The quantitative assessment of Motivational Interviewing using Co-active Life Coaching Skills as an intervention for adults struggling with obesity

Courtney Newnham-Kanas, Jennifer D. Irwin, Don Morrow & Danielle Battram

Objectives: *The purpose of this study was to explore Motivational Interviewing (MI) applied through Co-Active Life Coaching (CALC) skills on obese adults' (ages 35 to 55) weight, waist circumference, self-esteem, functional health status, quality of life, self-efficacy, physical activity, and nutrition.*

Design: *A single-subject multiple-baseline method research design was utilised.*

Method: *One volunteer Certified Professional Co-Active (CPCC) coach provided 18 35-minute weekly coaching sessions with eight women residing in London, Ontario whose BMI was ≥30. Measures included weight, waist circumference, the Rosenberg Self-Esteem Scale, Short-Form 36 (SF-36) Health Survey, the World Health Organization Quality of Life Questionnaire, self-efficacy questionnaires, The International Physical Activity Questionnaire, and two three-day dietary intakes. Participants returned six months after their final coaching session for a follow-up weigh-in and waist circumference measurement. Visual inspection was used to analyse weight and waist circumference to determine whether changes were observed. Statistical interpretations were used to analyse the remaining measures to determine whether a clinically significant change was made.*

Results: *Visual inspection indicated a change in weight and waist circumference. Clinically significant changes were observed in participants' self-esteem, functional health status, quality of life, self-efficacy, physical activity, and nutrition. At the six-month follow-up, three participants had gained weight (although two participants were still below their baseline weight), one participant continued to lose weight and four participants maintained the weight lost during the intervention phase.*

Conclusions: *MI using CALC skills is a behavioural intervention that is an effective tool in aiding individuals to conquer their battle with weight.*

Keywords: *Motivational Interviewing; Life Coaching; Obesity Intervention; Behaviour change.*

THE World Health Organisation (WHO) reports that globally, at least 400 million adults were obese in 2005 (WHO, 2006). Based on these numbers, it is projected that by 2012, obesity levels will rise to 700 million adults worldwide. While obesity was once believed to be a problem in high-income countries, rates are climbing substantially in low- and middle-income countries (WHO, 2006). The recent 2007–2009 Canadian Health Measures Survey (Shields et al., 2010) reported that over the past 25 to 30 years, Canadian adults have become heavier for their heights (Tjepkema, 2006). As a result, 19 per cent of males and 21 per cent of females aged 20 to 39 years were considered obese in 2009 and the percentage increased to one-third for ages 60 to 69. From 1981 to 2007–2009, the number of obese females aged 40- to 59-years-old doubled. Based on current waist circumference (WC) measurements, 31 per cent of females and 21 per cent of males aged 20- to 39-years-old are at high risk for health problems and for ages 60 to 69 years, those percentages rose to 65 per cent and 52 per cent, respectively. Body mass index (BMI) has been deemed limited in assessing general

health because it does not take the overall distribution of body fat into account. Therefore, WC, which assesses abdominal fat (a predictor of increased risk of disease for both sexes), is used in conjunction with BMI to reflect overall health (Janssen, Heymsfield & Ross, 2002; Janssen, Katzmarzyk & Ross, 2002, 2004). If these trends continue, in 25 years, half of all males and females in Canada will be considered obese. These alarming rates of obesity have considerable physical, psychological, and economic consequences for an avoidable non-communicable disease (Shields et al.).

Because on the drastic rise in obesity in a relatively short period of time (i.e. shorter than needed for genetic changes in a population to be expressed), it is believed that behavioural factors play a more pivotal role rather than biological factors in shaping the development and maintenance of obesity (Stice, Presnell & Shaw, 2005). While it has been reported widely that inactivity and food consumption are at the root causes of increased rates of obesity, these two behavioural challenges may, in part, be symptoms of other psychosocial challenges (e.g. depression, low self-esteem). Although this problem of underestimating the psychosocial contribution to the obesity epidemic is gaining widespread attention within academic journals and medical sources, new clinical approaches for treating/reducing obesity are lacking (Hardeman et al., 2000; Slevin, 2004). One such treatment is Motivational Interviewing (MI). MI is a directive, client-centred counselling style for eliciting behaviour change by helping people explore and resolve their ambivalence for change (Miller & Rollnick, 2002). MI has been well documented as an effective behaviour change intervention in the health care field since its inception in 1983, especially in the areas of addiction with particular emphasis on behaviours associated with alcohol use (Brown & Miller, 1993; Miller, 1998; Miller, Yahne & Tonigan, 2003). Recently, Dr Freedhoff and Dr Sharma (2010) recommended MI as an essential behavioural intervention needed as part of a comprehensive treatment plan for individuals struggling with obesity. A primary concern with using MI as a behaviour change intervention has been putting MI principles into action (Mesters, 2009). Previous research and experiences indicate that the tenets and premises of MI are contained entirely within, and brought to fruition via the skills of Co-Active Life Coaching (CALC; Whitworth, Kimsey-House & Sandahl 1998, 2007; Gorczynski, Morrow & Irwin, 2008; Irwin & Morrow, 2005; Newnham-Kanas, Morrow & Irwin, 2010; Newnham-Kanas, Irwin & Morrow, 2008; Newnham-Kanas et al., 2009; van Zandvoort, Irwin & Morrow, 2008; 2009). MI holds the same principles as CALC and is an accepted methodology that has been utilised in the worlds of medicine and allied health care for some time; CALC builds on these MI roots by providing the tools to effectively put MI principles into action. With MI's potential in aiding individuals struggling with obesity, the recent recommendations by Freedhoff and Sharma, and the application-based tools provided by CALC to properly implement MI principles into action, MI using CALC skills combine to represent a theoretically sound and evidence-based strategy worth investigating as an intervention for obesity.

When using MI administered via CALC tools as an intervention for obesity, our previous research has demonstrated a statistically significant decrease in WC and increases in self-esteem and functional health status. Qualitatively, participants reported an increase in daily physical activity and healthier dietary choices, feelings of optimism, and greater self-acceptance (Newnham-Kanas et al., 2008). Another study that used CALC as an intervention for obesity found coaching, and particular coaching skills, were associated with a trend towards a decrease in waist circumference and clinically significant increases in participants' self-esteem and their mental, physical, and overall health statuses (van Zandvoort et al., 2008). While coaching has been defined historically as a behaviour change tool for a non-clinical pop-

ulation, a recent annotated bibliography of 72 critically appraised health-related coaching studies, which demonstrated that life coaching has been utilised effectively in ameliorating many health issues, including, but not limited to diabetes, asthma, poor cardiovascular health, fitness, and depression (Newnham-Kanas et al., 2009). It should be noted that life coaches are not trained as mental health professionals. In fact, Grant and Zackon (2004) reported that only 40 per cent of life coaches received 11 or more hours of training in mental health issues in the form of professional development workshops or programmes. In a recent survey of Certified Professional Co-Active Coaches (CPCC), over 60 per cent of respondents did not have any formal training in recognising mental health issues (Newnham-Kanas, Irwin & Morrow, under review). Therefore, it is crucial that life coaches recognise mental health issues and refer on or work simultaneously with a mental health professional. Participants of the current study were informed that they must continue under a physician's or a trained mental health professional's care for any co-morbidities (e.g depression, diabetes, etc.).

CALC uses MI principles to create a proactive alliance in which coach and client work together as equals to meet the needs of the client. The approach has been evaluated as a theoretically-grounded behaviour change method (Irwin & Morrow, 2005) that includes constructs from Social Cognitive Theory (Bandura, 1977), the Theory of Reasoned Action (Fishbein & Ajzen, 1975), and the Theory of Planned Behaviour (Ajzen, 1988). CALC also shares some of the elements from Egan's Skilled Helper Model (Egan, 1997), Self-Regulation Theory (Kanfer, 1970) and Self-Determination Theory (Ryan & Deci, 2000). From a behavioural perspective it stands to reason that the MI using the CALC approach may work to produce desirable impacts on obesity because of its impact on self-regulation, and self-regulation in one domain (e.g. life stress) often increases self-regulation in other, unrelated domains (e.g. dietary intake and/or physical activity). Our experience with short-term, MI-obesity research studies suggests that obesity includes modifiable conditions (physical and psychological) that respond to an MI treatment, and a longer-term study is now required (Newnham-Kanas, Irwin & Morrow, 2008; van Zandvoort, Irwin & Morrow, 2008; 2009). For a full review of Co-Active life coaching, please refer to Whitworth, Kimsey-House and Sandahl (1998, 2007). The purpose of this study was to assess the impact of six-months of MI, administered via CALC skills (hereafter referred to as the coaching intervention), on the body composition, self-esteem, self-efficacy, quality of life, physical activity, dietary intake, and functional health status of eight adults struggling with obesity (aged 35 to 55; BMI values greater than 30). A secondary purpose was to determine the impact of MI using CALC six months after the end of the intervention.

Study design and methods

This study utilised a multiple-baseline, single-subject research design as explained by Kazdin (1982). This quasi-experimental design allows investigators to examine the pattern and stability of two or more behaviours within one participant or of a similar behaviour across two or more participants before and during the intervention phase (Kazdin). This design is particularly useful when assessing change in behaviour in a small number of participants because this methodology allows for new interventions to be observed on a small number of participants before it is tested on a larger sample size (Hayes, 1981). Eight women participated in this study, which allowed for an attrition rate of two participants, which was a feasible number for the study's single volunteer Certified Professional Co-Active Coach (CPCC). The larger the number of baselines, the clearer the demonstration that the intervention was responsible for the reported change and smaller the probability that changes between the baseline and intervention phase could be due to chance (Backman & Harris,

1999; Hayes, 1992; Kazdin, 1982). Typically, two baselines are a minimum requirement and for the present study, a minimum of four baselines was conducted to reduce the chance of coincidental extraneous events.

Recruitment

A sample of eight women was recruited via a local London Ontario newspaper. Participants were eligible to participate in the study if they were between the ages of 35 to 55, had a BMI equal to or greater than 30, spoke and read English fluently and continued under a physician's care for any co-morbidities (e.g. diabetes). Thirty-five people contacted the researcher and the first eight who met the study's eligibility requirements became the study participants. Ethical approval was received from The University of Western Ontario's Office of Research Ethics.

Participants

All eight participants were White women between the ages of 35 to 55. All participants had a starting BMI greater than or equal to 30. Participants one, two, three, five, seven, and eight had co-morbidities that presented after the study began and were under the supervision of a medical professional. The co-morbidities included depression, steroid medication, cancer, asthma, and injuries from a car accident. The specific co-morbidity is not attached to the corresponding participant to ensure confidentiality. A number of participants also experienced and received physician support for their symptoms related to menopause during the study.

Procedure

During the initial, face-to-face meeting between the lead researcher (CNK) and each participant, the nature of the study and the coaching intervention were explained and each participant received a letter of information for review. Once they agreed to participate (all eight agreed to participate), participants completed a consent form, and their height, weight, and waist circumference (the measuring tape was placed along their belly button to ensure a reliable reading and the same digital scale was used throughout the entire study) were measured and they provided a $10 fee for each coaching session ($180 total). This fee helps to create a sense of personal buy-in from the client, which translates into participants showing up for their appointments on time and doing the work they commit to during their session. Unbeknown to participants, the money would be returned at the end of the intervention. Participants were then asked to complete a series of previously validated tools/ questionnaires. Specifically: the SF-36 short form Functional Health Status Questionnaire (Ware, 1997); the Rosenberg Self-Esteem Scale (Rosenberg, 1989); a self-efficacy questionnaire; the International Physical Activity questionnaire (IPAQ); a three-day food record (Chronic Disease and Injury Prevention Team, 2009), and The World Health Organization Quality of Life Scale (WHOQOL-BREF; World Health Organization, 1997). Once the questionnaires were complete, a short 10-minute semi-structured interview was conducted assessing qualitatively participants' experiences associated with being obese and the effect of these experiences on their lives. The qualitative components of the study are presented in detail elsewhere (Newnham-Kanas, Irwin & Morrow, under review). To account for the repeated testing threat to internal validity (i.e. participants remembering correct answers or being conditioned to know the assessments; Cook & Campbell, 1979), baseline assessments (after the initial meeting) and assessments during the intervention consisted of having participants' weight and waist circumference measured only.

Participants one, two, and three had their first coaching session after four baseline assessments, while participants four, five, and six had their first coaching session after five baseline assessments, and participants seven and eight had their first coaching session after six baseline assessments. Baseline assessments were scheduled one week apart while assessments during the intervention were spaced at one-month intervals. To

determine whether the intervention might be associated with any changes, participants were asked not to alter their behaviour during the pre-intervention phase in order to capture an accurate portrayal of the stability of their weight and waist circumference.

One CPCC known to the researchers donated her time for the study. The coach received her training and certification through The Coaches Training Institute. The CPCC was not involved in the initial meeting with participants and was not privy to any of the information collected during assessments. The only contact that the CPCC and the researchers had about the study was to confirm that participants attended their sessions. After the baseline phases, each participant met with the CPCC at the host University, for her first and only hour-long face-to-face meeting. The lead researcher (CNK) then scheduled the remaining 35-minute telephone sessions. Each participant received one coaching session per week, after the first session, for 17 weeks. Missed appointments were rescheduled. All participants received all 18 sessions (no attrition occurred throughout the study) over six months. For each of these telephone sessions, it was each participant's responsibility to phone the CPCC at the designated appointment time (the CPCC telephoned one participant as a result of a telephone plan arrangement). At the beginning of each telephone coaching session, each participant was free to focus on any issue she wished, whether or not the issue seemed directly related to weight management; previous studies using CALC have demonstrated that obesity issues are connected to a wide variety of apparently unrelated issues extant in each client's life (Newnham-Kanas, Irwin & Morrow, 2008; van Zandvoort, Irwin & Morrow, 2008, 2009). The majority of questions and coaching content with a CPCC are unscripted open-ended questions, a primary characteristic of the CALC model (see Whitworth et al., 1998, 2007 and van Zandvoort et al., 2008, for additional information about the content of coaching sessions).

At the conclusion of the intervention (i.e. at six-months post initial coaching session), participants returned to the host University where they completed the same body composition, nutrition, quality-of-life, self-esteem, self-efficacy, physical activity measures, and their cheques were returned. Participants returned one year post initial coaching session for a final weigh-in and waist circumference measurement.

Date analysis and interpretation

BMI and WC for each participant during the baseline and intervention phase were graphed and analysed using visual inspection (as described by Kazdin, 1982) to determine the reliability or consistency of the intervention effects. Results from the measures assessing physical activity, self-esteem, self-efficacy, functional health status, quality of life, and nutrition were examined to determine whether a clinically significant difference was attained using effect size. Effect size is a measure of the strength of the relationship between two variables. Cohen's *d* is defined as the difference between two means divided by a standard deviation for the data (Cohen, 1988).

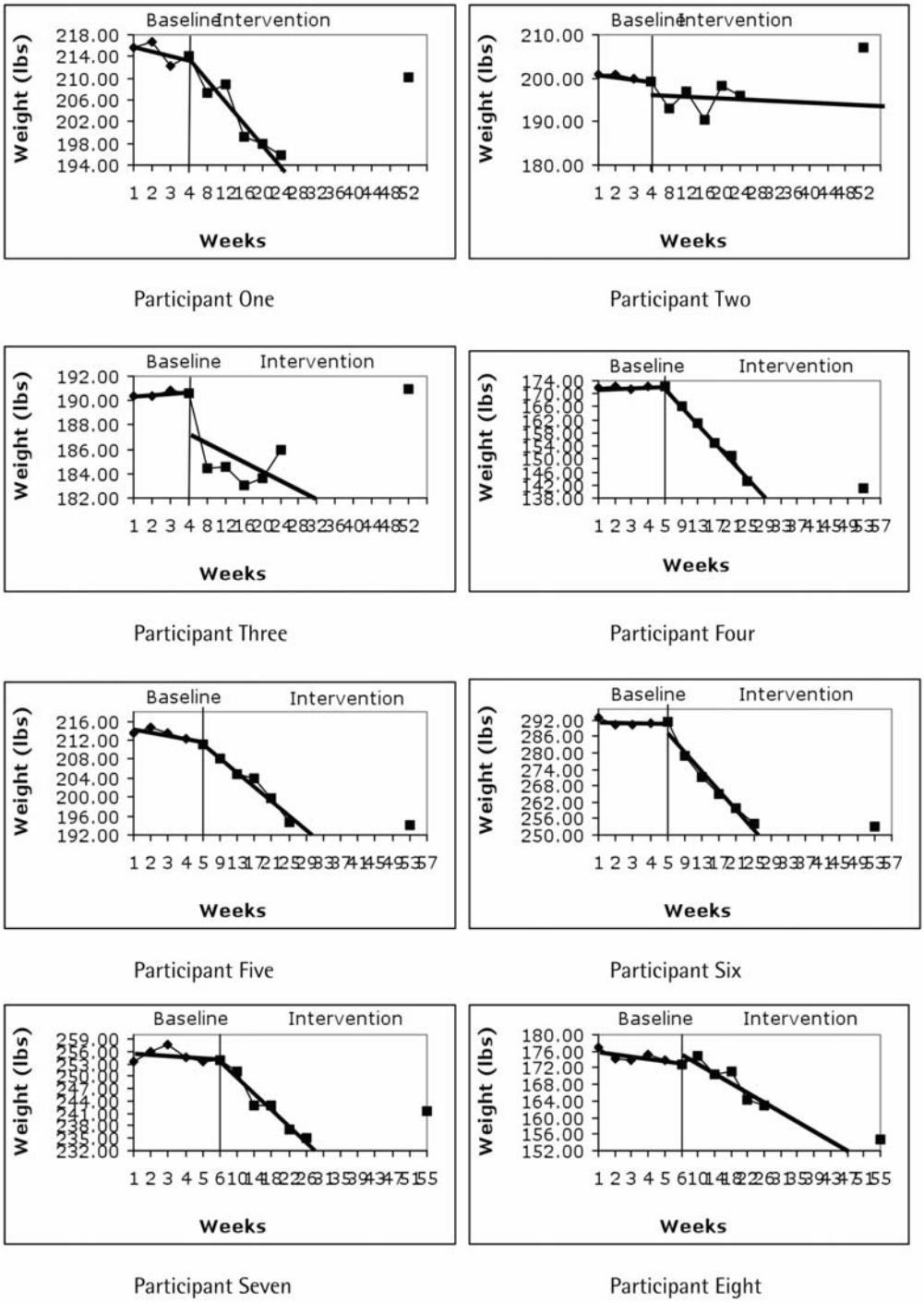
Values used to determine the effect size for the nutrition data were calculated by inputting the food intake records into a food processor computer program (Food Processor SQL 10.5, ESHA Research Inc., Salem, OR) and an average of the three days were calculated. In addition, the number of vegetable and fruit (V&F) servings according to Eating Well with Canada's Food Guide (EWCFG, 2007) was calculated manually (Health Canada).

Results

Visual inspection

Weight. BMI is an appropriate measure when assessing a change across participants because it provides a standard against which to compare (Centres for Disease Control and Prevention, 2011). However, when comparing within a participant, height is already a constant leaving weight as the only inde-

Figure 1: Graphed data of weight for participants one, two, three, four, five, six, seven, and eight. The vertical lines indicate the period prior to the intervention's implementation (baseline phase) and when it was implemented (intervention phase).



pendent variable. As a result, weight was reported in order to highlight the considerable changes these participants experienced.

Participant one's weight decreased from a baseline score of 214.2 lbs to 195.8 lbs at the end of the intervention phase. The level decreased 18.4 lbs from the end of baseline to the end of the intervention phase. Weight decreased consistently throughout the study period. However, participant one increased her weight by 14.4 lbs from the end of the intervention to the six-month follow-up. After using visual inspection, there appeared to be a decrease in participant one's weight across the intervention phase with an increase at the six-month follow-up, although still 5.4 lbs below her baseline weight. Weight data for participants one, two, three, four, five, six, seven, and eight are presented in Figure 1.

Participant two's weight decreased from a baseline score of 199.2 lbs to 196.0 lbs at the end of the intervention phase. The level decreased 3.2 lbs from the end of baseline to the end of the intervention phase. Weight decreased consistently throughout the study period. However, participant two increased her weight by 11 lbs from the end of the intervention to the six-month follow-up. Weight decreased slightly at the beginning of the intervention phase and then proceeded to increase half-way through the intervention. After using visual inspection, there appeared to be a very slight decrease in participant two's weight by the end of the intervention with a 6 lbs increase from baseline to the six-month follow-up.

Participant three's weight decreased from a baseline score of 190.6 lbs to 186.0 lbs at the end of the intervention phase. The level decreased 4.6 lbs from the end of baseline to the end of the intervention phase. Participant three gained 5 lbs from the end of the intervention phase to the six-month follow-up, although only 0.6 lbs above her baseline weight. Weight decreased slightly throughout the study period. After using visual inspection, there appeared to be a small decrease in participant three's weight across the intervention phase.

Participant four's weight decreased from a baseline score of 172.2 lbs to 143.0 lbs at the end of the intervention phase. The level decreased 29.2 lbs from the end of baseline to the end of the intervention phase. Participant four lost an additional 2 lbs from the end of the intervention phase to the six-month follow-up. Participant four lost a total of 30 lbs from her baseline weight to the six-month follow-up. After using visual inspection, there appeared to be a steady and steep decrease in participant four's weight throughout the intervention phase while continuing to maintain her weight from the end of the intervention to the six-month follow-up.

Participant five's weight decreased from a baseline score of 211.0 lbs to 194.8 lbs at the end of the intervention phase. The level decreased 16.2 lbs from the end of baseline to the end of the intervention phase. Participant five lost an additional 0.6 lbs from the end of the intervention phase to the six-month follow-up. Participant five lost a total of 19.2 lbs from her baseline weight to the six-month follow-up. After using visual inspection, there appeared to be a decrease in participant five's weight across the baseline and intervention phases with continued maintenance of her weight from the end of the intervention to the six-month follow-up.

Participant six's weight decreased from a baseline score of 291.4 lbs to 254.0 lbs at the end of the intervention phase. The level decreased 37.4 lbs from the end of baseline to the end of the intervention phase. Participant six lost an additional 1 lbs from the end of the intervention phase to the six-month follow-up. Weight decreased consistently throughout the intervention phase. Participant six lost a total of 40 lbs from her baseline weight to the six-month follow-up. After using visual inspection, there appeared to be a steady decrease in participant six's weight throughout the intervention phase with a continued maintenance of the weight lost from the end of the intervention phase to the six-month follow-up.

Participant seven's weight decreased from a baseline score of 254.0 lbs to 235.2 lbs at the end of the intervention phase. The level decreased 18.8 lbs from the end of baseline to the end of the intervention phase. Participant seven gained an additional 6.4 lbs from the end of the intervention phase to the six-month follow-up. After using visual inspection, there appeared to be a steady decrease in participant seven's weight throughout the intervention phase with an increase in weight from the end of the intervention to the six-month follow-up, although still 12 lbs below her baseline weight.

Participant eight's weight decreased from a baseline score of 172.8 lbs to a score of 163.0 lbs at the end of the intervention phase. The level decreased 9.8 lbs from the end of baseline to the end of the intervention phase. Participant eight lost an additional 8.2 lbs from the end of the intervention phase to the six-month follow-up. Participant eight lost a total of 22.2 lbs from her baseline weight to the six-month follow-up. After using visual inspection, there appeared to be a steady decrease in participant eight's weight throughout the intervention phase with a continued decrease in weight from the end of the intervention to the six-month follow-up.

To summarise, weight decreased for all participants from baseline to the end of the intervention with a more pronounced decrease in participant's one, four, five, six, seven, and eight. Three participants gained part of their weight back that was lost during the six-month follow-up and five participants maintained and continued to lose additional weight at the six-month follow-up.

Waist Circumference (WC). Participant one's WC decreased from a baseline score of 43.7in to a score of 42.0in at the end of the intervention phase. The level decreased 1.7in from the end of baseline to the end of the intervention phase. Participant one maintained her WC from the end of the intervention phase to the six-month follow-up. After using visual inspection, there appeared to be a decrease in participant one's WC throughout the intervention phase while maintaining her WC from the end of the intervention to the six-month follow-up. Waist circumference data for participants one, two, three, four, five, six, seven, and eight are presented in Figure 2.

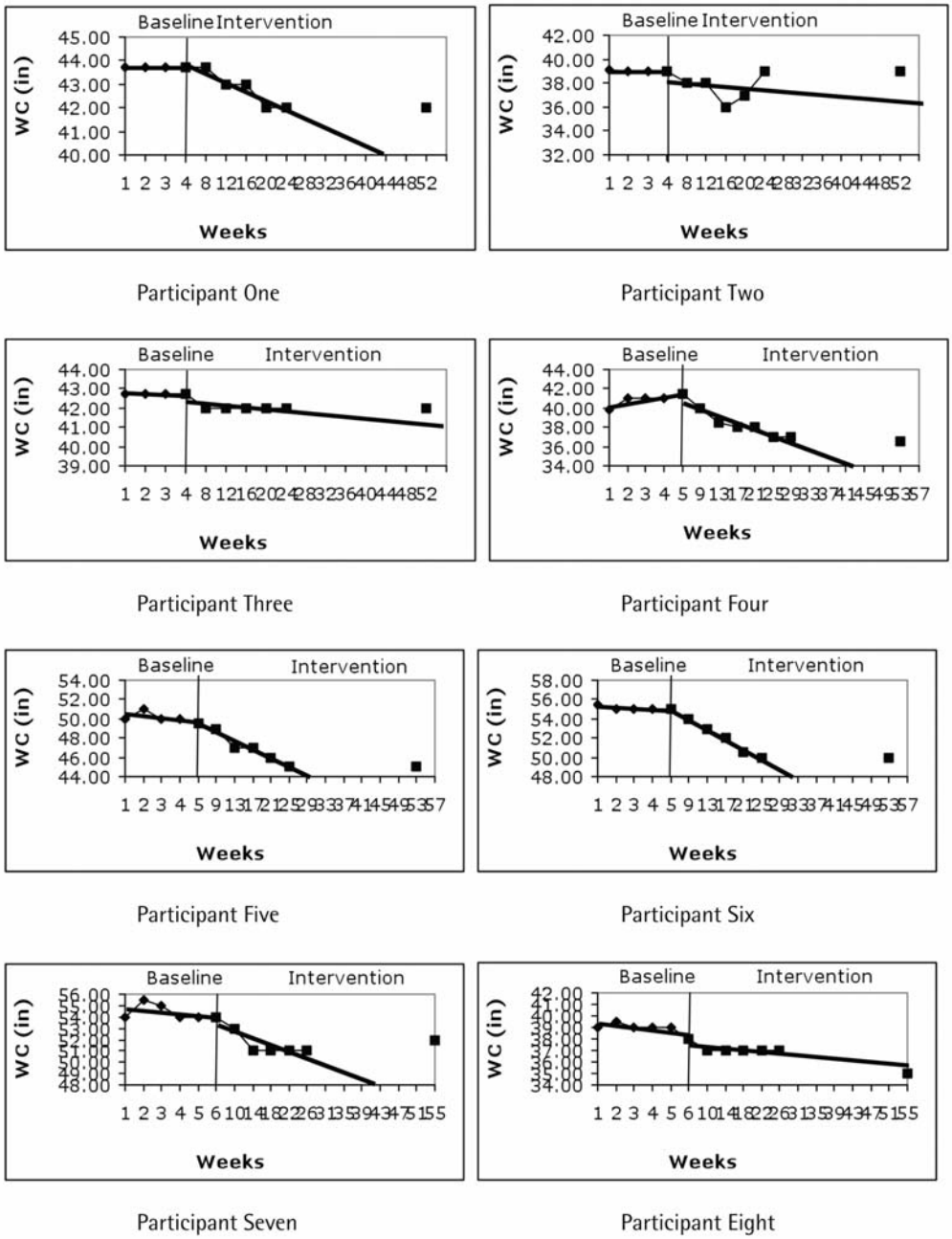
Participant two's WC did not change from a baseline score of 39.0in to 39.0in at the end of the intervention phase. Participant two maintained her WC from the end of the intervention phase to the six-month follow-up. After applying visual inspection, there appeared to be a slight decrease in participant two's WC throughout the early intervention phase with an increase near the end of the intervention and no change from the end of the intervention to the six-month follow-up.

Participant three's WC decreased from a baseline score of 42.7in to 42.0in at the end of the intervention phase. The level decreased 0.7in from the end of baseline to the end of the intervention phase. Participant three maintained her WC from the end of the intervention phase to the six-month follow-up. After applying visual inspection, there appeared to be a decrease in WC from baseline to the beginning of the intervention phase with WC remaining constant throughout the majority of the intervention phase and no change was detected from the end of the intervention to the six-month follow-up.

Participant four's WC decreased from a baseline score of 41.5in to 37in at the end of the intervention phase. The level decreased 4.5in from the end of baseline to the end of the intervention phase. Participant four decreased her WC by 0.5in from the end of the intervention phase to the six-month follow-up. After applying visual inspection, there appeared to be a decrease in participant four's WC throughout the intervention phase with a slight decrease from the end of the intervention to the six-month follow-up.

Participant five's WC decreased from a baseline score of 49.5in to 45in at the end of the intervention phase. The level decreased 4.5in from the end of baseline to the end of the intervention phase. Participant five

Figure 2: Graphed data of waist circumference for participants one, two, three, four, five, six, seven, and eight. The vertical lines indicate the period prior to the intervention's implementation (baseline phase) and when it was implemented (intervention phase).



maintained her WC from the end of the intervention phase to the six-month follow-up. After applying visual inspection, there appeared to be a sharp decrease in participant five's WC throughout the intervention phase and no change was detected from the end of the intervention phase to the six-month follow-up.

Participant six's WC decreased from a baseline score of 55in to 50in at the end of the intervention phase. The level decreased 5.0in from the end of baseline to the end of the intervention phase. Participant six maintained her WC from the end of the intervention phase to the six-month follow-up. After applying visual inspection, there appeared to be a sharp decrease in participant six's WC throughout the intervention phase with no change from the end of the intervention to the six-month follow-up. It should be noted that participant six could not make time to come in for her final assessment. Her weight and waist circumference were self-reported.

Participant seven's WC decreased from a baseline score of 54in to a score of 51in at the end of the intervention phase. The level decreased 3.0in from the end of baseline to the end of the intervention phase. Participant seven increased her WC from the end of the intervention to the six-month follow-up by 1.0in. After applying visual inspection, there appeared to be steady decrease in participant seven's WC throughout the intervention phase and a small increase from the end of the intervention to the six-month follow-up.

Participant eight's WC decreased from a baseline score of 38.0in to 37.0in at the end of the intervention phase. The level decreased 1.0in from the end of baseline to the end of the intervention phase. Participant eight continued to decrease her WC by 2.0in from the end of the intervention phase to the six-month follow-up. After applying visual inspection, there appeared to be a decrease in participant eight's WC when the intervention was applied and remained constant throughout the intervention phase with a continued decrease from the end of the intervention to the six-month follow-up.

To summarise, WC decreased for participants one, four, five, six, seven, and eight and remained stable for participants two and three. This demonstrates a trend towards a decrease in WC.

Clinical significance

Pre-post changes in self-esteem, functional health status, quality of life, self-efficacy, physical activity, and nutrition were evaluated for clinical significance by assessing statistical change through an examination of effect size using Cohen's *d* (Cohen, 1988).

Self-esteem. Participants' scores on the Rosenberg Self-Esteem Scale revealed a large effect (i.e. increase) in self-esteem (Cohen's d=1.85). Collectively, the effect size indicates a clinically significant improvement in participants' self-esteem after completing the coaching intervention.

Functional health status. Participants' scores on the overall health dimension of the SF-36 revealed a considerable increase (i.e. large effect) in overall health status (Cohen's d=1.34). Participants' scores on the physical health dimension of the SF-36 revealed an increase (i.e. large effect) in overall physical health status (Cohen's d=0.95). Participants' scores on the mental health dimension of the SF-36 revealed a considerable increase (i.e. large effect) in overall mental health status (Cohen's d=1.89). Collectively, the effect sizes for physical, mental, and overall health indicate a clinically significant improvement in participants' health status after completion of the coaching intervention.

Quality of Life (QOL). Participants' scores on the overall QOL on the WHOQOL-Bref revealed a moderate to large effect in overall QOL status (Cohen's d=0.72). Participants' scores on the overall health dimension revealed a considerable increase (i.e. large effect) in overall health status (Cohen's d=1.21). Participants' scores on the physical dimension revealed a considerable increase (i.e. large effect) in overall physical health

status (Cohen's *d*=1.44). Participants' scores on the psychological dimension revealed a considerable increase in overall psychological health status (Cohen's *d*=2.36). Participants' scores on the overall social dimension revealed a moderate increase in overall social status (Cohen's *d*=0.49). Participants' scores on the environmental dimension revealed a small to moderate effect in overall environmental status (Cohen's *d*=0.38). Collectively, the effect sizes for QOL dimensions indicate a clinically significant improvement in participants' overall QOL after finishing the coaching intervention.

Self-efficacy. Participants' scores on the self-efficacy barriers to nutrition questionnaire revealed an increase (i.e. large effect) in participants' ability to manage barriers to healthy nutrition (Cohen's *d*=0.77). Participants' scores on the barriers to physical activity questionnaire revealed a considerable increase in participants' ability to handle barriers to physical activity (Cohen's *d*=1.22). Participants' scores on the achieving tasks in physical activity questionnaire revealed a moderate increase (i.e. medium effect) in participants' ability to achieve tasks in physical activity (Cohen's *d*=0.51). Collectively, the effect sizes for self-efficacy indicate a clinically significant improvement in participants' overall self-efficacy after completing the coaching intervention.

Physical activity. Participants' scores on the IPAQ revealed a moderate increase (i.e. medium effect) in participants' level of physical activity (Cohen's *d*=0.6). The effect size for physical activity does not indicate a clinically significant improvement in participants' overall physical activity level after completing the coaching intervention.

Nutrition. Participants' food records revealed a large increase (i.e. large effect) in vegetables and fruits (Cohen's *d*=1.06) and protein (Cohen's *d*=1.30) and a large decrease in sodium (Cohen's *d*=–1.53), total calories (Cohen's *d*=–1.50), and saturated fat (Cohen's *d*=–1.08). There was a moderate decrease (i.e. medium effect) in fibre (Cohen's *d*=–0.51) and total fat (Cohen's *d*=–0.52) and a small to moderate decrease (i.e. small to medium effect) in cholesterol (Cohen's *d*=–0.39). The decrease in carbohydrates was too small to even classify as a small effect (Cohen's *d*=–0.04).

Discussion

The main purpose of this study was to determine the effectiveness of MI using CALC skills as an intervention for decreasing obesity. The secondary purpose was to examine the effect of MI on participants' self-esteem, functional health status, quality of life, self-efficacy, physical activity, and nutrition behaviours.

Weight decreased for all participants directly following the six-months of coaching. At the six-month follow-up, participants four, five, six, and eight continued to decrease or maintain their weight. Participants one, two, three, and seven gained weight at the six-month follow-up but participants one and seven were still below their baseline weight. It should be noted that of the three participants who regained weight, one participant reported an increase in asthma symptoms that reduced her ability to exercise consistently and two participants reported an injury from a car accident as factors that influenced their weight. Based on Shaw et al.'s (2007) literature review examining psychological interventions for treating obesity and Douketis et al.'s (2005) systematic review that examined methods used for weight loss, these results are not surprising. Both sets of researchers report that longer behavioural interventions result in significantly greater weight loss than shorter behavioural treatments. However, these results are surprising to the researchers of the current study due to the participants' reported co-morbidities. One participant was using Prednisone, a steroidal drug used to treat her asthma. Prednisone's side effects include weight gain, fatigue or weakness, joint pain, and severe swelling (Senecal, 1998). In a study conducted by Everdingen

et al. (2002) that assessed the impact of Prednisone on patients with early active rheumatoid arthritis, the treatment group who received Prednisone had a significant increase (p=0.001) in weight gain with no change in weight in the placebo group. One participant was dealing with depression. According to the Canadian Mental Health Association (2010), depressed individuals have a tendency to eat more, experience a loss of energy, and often feel tired. Three participants were going through menopause and presented symptoms that might have influenced weight inclusive of, aching joints, chronic fatigue, sweet, caffeine, junk food, and carbohydrate cravings, depression and anxiety, dizziness, weight gain, and sleep problems (Greendale & Judd, 1993). One participant received radiation therapy for detected cancerous cells. Radiation side effects include anxiety and depression, changes in appetite, fatigue, and sleep disturbances (Canadian Cancer Society, 2010). Moreover, this same participant quit smoking during the intervention, which can result in an increased appetite, problems sleeping, and slight social withdrawal (American Cancer Society, 2010). Given these co-morbidities it was not expected that participants would decrease their weight. However, participants one, four, five, six, seven and eight lost as little as 9.8 pounds and as much as 37.4 pounds. In a similar study conducted by Newnham-Kanas et al. (2008), it was suggested that coaching continue for a longer period of time which may garner greater weight loss. Directly following the final coaching session, three participants were no longer obese and two participants moved from Class II obesity to Class I and Class III obesity to Class II. At the end of the six-month follow-up, two participants were no longer obese and one participant moved from Class III to Class II. The current study's results highlight the effectiveness of MI using CALC skills' for six-months as a viable intervention for losing weight even when co-morbidities and psychological distress contributing to and/or resulting from obesity are present that may impact the amount of weight lost.

Waist circumference decreased for participants one, three, five, six, seven, and eight directly following the intervention. There was no change in waist circumference for participant two. Waist circumference continued to decrease for participants one and eight at the six-month follow-up. Participants three, five, and six maintained their WC from the end of the intervention, and participant seven increased her WC but it was lower than her baseline measurement. Waist circumference might have resulted from an increase in physical activity and healthier eating habits as reported in the exit interview. These results are particularly important given that WC is perceived as a more accurate representation of excess body fat which, in turn, is a good predictor of all-cause mortality in middle-aged men and women (Bigaard et al., 2005; Janssen, Katzmarzyk & Ross, 2004).

Self-esteem increased for participants with a large effect detected. This result is analogous to results reported by a similar study conducted by Newnham-Kanas et al. (2008) and Van Zandvoort et al. (2008). Gover (1991) explains that one way to build self-esteem is to become aware and challenge the individual's inner critic. In coaching we refer to this inner critic as the saboteur and identifying and confronting the thoughts associated with the saboteur were skills reportedly used by the coach during participants' coaching sessions. Self-concept is integral to increased self-esteem and is determined by the self-talk or internal thoughts the individual has about him/herself. By challenging the negative self-talk and thoughts, it is presumed that an individual will be able to set more challenging goals and suggest solutions to his/her problems (Hall, 2007). In balance coaching, a specific form of CALC, the coach works with clients to envision new perspectives to help them become aware of their current perspective and how to create action plans to generate new perspectives and new ways of looking at

life events and challenges (Whitworth, Kimsey-House & Sandahl, 1998, 2007). As reported by the coach of the current study (Newnham-Kanas, Irwin & Morrow, under review), balance coaching was one of the styles of coaching used predominately with participants. Increased self-esteem allows individuals to feel worthwhile, capable of helping themselves, and optimistic about the future (Gover). All of these traits are necessary for weight loss to be possible and may be one reason participants in the current study lost a considerable amount of weight and for some, were able to maintain and even further reduce that weight six-months later.

Functional health status (FHS) increased for participants with a large effect detected for the overall, physical, and mental dimensions of health. These findings were also reported in studies conducted by Newnham-Kanas et al. (2008) and Van Zandvoort et al. (2008). Stress has been reported as an important risk factor for weight loss and maintenance (Elfhag & Rossner, 2005). Additionally, individuals who tend to regain weight have a tendency to increase their eating habits to cope with the stress (Elfhag & Rossner). All of the participants in the current study struggled with their weight for many years and might fit within that paradigm. These increased FHS results after the coaching sessions suggest that MI applied via CALC aided participants in finding solutions to manage their stress and in turn adopt healthy behaviours that improved their sense of well being. These results are particularly surprising given the number of co-morbidities and resulting stress these participants were dealing with prior to and during the intervention.

Participants' overall quality of life (QOL) increased with a large effect detected for overall, physical, and psychological QOL dimensions. A moderate and small to moderate effect was detected for social and environmental dimensions. Research confirms that increased weight decreases health-related QOL, which would contribute to explaining the mechanism by which participants QOL increased (Jia & Lubetkin, 2005; Pinhas-Hamiel et al., 2005). These results are particularly surprising because it has been reported that as individuals increase in age, their physical QOL scores decrease (Zabelina et al., 2009). It is not surprising that psychological dimensions increased as self-esteem and learning to cope with life stressors are key components of the psychological dimension, which increased at the end of the coaching intervention (WHO-QOL-BREF; World Health Organisation, 1997). Although social and environment QOL increased moderately, participants reported in their exit interview and focus group (Newnham-Kanas et al., under review) that they have been stepping outside of their comfort zone by joining social clubs (e.g. book clubs) and reuniting with old friends.

Participants were viewed by the coach as naturally, creative, resourceful, and whole – a cornerstone of the Co-Active model (Whitworth et al., 2007). In other words, the coach viewed participants as having the capability to find their own solutions to problems and strong enough to work through difficult moments in order deepen their learning and/or commit to some specific behavioural action to ameliorate their health concern (reflective of another Co-Active cornerstone). Given the increase in nutrition barriers, physical activity barriers, and physical activity-related task self-efficacy (large and medium effect sizes detected) perceived by participants over the duration of the intervention, it is evident that participants increased their belief and ability to conquer obstacles such as working through issues that were impeding their ability to lose weight, increasing their physical activity (as reported in their post-interviews; Newnham-Kanas, Irwin & Morrow, under review), and making healthier nutritional changes. CALC tools that support clients in engaging in healthful actions and increasing self-acceptance are some of the reasons MI using CALC skills is believed to be an intervention that can have a more permanent effect on weight loss. These self-efficacy results are different from

the study conducted by Newnham-Kanas et al. (2008); our interpretation is that the difference in the present study is due to increasing the number of coaching sessions and the concomitant link to increased self-efficacy scores.

Although a moderate effect size was reported for physical activity, it should be emphasised that even with the co-morbidities listed above, participants still found ways to increase their physical activity. As well, six of the eight participants shared in the exit interview that they had to work through 'emotional baggage' before they could even contemplate integrating physical activity into their daily lives. Physical activity did increase in this study compared to the results report by Newnham-Kanas et al. (2008); this indicates that increasing the number of coaching sessions might aid in increasing participants frequency of engaging in healthful behaviours.

Participants reported a large reduction in energy intake of approximately 900 kcal per day, which likely contributed significantly to the observed weight loss. This large reduction in overall energy intake may be attributed to the increase (large effects) in protein and vegetable and fruit (V&F) intake with a simultaneous reduction in total fat intake – all of which may have enhanced the satiety value of participants' diets. In particular, a diet containing 25 per cent of total energy intake (TEI) from protein, which is similar to that observed in the present study, has demonstrated a spontaneous reduction in energy intake of about 400 kcal per day (Skov et al., 1999). Furthermore, the large increase in V&F intake in combination with reductions in total fat, saturated fat, cholesterol, and sodium may reduce participants' risk of developing future chronic diseases, such as Type 2 diabetes and cardiovascular diseases (Institute of Medicine, 2005). With respect to sodium alone, it is estimated that an 1800 mg/d reduction in sodium intake, which is approximately 50 per cent of what our participants achieved, could reduce systolic and diastolic blood pressure by 5.06 and 2.7 mmHg respectively and may reduce the overall prevalence of hypertension by 30 per cent (Joffres et al., 2007). It is noteworthy that fibre intake was moderately reduced throughout the study. This is an undesirable finding, as fibre intake is negatively associated with chronic disease development (Institute of Medicine). In future studies, some nutritional education may be warranted to ensure that participants meet their recommended intake of nutrients known to contribute to health and chronic disease prevention.

There are several limitations to the current study. Although recruitment methods were used to attract a variety of individuals, the final group of participants was homogenous in sex and ethnicity. Because the study had only one coach and due to the multiple-baseline, single-subject design, a small sample size was necessary. As a result of these two factors, these results are not representative of individuals struggling with obesity aged 35 to 55. Another limitation was the lack of a control group, which could have strengthened internal validity thereby increasing confidence that the measured effects could be attributed to the intervention. However, it should be noted that the current study incorporated suggestions reported by Newnham-Kanas et al. (2008) by standardising the number of coaching sessions for each participant (all participants completed 18 coaching sessions) and the number of coaching sessions increased from eight weeks to six months, and follow-up continued to one-year post-baseline.

Even though monthly weigh-in sessions may be viewed as an intervention in and of itself, this is unlikely for the current study. Participants were not shown their weight until the final weigh-in after all coaching sessions were complete. As well, none of the participants in the exit interview reported that the weigh-ins had any effect (positive or negative) on their final weight outcome.

Given the results of the current study, it is apparent that increasing the number of coaching sessions has a beneficial effect on

weight loss. Based on suggestions from participants, it is recommended that coaching continue for at least one year due to the multiplicity of areas in participants' lives that obesity affects, and that affect obesity. Although a significant amount of weight was lost in only six months, it has been reported that dietary/lifestyle therapy can require two to four years to maintain weight loss (Douketis et al., 2005). It is also recommended that a larger, more representative sample of participants, be used in conjunction with a control group to augment internal validity. Currently there are two other studies (Newnham-Kanas et al., 2008; Van Zandvoort et al., 2008) that have reported MI using CALC skills as an effective intervention for obesity. Thus, MI's effectiveness has been documented and thereby points the way toward integrating formal physical activity and nutritional programs in conjunction with MI to determine what impact these added programmes would have on obesity.

Despite these limitations and suggestions, the following conclusions can be drawn from the reported results:

1. MI applied via CALC was associated with a trend towards a decrease in weight and WC.
2. MI applied via CALC was associated with a trend towards maintaining or continuing to decrease weight and WC six months after the last coaching session.
3. MI applied via CALC was associated with clinically significant increases in self-esteem.
4. MI applied via CALC was associated with clinically significant increases in functional health status.
5. MI applied via CALC was associated with clinically significant increases in quality of life.
6. MI applied via CALC was associated with clinically significant increases in self-efficacy.
7. MI applied via CALC was associated with a moderately detected increase in physical activity.

As obesity levels continue to rise in Canada and around the world, it is crucial that research continue to test new strategies aimed at helping individuals decrease their weight. As research persists, a common theme of incorporating behavioural treatments with traditional physical activity and nutrition programmes are emphasised as vital in aiding obese individuals in decreasing their weight (Foster, Makris & Bailer, 2005; Kausman & Bruere, 2006). Specifically, treatments that empower individuals to find solutions to their own problems, make healthier choices, and learn to cope with life stressors are deemed effective strategies in losing and maintaining weight (Elfhag & Rossner, 2005; Kausman & Bruere). MI using CALC skills is one such intervention and it is an effective tool in aiding individuals conquer their battle with weight.

The Authors

Courtney Newnham-Kanas, Faculty of Health Sciences, University of Western Ontario;
Jennifer D. Irwin, Faculty of Health Sciences, University of Western Ontario;
Don Morrow, Faculty of Health Sciences, University of Western Ontario;
Danielle Battram, Division of Food and Nutritional Sciences, Brescia University College.

Correspondence

Jennifer D. Irwin
Room 215 Labatt Health Sciences Building,
Faculty of Health Sciences,
University of Western Ontario,
London ON CANADA, N6A5B9.
Email: jenirwin@uwo.ca

References

Ajzen, I. (1988). *Attitudes, personality, and behaviour.* Chicago: Dorsey Press.

American Cancer Society (2010). *Guide to quitting smoking.* Retrieved from: www.cancer.org/Healthy/StayAwayfromTobacco/GuidetoQuittingSmoking/guide-to-quitting-smoking

Backman, C.L. & Harris, S.R. (1999). Case studies, single-subject research, and N of 1 randomised trials: Comparisons and contrast. *American Journal of Physical Medicine & Rehabilitation, 78*(2), 170–176.

Bandura, A. (1977) Self-efficacy: Toward a unifying theory of behavioural change. *Psychological Review, 84*(2), 191–215.

Bigaard, J., Frederiksen, K., Tjonneland, A., Thomsen, B.L., Overvad, K., Heitmann, B.L. et al. (2005). Waist circumference and body composition in relation to all-cause mortality in middle-aged men and women. *International Journal of Obesity, 29*, 778–784.

Brown, J.M. & Miller, W.R. (1993). Impact of motivational interviewing on participation and outcome in residential alcoholism treatment. *Psychology of Addictive Behaviours, 7*(4), 211–218.

Canadian Cancer Society. (February, 2010). *Side effects of radiation therapy.* Retrieved from: www.cancer.ca/Canada-wide/About percent20cancer/Treatment/Radiation/Side percent 20effectspercent20ofpercent20radiation percent20therapy.aspx?sc_lang=en

Canadian Mental Health Association (2010). *Depression.* Retrieved from: www.cmha.ca/bins/content_page.asp?cid=3–86–87&lang=1

Centre for Disease Control and Prevention (2011). *Healthy weight – it's not a diet, it's a lifestyle!* Retrieved from: www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Cook, T.D. & Campbell, D.T. (1979). *Quasi-experimentation: Design and analysis for field settings.* Chicago: Rand McNally,.

Douketis, J.D., Macie, C., Thabane, L. & Williamson, D.F. (2005). Systematic review of long-term weight loss studies in obese adults: Clinical significance and applicability to clinical practice. *International Journal of Obesity, 29*, 1153–1167.

Egan, G. (1997). *The skilled helper: A problem-management approach to helping* (6th ed.). Pacific Grove: Brooks/Cole Publishing Company.

Elfhag, K. & Rossner, S. (2005). Who succeeds in maintaining weight loss? A conceptual review of factors associated with weight loss maintenance and weight regain. *Obesity Reviews, 6*, 68–85.

Everdingen, A.A., Jacobs, J.W.G., Siewertsz van Reesema, D.R. & Bijlsma, J.W.J. (2002). Low-dose prednisone therapy for patients with early active rheumatoid arthritis: Clinical efficacy, disease-modifying properties, and side effects: A randomised, double-blind, placebo-controlled clinical trial. *Annals of Internal Medicine, 136*(1), 1–12.

Fishbein, M. & Ajzen, I. (1975). *Belief, attitude, intention and behaviour: An introduction to theory and research.* Reading, MA: Addison-Wesley,

Fodor, J.G., Frohlich, J.J., Genest, Jr., J.J.G. & McPherson, P.R. (2000). Recommendations for the management and treatment of dyslipidemia: Report of the Working Group on Hypercholesterolemia and Other Dyslipidemias. *Canadian Medical Association Journal, 162*(10), 1441–1447.

Foster, G.D., Makris, A.P. & Bailer, B.A. (2005). Behavioural treatment of obesity. *The American Journal of Clinical Nutrition, 82*(1), 2305–2355.

Greendale G.A. & Judd, H.L. (1993). The menopause: Health implications and clinical management. *Journal of the American Geriatrics Society, 41*, 426–436.

Gorczynski, P., Morrow, D. & Irwin, J.D. (2008). The impact of co-active coaching on the physical activity levels of children. *International Journal of Evidence-Based Coaching and Mentoring, 6*(2), 13–26.

Gover, J. (1991). *Building self-efficacy.* Retrieved 29 January 2011, from: http://eric.ed.gov/PDFS/ED373298.pdf

Hardeman, W., Griffin, S., Johnston, M., Kinmonth, A.L. & Wareham, N.J. (2000). Interventions to prevent weight gain: A systematic review of psychological models and behaviour change methods. *International Journal of Obesity and Related Metabolic Disorders, 24*(2), 131–143.

Hayes, S.C. (1981). Single case experimental design and empirical clinical practice. In A.E. Kazdin (Ed.), *Methodological issues and strategies in clinical research* (2nd ed.). Washington, DC: American Psychological Association.

Health Canada (2007). *Eating well with Canada's food guide – a resource for educators and communicators.* Ottawa: HC Pub 4667.

Institute of Medicine (2005). *Dietary reference intakes for energy, carbohydrates, fibre, fat, fatty acids, cholesterol, protein and amino acids.* Washington DC: National Academy Press.

Irwin, J.D. & Morrow, D. (2005). Health promotion theory in practice: An analysis of co-active coaching. *International Journal of Evidence-Based Coaching and Mentoring, 3*(1), 29–38.

Janssen, I., Heymsfield, S.B. & Ross, R. (2002). Application of simple anthropometry in the assessment of health risk: Implications for the Canadian Physical Activity, Fitness and Lifestyle Appraisal. *Canadian Journal of Applied Physiology, 27*(4), 396–414.

Janssen, I., Katzmarzyk, P.T. & Ross, R. (2002). Body mass index, waist circumference, and health risk: Evidence in support of current National Institutes of Health guidelines. *Archives of Internal Medicine, 162*(18), 2074–2079.

Janssen, I., Katzmarzyk, P.T. & Ross, R. (2004). Waist circumference and not body mass index explains obesity-related health risk. *American Journal of Clinical Nutrition, 79*(3), 379–384.

Jia, H. & Lubetkin, E. (2005). The impact of obesity on health-related quality-of-life in the general adult US population. *Journal of Public Health, 27*(2), 156–164.

Joffres, M.R., Campbell, N.R.C., Manns, B. & Tu, K. (2007). Estimate of the benefits of a population-based reduction in dietary sodium additives on hypertension and its related health care costs in Canada. *Canadian Journal of Cardiology, 23*, 437–43.

Kanfer, F.H. (1970). Self-regulation: Research, issues, and speculation. In C. Neuringer & J.L. Michael (Ed.), *Behaviour modification in clinical psychology.* New York: Appleton Century-Crofts.

Kazdin, A.E. (1982). *Single-case research designs: Methods for clinical and applied settings.* New York: Oxford University Press.

Kausman, R. & Bruere, T. (2006). If not dieting, now what? *Australian Family Physician, 35*(8), 572–575.

London Health Unit (2009). *Three-day food record.* Chronic Disease and Injury Prevention Team, Middlesex.

Mesters, I. (2009). Motivational interviewing: Hype or hope? *Chronic Illness, 5*(3), 3–6.

Miller, W.R. (1998). Toward a motivational definition and understanding of addiction. *Motivational Interviewing Newsletter for Trainers, 5*(3), 2–6.

Miller, W.R., Yahne, C.E. & Tonigan, S.J. (2003). Motivational interviewing in drug abuse services: A randomised trial. *Journal of Consulting and Clinical Psychology, 71*(4), 754–763.

Miller, W.R. & Rollnick, S. (2002). *Motivational interviewing: Preparing people to change addictive behaviour.* New York: The Guilford Press.

Newnham-Kanas, C.E., Gorczynski, P., Irwin, J.D. & Morrow, D. (2009). Annotated bibliography of life coaching and health research. *International Journal of Evidence-Based Coaching and Mentoring, 6*(2), 1–12.

Newnham-Kanas, C., Irwin, J.D. & Morrow, D. (2008). Life coaching as an intervention for individuals with obesity. *International Journal of Evidence-Based Coaching and Mentoring, 6*(2), 1–12.

Newnham-Kanas, C., Irwin, J.D. & Morrow, D. (n.d.). Findings from a global sample of certified professional co–active coaches. *International Journal of Evidence-Based Coaching and Mentoring.*

Newnham-Kanas, C., Morrow, D. & Irwin, J.D. (n.d.). The impact of motivational interviewing using co-active life coaching skills on adults struggling with obesity. *Coaching: An International Journal of Theory, Research, and Practice.*

Newnham-Kanas, C., Morrow, D. & Irwin, J.D. (2010). A functional juxtaposition of three methods for health behaviour change: Motivational interviewing, coaching, and skilled helping. *International Journal of Evidence-Based Coaching and Mentoring, 8*(2), 27–48.

Penz, E.D., Joffres, M.R. & Campbell, N.R.C. (2008). Reducing dietary sodium and decreases in cardiovascular disease in Canada. *Canadian Journal Cardiology, 24*, 497–501.

Pinhas-Hamiel, O., Singer, S., Pilpel, N., Fradkin, A., Modan, D. & Reichman, B. (2005). Health-related quality of life among children and adolescents: Associations with obesity. *International Journal of Obesity*, 1–6.

Rosenberg, M. (1989). *Society and the adolescent self-image* (Rev. ed.). Middletown, CT: Wesleyan University Press.

Ryan, R.M. & Deci, E.L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78.

Senecal, J-L. (1998). *Lupus: The disease with a thousand faces* (4th ed.). Retrieved 29 January 2011, from: www.lupuscanada.org/english/living/1000faces_appen2.html

Shaw, K., O'Rourke, P., Del Mar C. & Kenardy, J. (2007). Psychological interventions for overweight or obesity (review). *Cochrane Database of Systematic Reviews. Issue 2.* Art No.:CD003818. DOI 10.1002/14651858.CD003818.pub2.

Shields, M., Tremblay, M.S., Laviolette, M., Craig, C.L. & Janssen, I. (January, 2010). *Fitness of Canadian adults: Results from the 2007–2009 Canadian health measures survey.* Health Reports (Statistics Canada, Catalogue no. 82–003–XPE), 21(1), 1–15.

Skov, A.R., Toubro, S., Ronn, B., Holm, L. & Astrup, A. (1999). Randomised trial on protein vs. carbohydrate in ad libitum fat reduced diet for the treatment of obesity. *International Journal of Obesity, 23,* 528–536.

Slevin, E. (2004). High intentsity counselling or behavioural interventions can result in moderate weight loss. *Evidence-Based Health Care and Public Health, 8*(3), 136–138.

Strazzullo, P., D'Elia, L., Kandala, N-B. & Cappuccio, F.P. (2009). Salt intake, stroke, and cardiovascular disease: Meta-analysis of prospective studies. *British Medical Journal, 339*, b4567.

Stice, E., Presnell, K. & Shaw, H. (2005). Psychological and behavioural risk factors of obesity onset in adolescent girls: A prospective study. *Journal of Consulting and Clinical Psychology, 73*(2), 195–202.

Tjepkema, M. (2006). Adult obesity. *Health Reports (Statistics Canada, Catalogue 82–003), 17*(3), 9–25.

van Zandvoort M.M., Irwin, J.D. & Morrow, D. (2009). The impact of co-active life coaching on female university students with obesity. *International Journal of Evidence-Based Coaching and Mentoring, 7*(1), 104–118

van Zandvoort, M.M., Irwin, J.D. & Morrow, D. (2008). Co-active coaching as an intervention for obesity among female university students. *International Coaching Psychology Review, 3*(3), 191–206.

Ware, J.D. (1997). *SF–36 Health Survey: Manual & Interpretation Guide*. Boston, MA: The Medical Outcomes Trust.

Whitworth, L., Kimsey-House, K., Kimsey-House, H. & Sandahl, P. (1998). *Co-active coaching: New skills for coaching people toward success in work and life*. California: Davis-Black Publishing.

Whitworth, L., Kimsey-House, K., Kimsey-House, H. & Sandahl, P. (2007). *Co-active coaching: New skills for coaching people toward success in work and life* (2nd ed.). California: Davis-Black Publishing.

World Health Organisation (1997). *WHOQOL Measuring quality of life*. Retrieved September 2009, from: www.who.int/mental_health/media/68.pdf

World Health Organisation (September, 2006). *Obesity and overweight*. Retrieved from: www.who.int/mediacentre/factsheets/fs311/en/index.html

Zabelina, D.L., Erickson, A.L. & Kolotkin, R.L. (2009). The effect of age on weight-related quality of life in overweight and obese individuals. *Obesity, 17*(7), 1410–1413.