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The CHANGE Program: Comparing an Interactive versus Prescriptive Obesity Intervention on University Students' Self-Esteem and Quality of Life

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Background: Previous studies incorporating Motivational Interviewing administered via Co-Active Life Coaching tools (MI-via-CALC) have elicited positive results among adults with obesity. However, there is a paucity of this research that includes sufficient power and a comparison group. This study's purpose was to compare MI-via-CALC with a validated obesity intervention among university students. **Methods:** Participants ($n = 45$) were randomised to either a telephone-based 12-week: (a) MI-via-CALC program whereby a certified coach worked with subjects to achieve goals through dialogue; or (b) lifestyle modification treatment following the LEARN Program for Weight Management. Participants completed the Rosenberg Self-Esteem Scale and Short Form Functional Health Status Scale (SF-36) at baseline, mid-, and post-treatment, and 3 and 6 months following the program. **Results:** Analyses revealed that both conditions elicited significant time effects between baseline and 6 months for self-esteem and all dimensions of the SF-36 (e.g. overall health). **Conclusions:** MI-via-CALC compares favorably with LEARN as an obesity treatment. Given that self-esteem and quality of life are essential for promoting behavior change among individuals with obesity, this study offers unique insights into their change processes. Future research should provide both treatments and allow participants to choose based on their personal preferences, learning styles, and needs.

Keywords: Co-Active Life Coaching, lifestyle intervention, motivational interviewing, obesity, quality of life, self-esteem

INTRODUCTION

In 2008, the World Health Organization (WHO) estimated the presence of approximately 500 million adults with obesity worldwide (WHO, 2011).

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Mirroring this international trend, recent reports indicate that more than one in four Canadian adults are now classified as obese (i.e. Body Mass Index [BMI] $\geq$ 30 kg/m^2; Public Health Agency of Canada [PHAC], 2011; Shields, Carroll, & Ogden, 2011). A prominent contributor to ill health and premature mortality, obesity is a modifiable risk factor for a myriad of conditions and diseases including type 2 diabetes, cardiovascular disease, stroke, hypertension, and some forms of cancer (e.g. Bray, 2004; Lau et al., 2007). The fundamental cause of obesity is over-nutrition and sedentariness which, in combination, create a long-term positive energy balance (Lau et al., 2007; WHO, 2011). Thus, common recommendations propose an energy-reduced diet and regular physical activity as the first line of treatment (e.g. Lau et al., 2007; Strychar, 2004). From a public health perspective, uncovering effective protocols for promoting positive and sustainable lifestyle changes is a paramount priority.

While obesity has been studied extensively with a view towards attenuating physical health concerns, the underlying psychosocial antecedents and consequences that can accompany this condition are complex and less understood (Hill & Williams, 1998; Tuthill, Slawik, O'Rahilly, & Finer, 2006; van der Merwe, 2007). In light of the fact that obesity appears to affect adversely the capacity of individuals to live full and active lives (de Zwaan et al., 2009), quality of life (QoL) has been viewed increasingly as a salient outcome measure of obesity-related research (Duval, Marceau, Pérusse, & Lacasse, 2006; Kushner & Foster, 2000).

QoL refers to an individual's perception of his or her well-being and performance in one or more areas of: somatic sensation (e.g. pain); physical function (e.g. mobility, self-care); emotional state (e.g. anxiety); and social interaction (e.g. visiting friends; Jain, 2004; Kushner & Foster, 2000; Shipper, Clinch, & Powell, 1990). Individuals with obesity tend to experience a lower QoL than their non-obese counterparts with the level of impairment correlating directly with the severity of obesity (Fontaine, Cheskin, & Barofsky, 1996; Jain, 2004; Tuthill et al., 2006). A self-perceived decline in QoL has been identified as one of the primary reasons an individual will seek obesity treatment (Kushner & Foster, 2000). Therefore, gaining insights into the experience of obesity from a QoL perspective allows for an advanced understanding of and appreciation for the condition from the patient or participant's point of view with respect to his/her feelings, values, abilities, and expectations (Kushner & Foster, 2000). Moreover, obtaining QoL measurements from individuals who are struggling with their weight is a useful way to evaluate the effects of treatment, and ultimately could influence the development of service provision, healthcare expenditures, and public health policy (Duval et al., 2006; Kushner & Foster, 2000).

For those willing to participate in a treatment regimen, comprehensive lifestyle interventions combining behavior modification, cognitive behavioral

therapy, and education have been recommended as an adjunct to physical activity and dietary modification (Galani & Schneider, 2007; Lau et al., 2007). While behavior-based interventions aimed primarily at weight loss have been successful in the short-term, long-term maintenance is often challenging (Blaine, Rodman, & Newman, 2007), suggesting that "weight loss" as a primary outcome measure may be an inappropriate first goal for many people (Nauta, Hospers, & Jansen, 2001). To improve the well-being of adults with obesity in the long term, extended efforts in areas beyond weight management alone are warranted (Jeffery et al., 2000), and could prove efficacious for sustaining improvements in overall health and QoL (Nauta et al., 2001; Lim, Norman, Clifton, & Noakes, 2009). Self-esteem (SE) enhancement is considered one of these vital areas. SE is an important measure of psychological well-being associated with QoL, and for individuals with excess adiposity, low SE has been linked with interpersonal distress (Blaine et al., 2007; Kushner & Foster, 2000; Lee & Shapiro, 2003; Lo Coco, Gullo, Salerno, & Iacoponelli, 2011). Bacon and colleagues (2005) argued that a more general, lifestyle-based approach to obesity can result in greater improvements in SE compared to a more prescriptive approach (e.g. specified energy restrictions). Although there is growing recognition regarding the importance of targeting variables beyond the realm of physical health among individuals with obesity, further examination of psychosocial origins and consequences of obesity, such as QoL and SE, is required in order to treat the individual as a whole person (Lee & Shapiro, 2003).

Motivational Interviewing (MI) applied using Co-Active life coaching (CALC) tools (referred to hereafter as MI-via-CALC) is a theoretically grounded, cognitive behavioral approach (Irwin & Morrow, 2005; Newnham-Kanas, Morrow, & Irwin, 2010; Pearson, 2011; Whitworth, Kimsey-House, Kimsey-House, & Sandahl, 2007) that has shown considerable promise as an intervention for eliciting health improvements among obese adults (e.g. Newnham-Kanas, Irwin, & Morrow, 2008; Newnham-Kanas, Irwin, Morrow, & Battram, 2011; van Zandvoort, Irwin, & Morrow, 2008, 2009). Encompassing the principles of MI, a client-centered counseling style that helps people explore and resolve their ambivalence for change (Miller & Rollnick, 2002; Rollnick & Miller, 1995), the Co-Active model is a specific style of life coaching—typically conducted over the telephone—which seeks to treat all aspects of a client's life through deepening his/her personal learning and/or forwarding him/her toward some action of his/her choosing (Whitworth et al., 2007). A primary assumption of MI-via-CALC is that clients are considered experts in their own lives and concomitantly are assumed to have the answers to their questions. The coach's role is to assist the client in accessing these answers in a supportive, motivating manner through exploring feelings and goals, and working with the client to brainstorm and identify solutions for attainment (Whitworth et al., 2007). Co-Active coaches

undergo extensive training where they are taught to use numerous skills (e.g. active listening, articulating, acknowledging, offering reflective summaries, asking meaningful questions). The types of techniques and skills applied are non-prescriptive, personalised, and dependent on the particular needs of each client and the context and content of the coaching session (Whitworth et al., 2007).

Previous small-scale research studies (i.e. sample size ≤ 20) integrating MI-via-CALC as an intervention for obesity among adults have demonstrated significant improvements to physical and psychological indices (e.g. reduced waist circumference, body weight, and BMI; enhanced SE; improved QoL; Newnham-Kanas et al., 2008, 2011; van Zandvoort et al., 2008, 2009). However, to our knowledge, there has yet to be a MI-via-CALC-based intervention that includes sufficient statistical power and the use of a comparison group, both of which are important considerations when seeking to establish further the viability of this particular methodology as an effective treatment for obesity.

University students were the target population of interest in many of the above-noted studies from which current understandings of the utility of MI-via-CALC have been garnered. Students are particularly important to study; as individuals positioned to become the policy makers, senior managers, and professionals of the future, the beliefs and attitudes held by university attendees towards health and health-related lifestyles are expected to have considerable influence on the health of the population (Stewart-Brown et al., 2000). Moreover, many of the physical activity behaviors and dietary habits developed between the ages of 18 and 24 are indicative of health status across the life span (Clement, Schmidt, Bernaix, Covington, & Carr, 2004). In Canada, it has been estimated that nearly 25 per cent of individuals with some post-secondary education are obese (Statistics Canada, 2006), and greater impairment to SE has been found among younger adults when compared to their older counterparts (Zabelina, Erickson, Kolotkin, & Crosby, 2009). Informed by recommendations emanating from the aforementioned small-scale studies, it follows that there is a marked need to intervene in this particular population. Thus, in response to the paucity of research aimed at addressing the psychosocial needs of individuals with obesity using a "whole person" treatment perspective, a large-scale MI-via-CALC research program was developed (i.e. the Coaching towards Healthy Actions Naturally through Goal-related Empowerment [CHANGE] Study).

Because the LEARN (Lifestyle, Exercise, Attitudes, Relationships, Nutrition) Program for Weight Management (Brownell, 2004) is a well-validated and thoroughly tested lifestyle-change program integrating educational and cognitive behavioral components, it was chosen to serve as the "gold standard" (i.e. the best available comparator found) for the comparison condition.

Specifically, the efficacy and robustness of LEARN has been demonstrated previously as evidenced by publications in a number of well-respected journals (e.g. Anderson et al., 1999; Wadden et al., 2005), its endurance (i.e. new editions have been published approximately every two years), and, as can be found through simple internet searches, its widespread commercial-based use among healthcare professionals and lay people alike. Typically administered via self-help format (i.e. participants work through the program material independently) or in-person (e.g. Foster et al., 2003; Wadden et al., 2005; Womble et al., 2004), the LEARN program was adapted for the purposes of the present study to be delivered over the telephone. Therefore, the specific aim of the present study was to compare the impact of two different treatments incorporating elements of goal setting on the QoL and SE of university students with obesity during a 12-week intervention, and 3 and 6 months following its completion: MI-via-CALC, a personalised intervention focused on needs identified by the participant; and the LEARN Program, a prescriptive weight management program. In light of MI-via-CALC's demonstrated effectiveness in previous small-scale studies, it was hypothesised that this interactive condition would elicit results comparable to the more prescriptive, previously validated LEARN treatment among the dependent variables examined. Because weight loss is a salient outcome measure in this population, a subsidiary aim was to explore whether changes to SE and QoL dimensions were related to changes in weight between baseline and the 6-month follow-up assessment. To our knowledge, no studies to date have examined these relationships as a function of participating in a MI-via-CALC-based program; thus, no predictions were made regarding the resultant relationship trajectories.

METHOD

Design and Participants

A parallel group randomised trial was conducted to examine the primary outcome measures between the two treatment groups at baseline and all subsequent assessment time-points. An a priori sample size calculation was conducted and the inclusion of 80 participants was deemed sufficient to detect a medium effect ($r^2 = .12$) of a two-level between-groups independent variable 90.4 per cent of the time using a .05 alpha level (Lee, 2004). Participants were recruited at one large urban, Canadian university between September 2010 and May 2011 via e-mails distributed to the entire study body at the beginning of each term, as well as poster advertisements circulated throughout the campus. Eligibility criteria for inclusion required that individuals were university students aged 18–24 with a BMI $\geq$ 30 kg/m^2 who could speak English fluently. In anticipation of participants

modifying dietary and/or physical activity behaviors, those requiring strict medical monitoring (e.g. type 1 diabetes) or diagnosed with a condition contraindicated for exercise were excluded in order to ensure their safety. Given the positive outcomes experienced in response to lifestyle modification among individuals with type 2 diabetes (Diabetes Prevention Program Research Group, 2003), those who self-reported this condition were accepted into the study. Once eligibility was confirmed by the Project Coordinator, participants were randomised to either the MI-via-CALC or the LEARN treatment group based on a computerised sequence generated by SPSS, and a baseline assessment was arranged at a mutually convenient time. Ethical approval was granted by the Office of Research Ethics at the host university.

MI-via-CALC Intervention

Subjects assigned to the MI-via-CALC treatment group received 12 weekly unscripted life coaching sessions (lasting 30 to 45 minutes) over the telephone with a randomly assigned, volunteer Certified Professional Co-Active Life Coach (CPCC) recruited and screened by the Project Coordinator. Eligibility criteria required that each CPCC be formally trained and certified via the Coaches Training Institute (2010), reside in North America, and commit to coaching at least two participants over the course of the study either simultaneously or in succession. Matches were based on the enrollment timeframe and availability of the CPCC (i.e. whether s/he could take on a new participant considering his/her schedule, additional commitments, etc.). In total, 16 coaches were enrolled to deliver the MI-via-CALC intervention (Canada, $n = 7$; United States, $n = 9$); however, three withdrew shortly thereafter due to scheduling conflicts and personal issues. All coaches were advised to conduct the sessions in accordance with their CPCC training only, whereby topics for discussion are determined entirely by the participant, and employ CALC-specific techniques and skills. For example: designing an alliance; being curious about that participant's experiences; acknowledging the participant and his/her actions; challenging him/her to attain goals; and holding the participant accountable to those actions. In keeping with the CALC method (Whitworth et al., 2007), the participant was responsible for calling the coach at a pre-arranged time each week with a topic (s)he wanted to discuss. The duo would then work collaboratively to explore the issue and identify solutions for goal attainment. Although the same number of sessions was prescribed to all enrollees, the content and skills employed within each varied and were dependent upon the individual needs of the participants. All coaching calls' content remained strictly confidential to coach and participant (for additional information on the CALC method, please refer to Whitworth et al., 2007).

LEARN Intervention

The LEARN Program for Weight Management (Brownell, 2004) is intended to assist people with developing the skills and confidence to lose weight and maintain this loss over time. The content consists of 12 lessons aimed at modifying behaviors and thinking patterns in relation to the principles of lifestyle, exercise, attitudes, relationships, and nutrition. Commencing with a foundational overview pertaining to health with a specific focus on diet and physical activity, the lessons progress to include more advanced information on topics such as stimulus control, problem solving strategies, goal setting, and cognitive restructuring techniques. In order to enable greater self-awareness, participants are encouraged to personalise recommendations through exercises such as behavioral self-monitoring (e.g. keeping records of food and caloric intake). Similar to the MI-via-CALC group, participants received 12, 30–45-minute LEARN sessions over the telephone. However, unlike the MI-via-CALC group, in order to maintain the standardised format of this condition, each LEARN participant received his/her calls from one of four randomly assigned "Specialists" (i.e. hired and thoroughly trained research assistants) who worked consistently with that participant on a weekly basis at a predetermined time. Specialists trained participants in self-monitoring skills and record keeping, delivered the prescriptive lesson material in a lecture-style format (i.e. reading the information verbatim to the participant), and asked participants to complete assignments and behavioral logs between calls.

Procedure

All assessments were conducted by the Project Coordinator in the University's Health Promotion Lab at baseline, mid-intervention (i.e. 6 weeks), post-intervention (i.e. 12 weeks), and 3 and 6 months following the intervention. At the initial baseline meeting, participants were given a letter of information detailing the nature of the study and written informed consent to participate was acquired. Treatment allocation was concealed from participants until this time. At each assessment time-point, participants completed a series of validated questionnaires (see below) using an on-line server and then had their height (baseline only), weight, and weight circumference measured.

Main Outcome Measures

The Short Form 36-Item Functional Health Status Scale (SF-36; Ware, 2008). The SF-36 is a validated and well-established quality of life measure (Kushner & Foster, 2000; Ware, 2008) comprising eight subscales and three composite measures that assesses physical, mental, and overall health status.

The *Physical Functioning* subscale measures the degree to which participants are limited when performing a variety of tasks during a typical day ranging from vigorous (e.g. running, lifting heavy objects), to moderate (e.g. pushing a vacuum cleaner), to basic activities of daily living (e.g. bathing oneself). Six of the subscales ask participants to describe their experience with a particular issue during the past four weeks: (1) *Role-physical* assesses issues associated with work or other activities as a result of physical problems (e.g. Have you accomplished less than you would like?); (2) *Bodily Pain* measures the degree of pain and limitations that arise when performing activities (e.g. How much bodily pain have you had?); (3) *Vitality* measures participant levels of energy or "pep" (e.g. How much of the time did you feel tired?); (4) *Social Functioning* assesses the extent to which physical or emotional problems interfere with normal social activities (e.g. How much of the time has your physical health or emotional health interfered with your social activities?); (5) *Role-emotional* measures limitations with work or other regular daily activities as a result of emotional problems (e.g. Have you cut down on the amount of time you spent on work or other activities?); and (6) *Mental Health* assesses feelings such as nervousness and depression (e.g. How much of the time have you felt calm and peaceful?). Finally, the *General Health* subscale assesses the degree to which individuals feel that they are healthy overall (e.g. My health is excellent). For the purposes of the present paper, it was determined that the three primary composite measures, which take into account the aforementioned subscales and present the results as a mean, would be reported. The *General Physical Health* subscale combines the physical functioning, role-physical, bodily pain, and general health subscales while the *General Mental Health* subscale comprises the vitality, social functioning, role-emotional, and mental health subscales. *Overall Health* is determined by averaging the General Physical and Mental Health scales. Questions were answered using a number of Likert-type rating scales ranging from two to six response options. Previous research supports the internal consistency of these subscales (Cronbach's $\alpha \geq .79$; Linder & Singer, 2003; Ware, 2008).

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). The RSES is a validated measure of SE that assesses subjective feelings pertaining to personal worth and self-respect. The 10-item questionnaire contains statements such as "I feel that I am a person of worth, at least on an equal plane with others", and, "I wish I could have more respect for myself." Participants were asked to respond on a 4-point Likert scale anchored at the extremes by (1) Strongly agree and (4) Strongly disagree. Previous research has deemed the RSES to be a reliable measure (Cronbach's $\alpha \geq .77$; Blascovich & Tomaka, 1993; Rosenberg, 1989).

Anthropometric Measures. Weight and height were obtained using the Tanita BWB-800S Digital Scale and HR-200 Height Rod. Waist

circumference measurements followed the Heart and Stroke Foundation (2010) guidelines and the same tape was used at each assessment.

Data Analysis

All statistical analyses were performed using SPSS version 19; data were analyzed using the general linear model application. To compare both groups for the primary outcome variables and to reduce the probability of a Type I error, multiple repeated-measures analysis of variance (ANOVA) were conducted across the various time-points where time was a within subjects variable (i.e. baseline, 6 weeks, 12 weeks, 3 months, and 6 months). The scores for QoL, SE, and body weight were analyzed for those who completed either 12-week program in addition to at least one of the follow-up assessments. Evaluation occurred using the principle of intention to treat with the last observation carried forward to account for missing data. To limit the probability of making a Type I error further across the five time-points, a Bonferonni correction adjustment was applied; as a result, statistical significance was set at 0.01 per cent for these analyses.

Pearson bivariate correlation analyses were conducted to examine the relationships between SE and participant weight; and the composite QoL dimensions (i.e. General Physical Health, General Mental Health, and Overall Health) and participant weight as a function of participating in the MI-via-CALC or LEARN conditions. Specifically, to examine the differences between groups over time, pre- (i.e. baseline) and post- (i.e. 6 months) residualised change scores were utilised for these analyses.

RESULTS

Participants

After the receipt of more than 600 inquiries, 78 young adults who met the eligibility criteria were enrolled in the CHANGE Program by the study start date and met with the Project Coordinator to participate in a baseline assessment (seven of these individuals failed to return after this initial meeting and therefore were not included in the present study; see Figure 1). To verify that the assumptions of randomisation held between groups, analyses were conducted to examine the baseline demographic variables and psychological outcome measures according to condition allocation; results revealed no significant differences between those assigned to the MI-via-CALC ($n = 36$) and LEARN ($n = 35$) treatment groups.

To examine the impact of the program on the SE and QoL of the enrollees over time, only those who completed the formal intervention and at least one

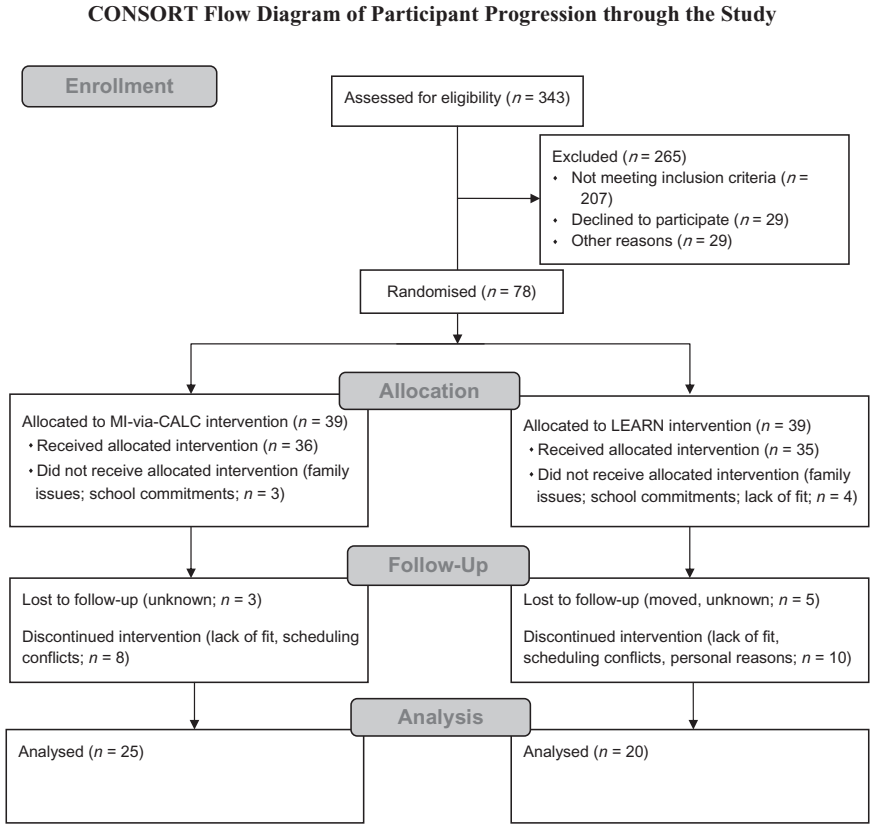

FIGURE 1. CONSORT flow diagram.

of the follow-up assessments were included in the present study.[1] Scheduling conflicts ($n = 5$) and a deviation of the program from personal expectations (i.e. lack of fit; $n = 11$) were cited most commonly as reasons for withdrawal. Two individuals dropped out of the program due to personal issues and the remaining decisions ($n = 8$) were unknown. Analyses of baseline demographics including age, weight, BMI, and waist circumference revealed no significant differences between those who dropped out of the program ($n = 26$) and

[1] An intention to treat analysis was conducted for all participants who began the program ($n = 71$) and approximately 28.4 per cent of the missing data was replaced. While the authors recognise the limitations inherent in a smaller sample size, it was determined that maintaining a sample of 45 participants with approximately 5 per cent of the missing data replaced was more reflective of the changes taking place.

those who completed ($n = 45$). A Pearson chi-square test was conducted to determine whether the number of individuals who dropped out of the program compared with those who completed the program varied by group assignment (i.e. MI-via-CALC or LEARN); no significant differences were observed, $\chi^2(1, n = 71) = 1.16$, $p = .28$. In addition, a univariate analysis of variance was conducted for each of the psychological outcome measures at baseline, revealing no differences among the SF-36 subscales; however, a significant difference was observed for SE ($p < .05$, $\eta^2 = .065$) between those who completed the program and those who dropped out.

In total, 45 participants completed the 12-week treatment program plus one or more of the follow-up assessments (i.e. 3 months, $n = 41$; 6 months, $n = 38$) and were included in the present analysis (see Figure 1). Among these individuals, there were no significant differences observed between the two treatment groups at baseline for the demographic or primary outcome measures. Demographics for these participants by group and time-point can be found in Table 1.

SF-36. The first set of analyses was conducted to determine whether changes occurred to quality of life via the composite functional health status measures over the course of the program and through the follow-up period. Separate 2 (treatment group) × 5 (time-baseline/6-week/12-week/3-month/6-month) repeated-measures ANOVAs were conducted. No group effects or group by time interactions were observed. However, analysis did reveal a significant effect for time between baseline and 6 months for: General Physical Health [$F(4, 40) = 11.2$, $p < .001$, $\eta^2 = .53$]; General Mental Health [$F(4, 40) = 10.8$, $p < .001$, $\eta^2 = .52$]; and Overall Health [$F(4, 40) = 12.1$, $p < .001$, $\eta^2 = .55$]. Additional analyses revealed that changes occurred specifically between baseline and week 6 for General Physical Health [$F(1, 43) = 15.6$, $p < .001$, $\eta^2 = .27$]; General Mental Health [$F(1, 43) = 8.9$, $p < .01$, $\eta^2 = .17$]; and Overall Health [$F(1, 43) = 10.3$, $p < .01$, $\eta^2 = .19$]; and also between weeks 6 and 12 for the same subscales: General Physical Health [$F(1, 43) = 9.8$, $p < .01$, $\eta^2 = .18$]; General Mental Health [$F(1, 43) = 12.8$, $p = .001$, $\eta^2 = .23$]; and Overall Health [$F(1, 43) = 13.2$, $p = .001$, $\eta^2 = .23$].

RSES. Analysis of SE showed a significant time effect between baseline and the 6-month follow-up [$F(4, 40) = 7.6$, $p < .001$, $\eta^2 = .43$]. Further analyses revealed that changes occurred specifically between weeks 6 and 12 [$F(1, 43) = 18.2$, $p < .001$, $\eta^2 = .30$]. No significant improvements were observed between baseline and week 6, or after the 12-week time-point, and no between-group interactions or group by time effects occurred. Table 2 contains descriptive statistics for SE and QoL by time-point.

Participant Weight. Within-group analyses of participant weight revealed a significant effect of time between baseline and the 6-month

TABLE 1
Participant Demographics by Time-Point ($n = 45$)

	Baseline		*Mid-program (6 week)*		*Post-Program (12 week)*		*3-month follow-up*		*6-month follow-up*	
Demographic	*C**	*L*	*C*	*L*	*C*	*L*	*C*	*L*	*C*	*L*
Age (years)	20.5 (1.7)[1]	21.4 (1.8)	—	—	—	—	—	—	—	—
Sex			—	—	—	—	—	—	—	—
Women	21	13	—	—	—	—	—	—	—	—
Men	4	7	—	—	—	—	—	—	—	—
Ethnicity										
White	19	12								
Chinese	1	1								
South Asian	1	2								
Black	1	2								
Latin American	1	2								
Other	2	1								
Height (in)	66.5 (3.5)[1]	66.7 (3.2)	—	—	—	—	—	—	—	—
Weight (lb)	221.7 (36.8)	220.7 (32.6)	220.3 (38.8)	216.8 (31.3)	219.1 (40.8)	212.9 (29.5)	218.2 (39.7)	212.7 (28.6)	216.4 (39.1)	212.6 (28.6)
Waist circumference (in)	44.1 (4.1)	43.7 (4.2)	43.9 (4.2)	43.2 (3.9)	43.6 (4.5)	42.7 (4.0)	43.2 (4.9)	43.0 (3.8)	43.4 (5.0)	42.8 (4.1)

*C = MI-via-CALC Condition; L = LEARN Condition; [1] Mean (± standard deviation) unless indicated otherwise.

TABLE 2
Descriptive Statistics for Quality of Life and Self-Esteem Subscales by Group over Time

	MI-via-CALC Group (n = 25)					*LEARN Group* (n = 20)				
Variable	*Baseline*	*Mid 6-week*	*Post 12-week*	*3-month follow-up*	*6-month follow-up*	*Baseline*	*Mid 6-week*	*Post 12-week*	*3-month follow-up*	*6-month follow-up*
General Physical Health	63.2 (14.8)	70.7 (13.7)	76.5 (16.2)	75.7 (15.8)	77.2 (14.6)	69.2 (13.7)	75.2 (13.9)	78.3 (16.7)	76.1 (17.0)	77.9 (16.9)
General Mental Health	57.5 (18.1)	66.1 (16.9)	74.9 (18.1)	70.9 (22.8)	70.4 (21.8)	57.3 (19.3)	63.2 (19.1)	70.9 (23.2)	72.5 (19.8)	72.9 (18.4)
Overall Health	63.8 (15.4)	70.9 (14.5)	78.6 (16.9)	76.3 (18.1)	76.9 (17.0)	66.4 (16.0)	71.6 (15.1)	77.0 (19.4)	77.3 (17.7)	78.3 (16.9)
Self-Esteem	20.8 (5.1)	21.4 (6.0)	24.5 (4.8)	24.3 (5.6)	23.4 (6.7)	19.6 (6.1)	21.5 (4.9)	23.2 (5.7)	22.1 (5.0)	22.6 (4.5)

follow-up [$F(4, 40) = 3.7$, $p = .01$, $\eta^2 = .27$]. Additional analyses revealed that changes occurred specifically between baseline and week 6 [$F(1, 43) = 10.05$, $p < .01$, $\eta^2 = .19$], and weeks 6 and 12 [$F(1, 43) = 6.6$, $p = .01$, $\eta^2 = .13$]. No main effects for group or group by time interactions were observed.

Correlation Analyses. Bivariate correlations were conducted to examine the relationships between SE and body weight changes, and the composite QoL dimensions and body weight changes as a function of participating in the MI-via-CALC and LEARN conditions ($n = 45$). Results revealed a significant negative relationship between changes in weight and the General Physical Health Subscale ($r = -.31$, $p < .05$); however, no additional significant correlations were found.

DISCUSSION

The primary purpose of this study was to compare the impact of MI-via-CALC to the LEARN Program for Weight Management on the QoL and SE of university students with obesity over the course of a 12-week, telephone-based intervention, with follow-up assessments at 3 and 6 months post-intervention. In keeping with our original hypothesis, the interactive MI-via-CALC condition fared comparably to the more prescriptive LEARN treatment across the variables examined. This indicates that: (a) both are effective at eliciting positive changes to QoL dimensions and SE in young adults with obesity; (b) MI-via-CALC appears to be on par with LEARN, a well-validated lifestyle modification program, as a viable obesity treatment that helps to facilitate sustainable change; and (c) to meet the expectations of treatment-seeking young adults with obesity, both treatments need to be made available, and in some cases merged, based on the differential learning styles and needs of each individual. In light of the substantial number of university students who struggle with their weight, these findings have several implications for practice and contribute further to our understanding of how QoL and SE are experienced within this population.

A primary tenet within the MI-via-CALC model is "choice". In the "real world", individuals interested in this form of treatment will seek out a Co-Active coach of their own volition. This process contrasts with the scientific research methodology employed in the present study whereby participants were assigned randomly to their condition and treatment provider. While beneficial for enhancing internal validity, randomisation does have limitations when considering the applicability of results beyond the research setting. That is, not all individuals respond well to a dialogue-based, introspective treatment (i.e. MI-via-CALC). For some, the provision of pertinent educational information accompanied by didactic and specific instructions on how to make changes (i.e. LEARN) is a preferable method. Given that

nearly 50 per cent of the individuals who dropped out of the program cited lack of fit as their reason, it is clear that personal learning styles and needs play a significant role with regard to an individual's receptivity to a particular treatment format. Therefore, it stands to reason that allowing individuals to choose their own condition could result in greater treatment effects and less attrition when seeking to attenuate obesity rates in this population.

In the field of obesity treatment and management, evaluation of health-related QoL has been deemed an essential clinical and research outcome measurement (Fontaine & Barofsky, 2001; Kushner & Foster, 2000). In this study, MI-via-CALC and the LEARN Program elicited significant improvements to QoL domains in as little as 6 weeks, and these enhancements continued up to the 6-month time-point. These findings are congruent with previous MI-via-CALC and LEARN-based studies examining quality of life in adults with obesity (e.g. Newnham-Kanas et al., 2011; Womble et al., 2004). Individuals struggling with their weight tend to report limitations in their capacity to perform day-to-day physical activities (Fontaine & Barofsky, 2001; Fontaine et al., 1996). The present study revealed that changes in weight were related negatively to changes in General Physical Health between baseline and the 6-month follow-up for both groups. Given that excess weight places increased demands on multiple organ functions, all of which can be perceived acutely by the individual (e.g. shortness of breath, mobility limitations, increased sweating; Kushner & Foster, 2000), it is not surprising that an association was found among these variables. In light of the number of young adults with weight challenges and the obesity-related burden that can be caused by a lower QoL, the improvements observed in the present study are promising, and highlight the importance of focusing on the domain of QoL during treatment.

Significant changes to SE were observed between weeks 6 and 12 of the CHANGE Program and improvements were unrelated to the weight loss experienced among participants. Findings of a meta-analysis examining the effects of weight loss treatment on weight and SE revealed that individuals who complete these programs typically emerge with greater SE, although they are not substantially lighter, a finding which suggests that the short- and long-term impact of weight loss treatment on SE is likely moderated by other variables (Blaine et al., 2007). These findings parallel research conducted in related domains of health psychology. For example, body image researchers have found that weight loss is correlated with significant improvements to body image; however, the degree of improvement does not seem to be related to the amount of weight lost, indicating that additional factors such as participating in the actual treatment might be responsible (Foster & Matz, 2002; Foster, Wadden, & Vogt, 1997; Martin & Lichtenberger, 2002). Similarly, participants in the present study may have experienced enhancements

to SE as a function of participating in the CHANGE Program; although more research is needed to verify these relationships.

One commonality across the present study's two treatments which could have contributed to the significant improvements observed was the element of contact time. In the context of overweight and obesity, research has revealed that the degree of contact time maintained with a treatment provider over the telephone can predict participant weight loss outcomes over the course of a behavioral weight loss program (Unick, Jakicic, & Marcus, 2010). Thus, it is possible that an element of social support contributed to enhancements in SE and QoL dimensions as well as weight loss across both conditions in the present study, albeit to unknown degrees. For individuals struggling with their weight, personal contact time may be an integral element for inclusion when seeking to elicit positive changes to psychosocial and anthropometric profiles.

Strengths and Limitations

In contrast to previous studies which have typically delivered LEARN in person or via self-help format, to the best of our knowledge this is the first study to administer the program over the telephone. Not only is talking on the telephone convenient and accessible, but it allows individuals to remain in the privacy of a location of their choosing when discussing personal issues which may be at the root of their struggles with weight and lifestyle choices. Given the positive results observed, it appears that this represents an important medium for the provision of obesity treatment in this population. In addition, this is the largest known MI-via-CALC obesity study, and the first to use a comparison group to assess its effectiveness in this context. Improvements in the MI-via-CALC group also compared favorably with LEARN, thereby lending additional credence to its utility as a viable health behavior change methodology.

Previous research has shown that attrition is likely when individuals wanting to make lifestyle changes are assigned to a control condition (Mantler, Irwin, & Morrow, 2010). While the present study incorporated a validated comparison condition, a true control group was not included which could be viewed as a limitation. Moreover, the generalisability of this study's findings is hindered by the low percentage of male participants, the number of drop-outs, and limited power of analysis.

Future Directions

In light of the fact that nearly 50 per cent of those who dropped out of the study did so due to lack of fit, prior to enrolling participants in either type of treatment program future studies should consider the inclusion of a baseline

readiness interview whereby behavior change history, expectations, and personal learning styles are assessed. This would enable participants to identify personal strengths and challenges with regard to weight management (Aggarwal et al., 2012) and also serve to uncover what has/has not worked well for them in the past. As a result, individuals could then be allocated to a treatment that best fits their personal learning styles and needs.

A number of barriers to participation in face-to-face obesity interventions have been identified (e.g. availability of programs, geographic proximity to the intervention location, transportation issues, time restrictions; Krukowski, Tilford, Harvey-Berino, & West, 2011). Previous studies in other areas of health (e.g. smoking cessation) have examined the impact of telephone hotlines on behavior change in at-risk populations and found that they are efficient, and able to reach a wide range of individuals (e.g. Tzelepis, Paul, Walsh, McElduff, & Knight, 2011). In a similar vein, the results of the present study could be used to inform the development of an integrated phone-based treatment that would provide callers with a comprehensive assimilation of MI-via-CALC and LEARN based on the needs and preferences of each individual. Because participants responded well to both treatments, it may be the case that combining the two will have additive effects. From a public health perspective, this particular modality has the potential to provide substantial reach in a cost-effective manner and therefore merits continued investigation as a viable treatment for obesity in this at-risk population.

In conclusion, the CHANGE Program has provided important insights into the impact of an interactive versus prescriptive intervention on the psychosocial and anthropometric profiles of young adults with obesity. In line with the MI-via-CALC model which emphasises that clients are considered the experts in their own lives (Whitworth et al., 2007), the present findings demonstrate the uniqueness of individuals and their treatment inclinations. MI-via-CALC and the LEARN Program compare favorably with one another when delivered in this manner, indicating that both treatments are warranted. Through focusing on a participant's/client's personal learning styles and needs, these two treatments offer a unique framework from which the development of future obesity-based treatments can emerge. A larger-scale study that allows participants to choose their treatment allocation in line with these needs (i.e. MI-via-CALC, LEARN, or a combination of the two) is now recommended.

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