Eating Behaviors 20 (2016) 27–33

Contents lists available at ScienceDirect

Eating Behaviors

Socio-demographic, anthropometric, and psychosocial predictors of attrition across behavioral weight-loss trials☆

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ARTICLE INFO

Article history:
Received 16 May 2015
Received in revised form 26 September 2015
Accepted 11 November 2015
Available online 14 November 2015

Keywords:
Attrition
Weight loss
Binge eating

ABSTRACT

Preventing attrition is a major concern in behavioral weight loss intervention studies. The purpose of this analysis was to identify baseline and six-month predictors associated with participant attrition across three independent clinical trials of behavioral weight loss interventions (PREFER, SELF, and SMART) that were conducted over 10 years. Baseline measures included body mass index, Barriers to Healthy Eating, Beck Depression Inventory-II (BDI), Hunger Satiety Scale (HSS), Binge Eating Scale (BES), Medical Outcome Study Short Form (MOS SF-36 v2) and Weight Efficacy Lifestyle Questionnaire (WEL). We also examined early weight loss and attendance at group sessions during the first 6 months. Attrition was recorded at the end of the trials. Participants included 504 overweight and obese adults seeking weight loss treatment. The sample was 84.92% female and 73.61% white, with a mean (±SD) age of 47.35 ± 9.75 years. After controlling for the specific trial, for every one unit increase in BMI, the odds of attrition increased by 11%. For every year increase in education, the odds of attrition decreased by 10%. Additional predictors of attrition included previous attempts to lose 50–79 lbs, age, not possessing health insurance, and BES, BDI, and HSS scores. At 6 months, the odds of attrition increased by 10% with reduced group session attendance. There was also an interaction between percent weight change and trial ($p < .001$). Multivariate analysis of the three trials showed education, age, BMI, and BES scores were independently associated with attrition ($p_s \leq .01$). These findings may inform the development of more robust strategies for reducing attrition.

1. Introduction

Obesity and its related co-morbidities remain a significant public health concern (Eckel, 1997). Randomized clinical trials (RCTs) testing weight loss interventions have resulted in the identification of efficacious strategies to treat overweight and obesity (Burke & Wang, 2011; Hamman et al., 2006). However, participant attrition reduces the effectiveness of weight-loss RCTs. Premature withdrawal from weight loss trials can prevent participants from adopting healthful behaviors that support long-term weight loss (Moroshko, Brennan, & O'Brien, 2011). Additionally, important research information is lost, which not only can reduce internal and external validity, but also bias trial outcomes (Anderson, Konz, Frederick, & Wood, 2001).

Highly variable attrition rates ranging from 10 to 80% have been reported in RCTs characterized by varying trial designs, interventions, and study duration (Grossi et al., 2006; Honas, Early, Frederickson, & O'Brien, 2003; Inelmen et al., 2005; Teixeira et al., 2004a). For example, in a 12-month RCT for weight loss, an attrition rate of 42% among overweight and obese participants was reported (Dansinger, Gleason, Griffith, Selker, & Schaefer, 2005). Similarly, in shorter weight-loss RCTs lasting 12–16 weeks, attrition rates ranging from 20% to 50% were reported (Teixeira et al., 2004a). Recognizing participant characteristics associated with attrition may enhance retention and the subsequent development of effective weight loss interventions (Moroshko et al., 2011).

Obesity researchers have identified factors linked to attrition in weight loss trials; inconsistent associations have been reported

☆ Trial registration: these studies are registered at clinialtrial.gov. PREFER: NCT00330629; SMART: NCT00277771; and SELF: NCT00896194.

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http://dx.doi.org/10.1016/j.eatbeh.2015.11.009
1471-0153/

between baseline factors (e.g., depression, body mass index (BMI)) and attrition (Clark, Guise, & Niaura, 1995; Fowler, Follick, Abrams, & Rickard-Figueroa, 1985; Fabricatore et al., 2009; Honas et al., 2003; Inelmen et al., 2005; Kong et al., 2012; Mitchell & Stuart, 1984; Niedhammer, Bugel, Bonenfant, Goldberg, & Leclerc, 2000). An association between reported binge eating and rates of attrition has been published; however, the relationship has not been reliable (Ho, Nichaman, Taylor, Lee, & Foreyt, 1995; Marcus, Wing, & Hopkins, 1988). A recent systematic review reveals there are no significant associations between pre-treatment weight-loss expectations among participants and attrition (Teixeira, Going, Sardinha, & Lohman, 2005a). Notably, the majority of studies described in the systematic review had methodological limitations such as a brief intervention duration and/or short follow-up period (Clark, Cargill, Medeiros, & Pera, 1996; Fowler et al., 1985; Honas et al., 2003; Jelalian et al., 2008; Mitchell & Stuart, 1984). Additionally, none of the studies reported attrition rates across multiple clinical trials for durations exceeding 12 months.

The purpose of this study was to conduct a secondary analysis of data from three RCTs of behavioral weight loss interventions, ranging from 18 to 24 months in duration, to identify socio-demographic, anthropometric, and psychosocial factors associated with participant attrition at baseline. Additionally, we also examined percent weight change and attendance to group sessions at six months as early predictors of attrition. For the purposes of this study, attrition was defined as *non-completion of the final end-of-trial assessment*, which is commensurate with current literature (Jelalian et al., 2008; Teixeira et al., 2004a) on the topic.

This study is unique in that it analyzes data from three RCTs (i.e., PREFER, SELF, and SMART) that were conducted over a 10-year period and included a diverse, pooled sample of 504 adults. Variable selection included those drawn from more recently developed measures which assess not only participants' self-efficacy and hunger and satiety, but also important factors inconsistently associated with attrition in smaller trials such as health-related quality of life, depressive symptoms, and binge eating (Inelmen et al., 2005; Teixeira, Going, Sardinha, & Lohman, 2005b). The rationale for including variables previously associated with attrition is to generate new evidence surrounding psychosocial factors and eating behaviors that may be related to attrition. Additionally, this study provides researchers with information to assist in identifying participants who may be at risk for RCT withdrawal.

2. Research methods and procedures

2.1. Trial design and participants

PREFER, SMART, and SELF were RCTs targeting weight loss over an extended period that featured a standard behavioral intervention. The design, recruitment, and randomization procedures of PREFER, SMART, and SELF have been described in detail (Burke, Styn, Ye, Sereika, & Ewing, 2012; Burke et al., 2006; Burke et al., 2009).

Individuals were eligible for RCT enrollment across all studies if they met the following criteria: (Eckel, 1997) over 18 years of age, (Burke & Wang, 2011) BMI between 27 and 43 kg/m^2, (Hamman et al., 2006) successfully completed a 5-day food diary at screening, (Moroshko et al., 2011) agreed to be randomly assigned to a treatment group, and (Anderson et al., 2001) willing to provide informed consent. Individuals were ineligible if they met any of the following exclusion criteria: (Eckel, 1997) has a medical condition requiring physician supervision of diet and/or physical activity, (Burke & Wang, 2011) is undergoing current pharmacological treatment that might affect weight, (Hamman et al., 2006) has a physical limitation that restricted exercise ability, (Moroshko et al., 2011) current alcohol consumption of four or more drinks/day, (Anderson et al., 2001) is participating in a weight-loss program or has used weight loss medication within the last 6 months, (Grossi et al., 2006) is pregnant or intends to become pregnant during the trial period, (Inelmen et al., 2005) has a serious mental illness (e.g., schizophrenia), and (Teixeira et al., 2004a) has a fasting plasma glucose level greater than 125 mg/dl at baseline.

Details of each trial are listed in Table 1. PREFER (Paving the Road to Everlasting Food and Exercise Regimes) was an 18-month trial (2002–2004) that examined the effect of dietary approaches and preferences using a 2 × 2 factorial design, which allowed participants to indicate their preference for one of two dietary options: a calorie-restricted, lacto-ovo-vegetarian diet or a standard calorie- and fat-restricted diet (n = 176) (Burke et al., 2006). Individuals first were randomized to their choice of treatment (yes/no) and subsequently to one of the two diets. The SMART (Self-Monitoring and Recording Using Technology) study was a 24-month trial (2005–2009) that examined the effect of three self-monitoring methods on weight loss (n = 210) (Burke et al., 2009). Participants were randomized to use one of three strategies for self-monitoring their diet and physical activity: use of a paper diary, use of a personal digital assistant (PDA), or use of PDA + daily dietary feedback messages (PDA + FB). SELF (Self-Efficacy Lifestyle Focus) was an 18-month clinical trial (2008–2013) that examined the effect of a self-efficacy enhancement intervention (SE) on weight loss (n = 130). Participants were randomized to standard behavioral treatment (SBT) or to a SBT + SE weight loss intervention group; SBT + SE included one-to-one sessions that augmented the standard group sessions and targeted enhanced self-efficacy (Burke et al., 2012). The University of Pittsburgh, Institutional Review Board approved each trial.

2.2. Justification for combining the three trials

Table 1 presents the participants' sociodemographic profiles in the three studies. While the three trials featured differences, all three delivered SBT for weight loss and were conducted in Greater Pittsburgh. In each study, all participants were given calorie goals that were determined by their weight and gender (i.e., at <200 lb, women were prescribed a 1200 kcal diet and men 1500 kcal; at >200 lb, women were prescribed a 1500 kcal diet and men 1800 kcal). Participants were also instructed to reduce fat consumption to less than 25% of their daily intake and participate in 150 min of physical activity weekly.

With the aim of understanding the factors affecting attrition, we completed analyses at 18 and 24 months—the time points indicating the end-of-study. The PREFER and SELF trials were conducted over 18-months, while SMART was conducted over 24 months. Although some may question the use of varying time points, to understand attrition, we needed to follow the original design of each study and measure attrition at the final assessment. Moreover, there were no significant differences in attrition across the three studies (p = .06). With the exception of age, sociodemographic and anthropometric factors did not differ by trial. Finally, our analyses controlled for study (PREFER, SELF, or SMART) in each model, and tested for interactions between study and each predictor.

2.3. Baseline and 6-month measures

Table 2 presents the baseline measures used across the three studies. With the exception of two scales, measures were the same across the three studies. The Beck Depression Inventory and the Hunger Satiety Scale were not used in SMART. Additionally, only two of the four cohorts in SMART completed the Weight Efficacy Lifestyle Questionnaire (WEL).

2.3.1. Socio-demographic and anthropometric data

Baseline socio-demographic characteristics were obtained via a self-administered, standardized questionnaire. Trained staff performed the anthropometric measures (e.g., BMI and waist circumference). A Tanita Digital Scale (Tanita Corporation of America, Inc., IL) was used to record weight with the participant wearing light clothing and no shoes; height was recorded using a wall-mounted stadiometer. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m^2). Percent weight change was defined as the percentage of change from