQ Flexible Control										
Baseline	3.20	1.74	2.09	1.22						
Post-treatment	5.27	1.33	4.36	1.91	5.33	0.03*	7.85	0.01*	0.15	0.71
TFEQ Rigid Control										
Baseline	2.40	1.88	2.27	1.79						
Post-treatment	5.40	1.40	4.55	1.75	2.00	0.17	16.46	0.00**	0.30	0.59
BDI										
Baseline	8.20	5.77	5.36	2.38						
Post-treatment	6.87	7.09	6.18	5.23	0.26	0.61	0.64	0.43	1.15	0.30
Q-LES-Q-SF ^a										
Baseline	0.74	0.12	0.79	0.06						
Post-treatment	0.76	0.13	0.77	0.16	0.26	0.62	0.00	0.97	0.57	0.46

^aIndicates score expressed as a percentage

*p < .05, **p < .01

Table 6

Between Groups Effect Sizes for BMI Change, Eating and Weight Measures, and General Psychological Measures in the Completer Sample (N = 26)

	Between Groups Effect Size
Variable	
Body Mass Index	0.81
Body Mass Index (Female)	0.42
EDE-Q Eating Concern	0.93
EDE-Q Restraint	0.22
EDE-Q Shape Concern	0.88
EDE-Q Weight Concern	0.77
TFEQ Disinhibition	0.42
TFEQ Hunger	0.43
TFEQ Flexible Control	0.10
TFEQ Rigid Control	0.35
BDI	0.54
Q-LES-Q-SF	0.33

Note. Between groups effect size (Cohen's *d*) calculated with mean change scores and pooled standard deviations. According to Cohen (1988), magnitude of absolute value of effect sizes is as follows: small = 0.20, medium = 0.50, and large = 0.80.

Table 7

Means, Standard Deviations, and Group Comparisons by Treatment Condition for Motivational Measures Completed at Baseline, Session 2, and Session 6 (N = 27)^a

	GSH/MI (n=15)		GSH (n=12)		Treatment Condition		Time		Time x Treatment Condition	
	M	SD	M	SD	F	p value	F	p value	F	p value
PCS										
Baseline	5.40	1.03	5.08	0.95						
Session 2	5.67	0.67	5.44	1.03						
Session 6	5.83	0.91	5.44	1.18	0.75	0.40	0.58	0.57	0.19	0.83
TSRQ Autonomous										
Baseline	5.59	0.90	5.53	0.87						
Session 2	5.62	0.84	5.53	0.97						
Session 6	6.19	0.59	6.20	0.59	0.00	0.98	2.50	0.10	0.23	0.80
TSRQ Controlled										
Baseline	2.46	0.95	1.96	0.99						
Session 2	2.54	1.25	2.24	1.09						
Session 6	2.94	1.11	2.76	0.81	0.53	0.47	0.02	0.98	0.06	0.95

^an=27 (Including all study participants who completed Baseline, Session 2, and Session 6 motivational measures)

Table 8

Means, Standard Deviations, and Group Comparisons by Treatment Condition for Motivational Measures Completed at Baseline and Session 2 (N = 37)^a

	GSH/MI (n=20)		GSH (n=17)		Treatment Condition		Time		Time x Treatment Condition	
	M	SD	M	SD	F	p value	F	p value	F	p value
PCS										
Baseline	5.04	1.27	5.07	0.94						
Session 2	5.44	0.79	5.49	1.21	0.13	0.72	0.78	0.38	0.01	0.92
TSRQ Autonomous										
Baseline	5.68	0.88	5.64	0.95						
Session 2	5.65	0.76	5.73	0.92	0.10	0.75	2.15	0.15	0.00	0.97
TSRQ Controlled										
Baseline	2.51	0.90	2.01	0.90						
Session 2	2.69	1.13	2.20	1.01	1.73	0.20	0.00	0.96	0.03	0.87

^an=37 (Including all study participants who completed Baseline and Session 2 motivational measures).

Table 9

Summary of Regression Analysis for Averaged Baseline and Session 2 Motivational Scores Predicting BMI Change (N = 39)

Variable	<i>B</i>	<i>SE B</i>	β	Part Correlation ²
BL-S2 PCS	-.35	.16	-.33*	.11
BL-S2 Autonomy	.41	.21	.31	.08
BL-S2 Controlled	-.20	.18	-.18	.03

*p < .05.

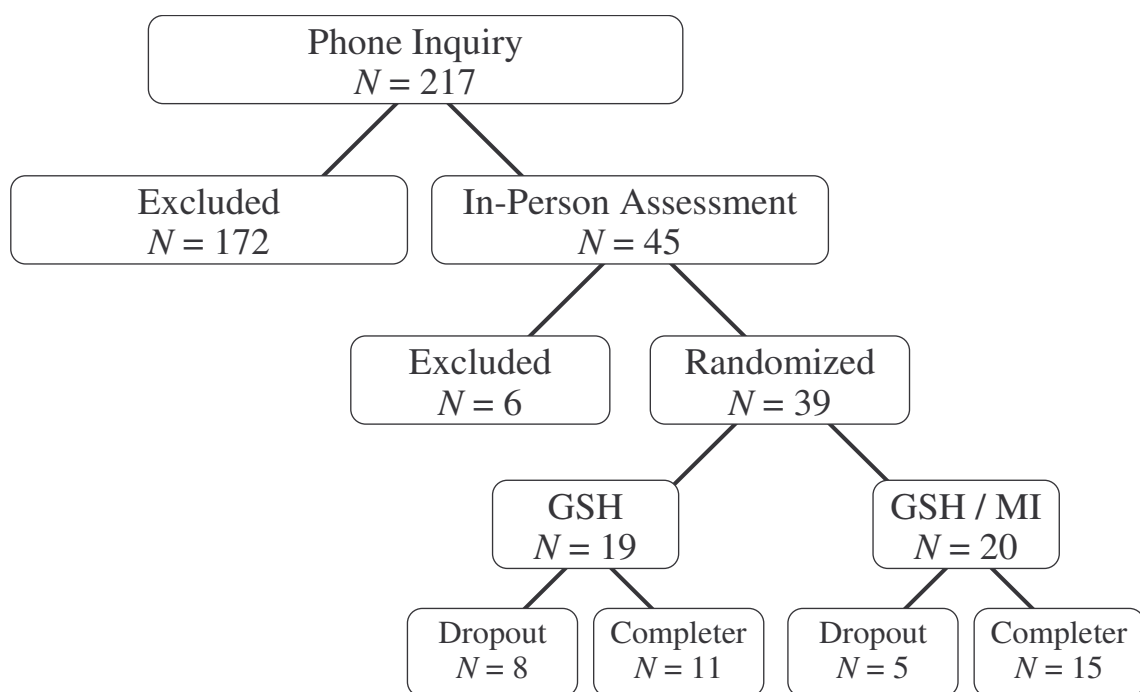
Table 10

Summary of Regression Analysis for Session 6 Motivational Scores Predicting BMI Change (N = 26)^a

Variable	<i>B</i>	<i>SE B</i>	β	Part Correlation ²
Session 6 PCS	-.53	.19	-.54*	.25
Session 6 Autonomy	.48	.37	.24	.05
Session 6 Controlled	-.42	.19	-.41*	.15

^a*n* = 26 (Including all study participants who completed Session 6 motivational measures and were weighed at post-treatment)

**p* < .05.



Bibliography

- Amrhein, P. C., Miller, W. R., Yahne, C. E., Palmer, M., & Fulcher, L. (2003). Client commitment language during motivational interviewing predicts drug use outcomes. *Journal of Consulting and Clinical Psychology, 71*, 862-878.
- Andersen, R. E., Wadden, T. A., Bartlett, S. J., Zemel, B., Verde, T. J., & Franckowiak, S. C. (1999). Effects of lifestyle activity vs structured aerobic exercise in obese women: a randomized trial. *JAMA, 281*, 335-340.
- Atkins, R. (2002). *Dr. Atkins' new diet revolution*. New York: Harper Collins.
- Beck, A. T., Steer, R. A., & Garbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review, 8*, 77-100.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4*, 561-571.
- Black, C. M. D., & Wilson, G. (1996). Assessment of eating disorders: Interview versus questionnaire. *International Journal of Eating Disorders, 20*, 43-50.
- Bowen, D., Ehret, C., Pedersen, M., Snetselaar, L., Johnson, M., Tinker, L., et al. (2002). Results of an adjunct dietary intervention program in the Women's Health Initiative. *Journal of the American Dietetic Association, 102*, 1631-1637.
- Brownell, K.D. (2004). *The LEARN Program for Weight Management* (10th ed.). Dallas: American Health Publishing Company.
- Burke, B. L., Arkowitz, H., & Dunn, C. (2003). The efficacy of motivational interviewing and its adaptations: What we know so far. In W. R. Miller & S. Rollnick (Eds.), *Motivational interviewing: Preparing people for change* (2nd ed., pp. 217-250). New York: Guilford Press.
- Butryn, M.L., Phelan, S., & Wing, R.R. (2007). Self-guided approaches to weight loss. In J.D. Latner & G.T. Wilson (Eds.), *Self-help approaches for obesity and eating disorders* (pp. 3-20). New York: Guilford Press.
- Carels, R.A., Darby, L., Cacciapaglia, H.M., Konrad, K., Coit, C., Harper, J., et al. (2007). Using motivational interviewing as a supplement to obesity treatment: A stepped-care approach. *Health Psychology, 26*, 369-374.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Davis, M. J., & Addis, M. E. (1999). Predictors of attrition from behavioral medicine treatments. *Annals of Behavioral Medicine, 21*, 339-349.
- Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*, 227-268.
- DiClemente, C. C., & Velasquez, M. M. (2002). Motivational interviewing and the stages of change. In W. R. Miller & S. Rollnick (Eds.), *Motivational interviewing: Preparing people for change* (2nd ed., pp. 201-216). New York: Guilford Press.
- DiLillo, V., Siegfried, N. J., & West, D. S. (2003). Incorporating motivational interviewing into behavioral obesity treatment. *Cognitive & Behavioral Practice, 10*, 120-130.
- Dunn, E.C., Neighbors, C., & Larimer, M.E. (2006). Motivational enhancement therapy and self-help treatment for binge eaters. *Psychology of Addictive Behaviors, 20*, 44-52.

- Endicott, J., Nee, J., Harrison, W., & Blumenthal, R. (1993). Quality of life enjoyment and satisfaction questionnaire: A new measure. *Psychopharmacology Bulletin*, 29, 321-326.
- Fairburn, C.G. (1995). *Overcoming binge eating*. New York: Guilford Press.
- Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders*, 16, 363-370.
- Finch, E.A., Linde, J.A., Jeffery, R.W., Rothman, A.J., King, C.M., & Levy, R.L. (2005). The effects of outcome expectations and satisfaction on weight loss and maintenance: Correlational and experimental analyses—A randomized trial. *Health Psychology*, 24, 608-616.
- Flegal, K. M., Carroll, M. D., Ogden, C. L., & Johnson, C. L. (2002). Prevalence and trends in obesity among US adults, 1999-2000. *JAMA*, 288, 1723-1727.
- Foot, J., DeLuca, A., Magura, S., Warner, A., Grand, A., Rosenblum, A., et al. (1999). A group motivational treatment for chemical dependency. *Journal of Substance Abuse Treatment*, 17, 181-192.
- Foster, G. D., Wadden, T. A., Swain, R. M., Stunkard, A. J., Platte, P., & Vogt, R. A. (1998). The Eating Inventory in obese women: clinical correlates and relationship to weight loss. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity*, 22, 778-785.
- Foster, G. D., Wadden, T. A., Vogt, R. A., & Brewer, G. (1997). What is a reasonable weight loss? Participants' expectations and evaluations of obesity treatment outcomes. *Journal of Consulting & Clinical Psychology*, 65, 79-85.
- Foster, G. D., Wyatt, H. R., Hill, J. O., McGuckin, B. G., Brill, C., Mohammed, B. S., et al. (2003). A randomized trial of a low-carbohydrate diet for obesity. *New England Journal of Medicine*, 348, 2082-2090.
- Gardner, C.D., Kiazand, A., Alhassan, S., Kim, S., Stafford, R.S., Balise, R.R., et al. (2007). Comparison of the Atkins, Zone, Ornish, and LEARN diets for change in weight and related risk factors among overweight premenopausal women. The A to Z weight loss study: A randomized trial. *JAMA*, 297, 969-977.
- Ginsburg, J.I.D., Mann, R.E., Rotgers, F., & Weekes, J.R. (2002). Motivational interviewing with criminal justice populations. In W. R. Miller & S. Rollnick (Eds.), *Motivational interviewing: Preparing people for change* (2nd ed., pp. 333-346). New York: Guilford Press.
- Goldberg, J.H., & Kiernan, M. (2005). Innovative techniques to address retention in a behavioral weight-loss trial. *Health Education Research*, 20, 439-47.
- Grilo, C.M., & Masheb, R.M. (2005). A randomized controlled comparison of guided self-help cognitive behavioral therapy and behavioral weight loss for binge eating disorder. *Behaviour Research and Therapy*, 43, 1509-1525.
- Hedley, A. A., Ogden, C. L., Johnson, C. L., Carroll, M. D., Curtin, L. R., & Flegal, K. M. (2004). Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *JAMA*, 291, 2847-2850.
- Hettema, J., Steele, J., & Miller, W. R. (2005). Motivational Interviewing. *Annual Review of Clinical Psychology*, 1, 91-111.
- Jeffery, R. W., Drewnowski, A., Epstein, L. H., Stunkard, A. J., Wilson, G. T., Wing, R. R., et al. (2000). Long-term maintenance of weight loss: current status. *Health Psychology*, 19, 5-16.

- Jeffery, R. W., French, S. A., & Rothman, A. J. (1999). Stage of change as a predictor of success in weight control in adult women. *Health Psychology, 18*, 543-546.
- Latner, J.D., Stunkard, A.J., Wilson, G.T., Jackson, M.L., Zelitch, D.S., & Labouvie E. (2000). Effective long-term treatment of obesity: A continuing care model. *International Journal of Obesity & Related Metabolic Disorders: Journal of the International Association for the Study of Obesity, 24*, 893-898.
- Latner, J.D. & Wilson, G.T. (2007). Continuing care and self-help in the treatment of obesity. In J.D. Latner & G.T. Wilson (Eds.), *Self-help approaches for obesity and eating disorders* (pp. 223-239). New York: Guilford Press.
- Latner, J.D., Wilson, G.T., Stunkard, A.J., & Jackson, M.L. (2002). Self-help and long-term behavior therapy for obesity. *Behaviour Research and Therapy, 40*, 805-812.
- Luce, K. H., & Crowther, J. H. (1999). The reliability of the Eating Disorder Examination--Self-Report Questionnaire Version (EDE-Q). *International Journal of Eating Disorders, 25*, 349-351.
- Macqueen, C. E., Brynes, A. E., & Frost, G. S. (2002). Treating obesity: a follow-up study. Can the stages of change model be used as a postal screening tool? *Journal of Human Nutrition & Dietetics, 15*, 3-7.
- Madson, M.B., Campbell, T.C., Barrett, D.E., Brondino, M.J., & Melchert, T.P. (2005). Development of the Motivational Interviewing Supervision and Training Scale. *Psychology of Addictive Behaviors, 19*, 303-310.
- Markland, D., Ryan, R.M., Tobin, V.J., & Rollnick, S. (2005). Motivational interviewing and self-determination theory. *Journal of Social and Clinical Psychology, 24*, 811-831.
- Miller, W.R. (1983). Motivational interviewing with problem drinkers. *Behavioural Psychotherapy, 11*, 147-172.
- Miller, W.R., & Baca, L.M. (1983). Two-year follow-up of bibliotherapy and therapist-directed controlled drinking training for problem drinkers. *Behavior Therapy, 14*, 441-448.
- Miller, W.R., Benefield, R.G., & Tonigan, J.S. (1993). Enhancing motivation for change in problem drinking: A controlled comparison of two therapist styles. *Journal of Consulting and Clinical Psychology, 61*, 455-461.
- Miller, W. R., & Rollnick, S. (2002). *Motivational interviewing: Preparing people for change* (2nd ed.). New York: Guilford Press.
- Miller, W.R., Taylor, C.A., & West, J.C. (1980). Focused versus broad spectrum behavior therapy for problem drinkers. *Journal of Consulting and Clinical Psychology, 48*, 590-601.
- Moyers, T.B., Martin, T., Manuel, J.K., Hendrickson, S.M.L., & Miller, W.B. (2005). Assessing competence in the use of motivational interviewing. *Journal of Substance Abuse Treatment, 28*, 19-26.
- Moyers, T. B., Miller, W. R., & Hendrickson, S. M. (2005). How does motivational interviewing work? Therapist interpersonal skill predicts client involvement within motivational interviewing sessions. *Journal of Consulting and Clinical Psychology, 73*, 590-598.

- National Heart, Lung, and Blood Institute Obesity Education Initiative Expert Panel (1998). *Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: The evidence report* (NIH Publication No. 98-4083). Washington, DC: National Institutes of Health.
- Ornish, D. (2001). *Eat more, weigh less*. New York: Harper Collins.
- Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change. Applications to addictive behaviors. *American Psychologist*, 47, 1102-1114.
- Project MATCH Research Group (1997). Matching alcoholism treatments to client heterogeneity: Project MATCH Posttreatment drinking outcomes. *Journal of Studies on Alcohol*, 58, 7-29.
- Puhl, R., & Brownell, K.D. (2007). Strategies for coping with the stigma of obesity. In J.D. Latner & G.T. Wilson (Eds.), *Self-help approaches for obesity and eating disorders* (pp. 347-362). New York: Guilford Press.
- Resnicow, K., Campbell, M. K., Carr, C., McCarty, F., Wang, T., Periasamy, S., et al. (2004). Body and soul. A dietary intervention conducted through African-American churches. *American Journal of Preventive Medicine*, 27, 97-105.
- Resnicow, K., Jackson, A., Blissett, D., Wang, T., McCarty, F., Rahotep, S., et al. (2005). Results of the Healthy Body Healthy Spirit Trial. *Health Psychology*, 24, 339-348.
- Resnicow, K., Jackson, A., Wang, T., De, A. K., McCarty, F., Dudley, W. N., et al. (2001). A motivational interviewing intervention to increase fruit and vegetable intake through Black churches: results of the Eat for Life trial. *American Journal of Public Health*, 91, 1686-1693.
- Resnicow, K., McCarty, F., & Baranowski, T. (2003). Are precontemplators less likely to change their dietary behavior? A prospective analysis. *Health Education Research*, 18, 693-705.
- Rogers, C. R. (1951). *Client-centered therapy; its current practice, implications, and theory*. Oxford, England: Houghton Mifflin.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68-78.
- Ryan, R. M., Frederick, C. M., Lipes, D., Rubio, N., & Sheldon, K. M. (1997). Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology*, 28, 335-354.
- Sears, B., & Lawren, W. (1995). *Enter the zone*. New York: Harper Collins.
- Shepherd, R. (2002). Resistance to changes in diet. *Proceedings of the Nutrition Society*, 61, 267-272.
- Smith, D. E., Heckemeyer, C. M., Kratt, P. P., & Mason, D. A. (1997). Motivational interviewing to improve adherence to a behavioral weight-control program for older obese women with NIDDM. A pilot study. *Diabetes Care*, 20, 52-54.
- Sparks, P., Conner, M., James, R., Shepherd, R., & Povey, R. (2001). Ambivalence about health-related behaviours: An exploration in the domain of food choice. *British Journal of Health Psychology*, 6, 53-68.

- Stunkard, A. J., & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research*, 29, 71-83.
- Teixeira, P.J., Goings, S.B., Sardinha, L.B., & Lohman, T.G. (2005). A review of psychosocial pre-treatment predictors of weight control. *Obesity Reviews*, 6, 43-65.
- Vansteenkiste, M., & Sheldon, K.M. (2006). There's nothing more practical than a good theory: Integrating motivational interviewing and self-determination theory. *British Journal of Clinical Psychology*, 45, 63-82.
- Wadden, T. A., Berkowitz, R. I., Sarwer, D. B., Prus-Wisniewski, R., & Steinberg, C. (2001). Benefits of lifestyle modification in the pharmacologic treatment of obesity: a randomized trial. *Archives of Internal Medicine*, 161, 218-227.
- Wadden, T.A., Crerand, C.E., & Brock, J. (2005). Behavioral treatment of obesity. *Psychiatric Clinics of North America*, 28, 151-170.
- Wadden, T. A., & Foster, G. D. (2000). Behavioral treatment of obesity. *Medical Clinics of North America*, 84, 441-461.
- Wadden, T. A., Foster, G. D., & Letizia, K. A. (1994). One-year behavioral treatment of obesity: comparison of moderate and severe caloric restriction and the effects of weight maintenance therapy. *Journal of Consulting & Clinical Psychology*, 62, 165-171.
- Wadden, T. A., & Osei, S. (2002). The treatment of obesity: An overview. In T. A. Wadden & A. J. Stunkard (Eds.), *Handbook of obesity treatment* (pp. 229-248). New York, NY: Guilford Press.
- Wadden, T. A., & Stunkard, A. J. (Eds.). (2002). *Handbook of obesity treatment*. New York, NY: Guilford Press.
- Wadden, T. A., Womble, L. G., Sarwer, D. B., Berkowitz, R. I., Clark, V. L., & Foster, G. D. (2003). Great expectations: "I'm losing 25% of my weight no matter what you say". *Journal of Consulting & Clinical Psychology*, 71, 1084-1089.
- West, D.S., DiLillo, V., Bursac, Z., Gore, S.A., & Greene, P.G. (2007). Motivational interviewing improves weight loss in women with Type 2 Diabetes. *Diabetes Care*, 30, 1081-1087.
- West, D.S., Gore, S.A., & Lueders, N.K. (2007). Behavioral obesity treatment translated. In J.D. Latner & G.T. Wilson (Eds.), *Self-help approaches for obesity and eating disorders* (pp. 243-264). New York: Guilford Press.
- Westenhoefer, J., Stunkard, A.J., & Pudel, V. (1999). Validation of the flexible and rigid control dimensions of dietary restraint. *International Journal of Eating Disorders*, 26, 53-64.
- Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: a test of self-determination theory. *Journal of Personality & Social Psychology*, 70, 767-779.
- Williams, G. C., & Deci, E. L. (2001). Activating participants for smoking cessation through physician autonomy support. *Medical Care*, 39, 813-823.
- Williams, G. C., Freedman, Z. R., & Deci, E. L. (1998). Supporting autonomy to motivate participants with diabetes for glucose control. *Diabetes Care*, 21, 1644-1651.

- Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality & Social Psychology*, 70, 115-126.
- Williams, G. C., McGregor, H. A., Zeldman, A., Freedman, Z. R., & Deci, E. L. (2004). Testing a self-determination theory process model for promoting glycemic control through diabetes self-management. *Health Psychology*, 23, 58-66.
- Wilson, G., & Schlam, T. R. (2004). The transtheoretical model and motivational interviewing in the treatment of eating and weight disorders. *Clinical Psychology Review*, 24, 361-378.
- Windhauser, M. M., Ernst, D. B., Karanja, N. M., Crawford, S. W., Redican, S. E., Swain, J. F., et al. (1999). Translating the Dietary Approaches to Stop Hypertension diet from research to practice: dietary and behavior change techniques. DASH Collaborative Research Group. *Journal of the American Dietetic Association*, 99, S90-95.
- Wing, R. R. (2002). Behavioral weight control. In T. A. Wadden & A. J. Stunkard (Eds.), *Handbook of obesity treatment* (pp. 301-316). New York, NY: Guilford Press.
- Wing, R. R., Venditti, E., Jakicic, J. M., Polley, B. A., & Lang, W. (1998). Lifestyle intervention in overweight individuals with a family history of diabetes. *Diabetes Care*, 21, 350-359.
- Wolk, S. L., & Devlin, M. J. (2001). Stage of change as a predictor of response to psychotherapy for bulimia nervosa. *International Journal of Eating Disorders*, 30, 96-100.
- Womble, L. G., Wadden, T. A., McGuckin, B. G., Sargent, S. L., Rothman, R. A., & Krauthamer-Ewing, E. S. (2004). A randomized controlled trial of a commercial internet weight loss program. *Obesity Research*, 12, 1011-1018.
- Woollard, J., Beilin, L., Lord, T., Puddey, I., MacAdam, D., & Rouse, I. (1995). A controlled trial of nurse counselling on lifestyle change for hypertensives treated in general practice: Preliminary results. *Clinical and Experimental Pharmacology and Physiology*, 22, 466-468.

Curriculum Vita

Ilyse Dobrow DiMarco

August 1997-May 2001	Yale University, Psychology Major, B.A.
August 2003-May 2005	Rutgers University, Clinical Psychology, M.S.
July 2001-June 2003	Research Assistant, New York State Psychiatric Institute Eating Disorders Research Unit
August 2003-May 2007	Teaching Assistant, Rutgers University Department of Psychology
July 2004-August 2004	Summer Research Assistant, New York State Psychiatric Institute Eating Disorders Research Unit
September 2004-May 2005	Assessment Clinician, Cognitive-Behavioral Therapy for Somatization Research Project University of Medicine and Dentistry of New Jersey/Robert Wood Johnson Medical School, Piscataway, New Jersey
September 2004-June 2007	Research Assistant, Rutgers University Eating Disorders Clinic, Piscataway, New Jersey

Devlin, M.J., Goldfein, J.A., & Dobrow, I.J. (2003). What is this thing called BED?: Current status of binge eating disorder nosology. *International Journal of Eating Disorders*, 34, S2-S18.

Devlin, M.J., Goldfein, J.A., Petkova, E., Jiang, H., Raizman, P.S., Wolk, S., Mayer, L., Carino, J., Bellace, D., Kamenetz, C., Dobrow, I., & Walsh, B.T. (2005). Cognitive behavioral therapy and fluoxetine as adjuncts to group behavioral therapy for binge eating disorder. *Obesity Research*, 13, 1077-1088

Devlin, M.J., Jahraus, J.P., & Dobrow, I.J. (2005). Eating disorders. In J.L. Levenson (Ed.), *Textbook of Psychosomatic Medicine* (pp. 311-334). Arlington, VA: American Psychiatric Publishing, Inc.

Dobrow, I.J., Glasofer, D.R., & Kotler, L.A. (2003). Child and adolescent obesity. *Directions in Psychiatry*, 23, 65-82.

Dobrow, I.J., Kamenetz, C., & Devlin, M.J. (2002). Psychiatric aspects of obesity. *Revista Brasileira de Psiquiatria*, 24, 63-67.

Loeb, K.L., Walsh, B.T., Lock, J., le Grange, D., Jones, J., Marcus, S., Weaver, J., & *Dobrow, I. (2007). Open trial of

family-based treatment for full and partial adolescent anorexia nervosa in adolescence: Evidence of successful dissemination. *Journal of the American Academy of Child & Adolescent Psychiatry*, 46, 792-800.