Assessing the impact of Motivational-Interviewing via Co-active Life Coaching on engagement in physical activity

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Abstract

The purpose of this 12-week pre-post design study was to assess the impact of Motivational Interviewing via Co-Active Life Coaching (MI-via-CALC) on engagement in physical activity for 25 women between the ages of 30 and 55 years. Data on task self-efficacy, barrier-specific self-efficacy, self-esteem, physical activity (PA), body mass index (BMI), and waist-to-tip ratio and circumference were collected. Results indicated some positive, but not significant differences in barrier-specific self-efficacy, which were detected between pre- and post- intervention, and statistically significant differences in self-esteem between pre- and post-intervention were found. No statistically significant differences were found in participants' task self-efficacy scores and PA scores. Statistically significant decreases were detected for BMI, and waist-to-hip ratios and circumference. MI-via-CALC is an encouraging approach for women who are seeking a more physically active lifestyle, and additional research with a larger sample size is recommended.

Key words*:* MI-via-CALC; physical activity; women; self-efficacy; self-esteem

Introduction

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure, whereas exercise is defined as physical activity that is structured, repeated and controlled (Canadian Society for Exercise Physiology [CSEP], 2014; World Health Organization [WHO], 2014). In Canada, it has been reported that upwards of 52% of the adult female population do not engage in moderate to vigorous PA, compared to 44% of males (Canadian Fitness and Lifestyle Research Institute [CFLRI], 2009). PA participation has been associated with maintaining health and improving quality of life (Health Canada, 2013; Kokkinos, 2012). In fact, regular PA has been associated with a 30-50% reduction in risk for cardiovascular events, obesity prevention, decreased bone loss and therefore potential decreased risk of osteoporosis, and a significant decrease in cognitive decline (Senter, Appelle, & Behera, 2013). Despite public awareness among Canadians about the importance of PA, PA rates have declined (Adamo, Langlois, Brett, & Colley, 2012). Concurrent with

waning rates for PA, the percentage of Canadians classified as overweight or obese continues to rise, and recent statistics from 2012 have projected that the percentage of Canadians who are either overweight or obese comprise over half the population, at 52% (CFLRI, 2009; Clark, 2012; Statistics Canada, 2012). The implications of increased rates of obesity among Canadians are extensive. Aside from population health and welfare, there are escalating costs to the workforce, health care costs, and individual costs that can be attributed to obesity-related issues. These costs are evident through the increased obesity-related use of pharmaceuticals and hospital stays, and a decrease in productivity and lost income (Wyatt, Winters, & Dubbert, 2006). Most notable at an individual level, is an increased risk for cardiovascular disease, type II diabetes, and other chronic illnesses (Miller, Trost, & Brown, 2002).

As the number of cases of obesity in North America continues to rise toward epidemic proportions, a growing body of evidence has focused on physical inactivity as a correlate to obesity (Salmon, Tremblay, Marshall, & Hume, 2011; Starky, 2005; Thorp, Owen, Neuhaus, & Dunstan, 2011). One population that has been targeted recently in health promotion for its physical inactivity and body mass concerns are women between the ages of 30-55. The proportion of Canadian women who meet the recommended amount of PA in order to avoid weight gain is 21.6%, and 42.6% of American women (Centers for Disease Control and Prevention, 2014; Scheers, Philippaerts, & Lefevre, 2012). That being said, over three quarters of Canadian female population, and half of the American female population are not achieving sufficient levels of PA to avoid weight gain (Scheers et al., 2012). In addition, studies have illustrated the alarming rates of physical inactivity as women age (White, Wojcicki, & McAuley, 2012). This is especially troublesome because women between the ages of 30-55 are the fastest growing segment of the population (Statistics Canada, 2012).

When discussing engagement in PA, it is important to focus on moderate to vigorous PA rather than exercise, because PA encompasses a broader scope of activities that fit within the busy schedules of women, in addition to stimulating enough energy expenditure to facilitate health benefits. However, most PA interventions result in only slight increases in levels of activity (Ayotte, Margrett, & Hicks-Patrick, 2010). Often, the lack of focus on the psychological and social determinants of PA is cited as deficient in PA-related interventions (Ayotte et al., 2010). Therefore, in order for a PA-related intervention to achieve success and have sustained increases in PA participation, an intervention should include a focus on the underlying psychological and social factors such as self-efficacy and self-esteem and how they are related to participation in PA.

Women and self-efficacy

Self-efficacy has been cited frequently as a contributing factor of PA behaviour (Trost, Owen, Bauman, Sallis, & Brown, 2002). Self-efficacy as a construct refers to an individual's perception that he/she is capable of successfully performing behaviours given his/her skills and situations (Bandura; 1977; 1986; 1997). In relation to PA, self-efficacy can be measured through exercise-specific self-efficacy (EXSE). EXSE is an exercise-specific expression of self-efficacy that measures the confidence in one's ability to complete 30-plus minutes of moderately intense aerobic activity at varying frequencies (Cramp & Bray, 2011). These 30-plus minutes of moderately intense aerobic activity do not have to be in a structured environment, nor do they need to be planned or repetitive. The EXSE measures confidence in completing tasks in both PA behaviours in addition to exercise behaviours, and is therefore a broader approach to targeting PA-related self-efficacy in women.

As previously mentioned, self-efficacy is a contributing factor to PA participation. However, one study has found that women have low self-efficacy, and that self-efficacy is one factor that accounts for the variability of PA and PA behaviours (Ayotte et al., 2010). In addition, White and colleagues (2012) demonstrated that when women have higher levels of self-efficacy, there is concomitant greater participation in PA (McAuley & Blissmer, 2000).

In addition to self-efficacy, women encounter a number of perceived environmental and personal barriers, which may serve as deterrants to their participation in PA (Ayotte et al., 2010). The perception that one has in his/her ability to overcome barriers to PA is referred to as barrier self-efficacy (Bandura, 1977). Given that women may encounter varying personal challenges such as a perceived lack of ability, health issues and being tired, the specific physical actions of PA might be challenging for them (Ayotte et al., 2010). Task self-efficacy refers to one's confidence in his/her ability to perform the components of a task (Bandura, 1977). For example, task efficacy would refer to a woman's confidence at throwing a ball efficiently and effectively. Where task self-efficacy is concerned, PA studies have shown that overweight women have lower task-specific self-efficacy because of their increased body size (Dallow & Anderson, 2003).

One way to determine ability to succeed is to measure one's competence in completing tasks as compared to gauging success from external stimuli. Bandura's Self-Efficacy Theory is a conceptual, well-established theory that encompasses this self-competency measure (Bandura, 1997). For the purpose of PA and women, Self-Efficacy Theory posits that people – in this instance women – who have higher self-efficacy feel more confident in their ability to persist with exercise goals and behaviours, regardless of when perceived barriers interfere with their lives (Bandura, 1997).

Recent studies have demonstrated that having a higher level of self-efficacy is predictive of higher engagement in PA for women between the ages of 30-55 (Ayotte et al., 2010). Ayotte et al. (2010) illustrated that where exercise is concerned, women with higher self-regulated efficacy (SRE) – which is a measure of self-efficacy within the Self Efficacy Theory paradigm – were more successful in exercise persistence than women with lower SRE. According to Bandura (1977), SRE is related strongly to self-efficacy beliefs; this means that a woman can regulate her self-efficacy by adapting her feeling of self-efficacy to specific situations. In general, people with higher self-efficacy will perceive their SRE as higher. In relation to PA, this suggests that only women with high levels of self-efficacy would be successful in engaging in long term PA. However, Lind, Joens-Matre, & Ekkekakis (2005) suggested that self-efficacy decreases for women as they age. The importance of high levels of self-efficacy as a predictor for engagement in PA, coupled with the research that demonstrates that self-efficacy declines for women as they age, suggests that this population may need additional support and resources to increase their self-efficacy.

Gallagher, Jakicic, Napolitano, and Marcus (2006) demonstrated that when women felt that they could be successful in a program that may result in achieving weight loss they were more likely to be successful. Further when these women were more active they achieved higher measures of self-efficacy. Gallagher and colleagues (2006) explained that when women reported higher levels of PA, they also had higher levels of self-efficacy, lower levels of perceived barriers, and were more likely to seek out social support. Notably, these PA gains did not need to take place in a formal exercise setting such as a gym (Gallagher et al., 2006).

The concept of pairing self-efficacy measures with weight loss is further exemplified in a study conducted by Teixeira and colleagues (2002); in this study the researchers demonstrated that both low self-esteem and low levels of self-efficacy contributed to only short-term weight loss and lower PA participation among women. Furthermore, the researchers illustrated the need for an intervention to address psychosocial measures such as self-esteem, in addition to self-efficacy to exercise. The researchers concluded that when women have higher self-esteem and higher levels of self-efficacy, they will be more successful in weight loss interventions (Teixeira et al., 2002). This demonstrates how closely self-esteem and self-efficacy can be related in behavioral change interventions such as those that target PA levels in women. If self-esteem and self-efficacy are so closely related, it would be beneficial to understand how self-esteem and self-efficacy relate to long-term PA engagement.

Self-esteem is defined as the evaluation that an individual makes with regard to himself or herself, or is sometimes referred to as one's feelings of personal worthiness (Coopersmith, 1967). Sonstroem and Morgan (1989) found that when someone engages in PA, his/her perceived physical competencies will increase. This increase in physical competency, in turn, will lead to a greater feeling of general (global) self-esteem. However, Brown, Ford, Burton, Marshall, and Dobson (2005) illustrated that many women experience low self-esteem and depressive symptoms. Therefore, if the engagement in a PA can increase feelings of self-esteem then the application of a PA-intervention that focuses on increasing psychosocial factors such as self-esteem may result in mediating these low levels of self-esteem and depressive symptoms.

Elavsky and McAuley (2005) examined the relationship between PA participation and self-esteem for adult women. In addition to lowering negative symptoms of menopause, regular participation of PA was associated with higher levels of self-esteem, and higher confidence to participate in PA (self-efficacy). Determining how self-esteem and self-efficacy are connected to PA is necessary to understand how women can attain levels that will result in long-term engagement in PA.

It is evident that self-esteem and self-efficacy are important predictors of PA. It is also known that women between the ages of 30-55 tend to have lower levels of self-esteem and self-efficacy than women under the age of 30, and that these levels decline as women age. One potential and promising avenue to increase both self-esteem and self-efficacy for PA in women is to use a cognitive-behavioural approach. An example of such an approach is Motivational Interviewing (MI), a counselling style that works to strengthen a person's motivation to change.

Motivational Interviewing as a tool for behaviour change

Motivational Interviewing (MI) is an evidence-based behaviour change approach that focuses on strengthening a person's motivation to change (Miller & Rollnick, 2013). Specifically, Miller and Rollnick (2013) define MI as a collaborative, goal-oriented style of communication with particular attention to the language of change. It is designed to strengthen personal motivation for and commitment to a specific goal by eliciting and exploring the person's own reason/s for change within an atmosphere of acceptance and compassion. Specifically, MI explores and builds on an individual's readiness and willingness to change in order to facilitate that person's desired behavioural change(s). For MI to be successful, an individual has to be ready to change. MI is different than other behavioural change interventions in that it is not a coercive process; rather MI is a collaborative process that is aligned with the individual's values and concerns (Miller & Rollnick, 2013). When a client is ready, the interviewer and client collaborative process is an effective method to facilitate the behaviour change process.

However, MI interventions have also been criticized for not producing significant benefits as compared to other viable treatments (Brodie & Inoue, 2005; Lundahl & Burke, 2009). Furthermore, detractors of MI suggest that there is a lack of fidelity, inconsistency of MI delivery, and lack of description and ambiguity in content of MI sessions (Hettema & Hendricks, 2010; Lai, Cahill, Qin, & Tang, 2010; Mantler, Irwin, Morrow, Hall, & Mandich, 2014). Inconsistent delivery of MI is not optimal in a research study as it increases confounding variables and a researcher cannot make claims about the effectiveness of MI if the delivery is inconsistent. Lastly, Miller and Rollnick (2013) suggested that "[t]here is no minimum or sufficient 'dose' or training to guarantee competence in MI (Miller & Rollnick, 2013, p. 384)." This lack of standardization for training is not conducive for research studies because it is difficult to make claims on MI effectiveness if there is no standard training process. Thus, some researchers have connected the concept of MI with the tools used in Co-Active Life Coaching (hereafter referred to as MI-via-CALC) methodology, because it is felt that CALC and MI are very similar client-centered counselling styles (Liu, Irwin, & Morrow, 2015; Mantler, Irwin, & Morrow, 2010; Mantler, Irwin, & Morrow, 2013; Newnham-Kanas, Irwin & Morrow, 2008; Newnham-Kanas, Irwin, & Morrow, 2010; Newnham-Kanas, Irwin & Morrow, 2011; Newnham-Kanas, Irwin, Morrow, & Battram, 2011; Pearson, Irwin & Morrow, 2013; Wiley, Irwin, & Morrow, 2011; Wiley, Irwin, & Morrow, 2012; van Zandvoort, Irwin, & Morrow, 2008; vanZandvoort, Irwin, & Morrow, 2009). The goal of applying a Co-Active Life Coaching skills and tools within the principles of MI is to provide an effective, powerful, standardized, and clear set of actions in applying MI (Newnham-Kanas et al., 2010). The CALC model is an accredited coach training program that is recognized by the International Coaching Federation (The Coaches Training Institute, 2014). By pairing CALC with MI, researchers can address some of the shortcomings of MI that have been cited in previous studies, namely the lack of application-based training and consistent implementation (Hettema, & Hendricks, 2010, Mantler et. al, 2014, & Mesters, 2009). Since CALC certification requires an extensive training program, pairing the CALC model with MI can overcome some of the aforementioned shortcomings. For a detailed explanation of MI-via-CALC, please refer to Liu, Irwin, & Morrow (2015) and Pearson, Irwin, Morrow, and Hall (2012).

MI-via-CALC is an appealing approach for increasing both self-esteem and PA specific self-efficacy in women because its roots are grounded in Social Cognitive Theory (Bandura 1977; Irwin & Morrow, 2005). It follows that women who have a higher exercise specific self-efficacy will likely be more successful in engaging in PA consistently over time.

Methodology

The purpose of this study was to determine the effectiveness of a personalized 12-week, telephone-based MI-via-CALC intervention on increasing: (a) self-reported PA participation; (b) task and barrier-specific self-efficacy; and (c) self-esteem for Canadian women between the ages of 30-55. Twenty-five participants were recruited and every participant received the same intervention. Each participant received one telephone MI-via-CALC session with a Certified Professional Co-Active Coach (CPCC) per week, and each person was also encouraged by the researcher to engage in physical activity at the onset of her enrolment. Given the success of previous MI-via-CALC studies for achieving behavioural change in areas such as smoking cessation and obesity, it was hypothesized that there would be a positive change in PA levels, task self-efficacy levels, self-esteem, and waist and hip circumferences.

The study targeted Canadian female participants between the ages of 30-55 years old who were inactive and wished to increase their level of PA. Participant recruitment was done via posters placed in such venues as supermarkets, flyers posted in libraries, and commercial fitness facilities in London, Ontario; as well as social media tweets/posts, advertisements on Kijiji, and e-mail 'blasts' distributed via two localized school boards, the Thames Valley District School Board and Waterloo Region District School Board. A total of 65 women expressed interest. Inclusion criteria for acceptance into the intervention included: (a) being a female between the ages of 30-55; (b) self-identifying as struggling to achieve moderate PA in her life and seeking to become more physically active; (c) did not have any existing health concerns that would preclude her from participating in moderate PA; (d) was English-speaking; and (e) had access to the internet so that she could assess online surveys. In total, 35 of the 65 women who expressed interest in the study actually met the eligibility criteria. Common reasons for study exclusion were: (a) the participants were not between the ages of 30-55 years old (n=2); (b) did not have ready or consistently available access to the internet (n=2); (c) did not wish to make phone calls to a CPCC certified coach (n=5); and (d) had a medical condition that precluded them from participating in moderate PA (n=1). Once a participant was deemed eligible to participate in the study, and once she stated that she wanted to move forward with the intervention, a baseline assessment meeting was set up at a mutually convenient time for the participant. A total of 25 women enrolled in the intervention between May 2014 and June 2014. Ethical approval was obtained from the Research and Ethics board at Western University, London, Ontario. Each participant signed a written consent form prior to commencing the intervention.

At the initial meeting, each participant was given a detailed letter that explained the nature of the study, the eligibility requirements, the anonymity of participation, anonymity of each MI-via-CALC session, what voluntary participation meant for each participant, and confidentiality. Once written consent was acquired, the participant was then asked to complete a Physical Activity Readiness-Questionnaire (PAR-Q), and a demographic questionnaire. Then height, weight, waist and hip circumference were measured and recorded. The Project Coordinator then outlined and explained the four survey measurements that were used. The Project Coordinator explained the steps that were needed to access each survey through the online survey generating website, Survey Monkey©. Following the explanation of the surveys, the participants were then redirected to the desk where the Project Coordinator provided each participant with Canada's Physical Activity Guide for Healthy Active Living so they knew what recommended PA examples looked like (Health Canada, 2012). The Project Coordinator then explained to each participant what differing levels of intensity of PA would look like and entertained any questions that she might have. The participants were then paired with a CPCC and were given their individual coach's contact information. The Project Coordinator then instructed each participant to make contact with her coach within seven days of her initial meeting. Lastly, the Project Coordinator explained that the PA portion of the intervention was to be self-regulated PA and was to be done at the participant's home, fitness facility, or other facility that was available. Each participant could choose whatever form of PA she preferred; activity choices varied from activities such as (but were not limited to) yard work, housework, yoga, Pilates, and exercise classes amongst others. Requiring self-regulated PA ensured that each participant was given a chance to succeed at PA participation because she picked the activities that were better suited to her needs.

Participants were to receive 12, 30-45 minute coaching sessions with their CPCC. Coaches and participants were matched at the time of enrolment and matching was primarily based on time preference for coaching sessions and coach availability. All coaching sessions were done over the phone, for mutual convenience and for the purposes for standardized delivery of the intervention.

During the initial meeting, the Project Coordinator explained the process of CALC to each participant. For example, the Project Coordinator explained that each coach must be certified with the CTI (as a CPCC), and each CPCC was recruited on a volunteer basis. In addition, the Project Coordinator explained that each coach was instructed that he/she must only use his/her CPCC tools, so that there was no discrepancy between the coaching methods delivered among clients. Once the background information about the coaching process was outlined, the Project Coordinator briefly explained the CALC relationship specifically, what it meant to enter into an alliance with a CPCC. The Project Coordinator then discussed issues of confidentiality, trust and authenticity, as these elements were crucial to the success of the coaching relationship (Kimsey-House et al., 2011). As is congruent with the tenets and intentions of CALC, it was the responsibility of the client to contact the coach for each session. In addition, each coach and participant was given a tracking sheet to record the date and time of each conversation. The Project Coordinator then informed each participant that she would ask each coach to inform her of any missed appointments in order to ensure each participant received 12 sessions of coaching.

Once a participant was enrolled in the study and matched with a potential coach, the Project Coordinator contacted that coach and provided him/her with the name of their client so that when initial contact was made it would not be unexpected. In the interim, the Project Coordinator asked each participant to contact her once they have made initial contact with their coach and to notify her when their initial session would take place. The Project Coordinator then recorded the initial session dates so that adequate timelines for future assessments could be projected.

The assessment tools that were administered at the initial meeting were repeated at two different time periods throughout the study (i.e. midpoint of study or 6 weeks; and final assessments or at 12 weeks). All of the surveys were administered at these two time periods; however, the BMI and waist and hip circumference were not recorded at the midpoint mark of the study, and the International Physical Activity Questionnaire-Short Form (IPAQ-SF), (IPAQ, 2005) was administered on a weekly basis. The IPAQ-SF (2005) was administered weekly because it was hypothesized that it would be easier for participants to recall PA over a 7-day period rather than an extended period of time. The BMI and waist and hip circumferences were only done at two time points because it was hypothesized that there would be little change at the six-week mark, and having little change might have been a negative influence on motivation to proceed with the rest of the intervention.

Measures

Waist and hip circumference

Waist and hip circumference was measured at baseline. This was done using the same measuring tape for everyone and at all measuring times over the course of the study to determine the circumference of each participant's waist, and was measured at one's natural waist (navel area). Hip circumference was measured at one's natural hip (largest part of the hip). Both measurements were taken in accordance with the guidelines set out by the Canadian Heart and Stroke Foundation (2010) for measuring waist and hip circumference, and was conducted to calculate waist to hip ratio. Waist to hip ratio was calculated because it is the best predictor of morbidity and mortality (Heart and Stroke Foundation, 2010). This measure was repeated immediately post-intervention, at the 12th week.

Body Mass Index

BMI was calculated at baseline. Calculating one's BMI is an appropriate measure because it provides information about a person's body mass and measures it against a standard to which a

participant can be compared (CDC, 2014). To calculate BMI, a participant's weight in kilograms was divided by height in meters squared (CDC, 2014). The BMI number was then compared to a standardized chart that determined how body mass correlates to averages. For example, a BMI of 20-24.5 is considered normal for both genders, for adults (CDC, 2014). BMI is a good indicator for body fatness as one's BMI number has a strong correlation to body fatness (CDC, 2014). The BMI is widely used and accepted as a valid and reliable tool for measuring body fatness. Mei et al. (2002) have validated the tool based on statistically significant correlation coefficients (p <0.05) and thus results from the BMI can be deemed as valid (Mei et al., 2002).

Exercise-Specific Self-Efficacy Scale (EXSE)

Participants completed the Exercise Self-Efficacy Scale (EXSE; McAuley, 1993). This particular scale was devised based on the recommendations from Bandura (1997). It is an 11-item scale that measures task self-efficacy by asking participants about their degree of confidence in performing certain tasks. The participants in this study were asked to assess their confidence in performing moderate PA for a duration of at least 30 minutes at frequencies of one through five times per week and then were asked to assess their confidence in performing moderately intense PA for 30-, 45- and 60-minute intervals, three times per week for a period of 6 weeks. Participants were provided with definitions of what moderate PA meant (not overly exhausting but you breathe harder than normal, feel tired, and begin to sweat) and were then asked to rank their degree of confidence about their ability to perform moderate PA on a scale of 10-100. A score of 100 meant that they were extremely confident in their ability, whereas a score of 10 meant that they were not confident at all in their ability. These 8 frequency increment items were intended to measure participants confidence in increasing their frequency of PA. Bandura suggests that participants are more apt to be more successful if they have specific outcome measures (namely increasing frequency of moderate PA bouts; Bandura, 1997).

Barrier Specific Self-Efficacy Scale (BARSE)

Participants completed the Barrier-Specific Self-Efficacy Scale (BARSE; McAuley, 1992). This scale assessed participants' overall degree of confidence about performing a task in the presence of certain barriers. For the purpose of this study, the scale was used to assess the participants degree of confidence in overcoming the 21 most cited barriers to PA for women (Cramp & Bray, 2011). Participants rated their degree of confidence using an 11-point scale, ranging from 0 (not confident at all) to 100 (very confident). An overall mean for each barrier was calculated. Internal consistency values were calculated at the beginning, midpoint (6-week), and at the study's end. Cronbach's alpha was used to assess the internal consistency of these values (Cronbach, 1951).

International Physical Activity Questionnaire-Short Form (IPAQ-SF)

Participants completed the International Physical Activity Questionnaire-Short Version (IPAQ-SF; Craig et al., 2003). The scale was intended to assess the amount of time performing multiple types of PA over a seven-day period (Craig et al., 2003; IPAQ, 2005). Participants answered questions that gauged the intensity of their PA, and participants provided an estimate of the duration of each bout of PA. The IPAQ (Craig et al., 2003) is a unique measurement tool in that it considers activities such as housework and yard work in addition to traditional PA forms as measurable activity items (Abu-Omar & Rutten, 2008). The tool was administered at baseline, and on a weekly basis, via Survey Monkey ©, to each participant.

The Rosenberg self-esteem scale (RSES)

Participants completed the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965). This 10-item scale was intended to assess a participant's general self-esteem by measuring the participant's positive and negative feelings of herself (Rosenberg, 1965). Each question was measured on a four-point Likert scale; ranging from strongly disagree to strongly agree. This measure was administered at baseline, at the midpoint of the intervention and upon completion of the 12-week intervention. It was hypothesized that participants' self-esteem would increase as the MI-via-CALC intervention progressed.

Results

Sixty-five women between the ages of 30-55 expressed interest in participating in this intervention. Of the 65, 25 participants were deemed eligible to participate in this study, and of those 25 women, 19 completed the 12-week intervention. Two participants withdrew from participation after the first week of the intervention for personal health reasons and four participants did not attend the baseline assessment, and therefore did not begin the intervention. However, demographic information was collected from all participants (n = 25). Therefore, data utilized for statistical analysis is based on a sample size of 19 (except where otherwise stated). The mean age of participants was 47.14 years (range: 34-55 years); and 95.2% were Caucasian (n = 19). See Table 1 for a summary of the demographic information (Table 1 was compiled using a sample size of 21).

Participant Characteristic	N	%
Sex		
Female	21	100
Age		
30-35 years	2	9.52
36-40 years	6	28.7
41-45 years	3	14.28
46-50 years	9	42.85
51-55 years	1	4.76
Height		
5'0"-5"4"	10	47.6
5'5"-5'9"	10	47.6
6'0"+	1	4.8
Ethnicity		
Caucasian	20	95.2
Asian	1	4.8
Highest Completed Level of Education		
PhD	0	0
Master's	1	4.8
University/College	18	85.71
High School	2	9.52

Table 1 Participant Demographic Information (n = 21)

Body Mass Index

BMI is deemed to be an effective measure for assessing change in a participant's body mass because it provides a standard against which to compare based on weight status (CDC, 2014). Given that participants were between the ages of 30-55 years, and their height remained constant throughout the intervention, weight was the only measure that was compared. Weight was measured in both kilograms (kg) to determine BMI, and pounds (lb.) to make final comparisons. Weight was calculated and assessed in pounds because it was assumed by the researcher to be the more readily accepted form of measurement in the demographic area. Weight decreased throughout the study. The mean starting weight was 175.76 pounds and the mean final weight was 170.81 pounds as depicted in Table 2.

		Mean	SD	P Value
Pair 1	Weight Start of Study (lbs)	175.764211	24.91	
	Weight End of Study (lbs)	170.810526	24.00	<0.05

Table 2 Participants' Paired Weight Sample Statistics Over The Study Duration (n = 19)

The paired *t*-test calculations indicated that the coaching intervention and concomitant PA behaviour changes that were measured by the International Physical Activity Questionnaire-Short Form, did significantly decrease the participants weight post-intervention, [$t(18) = 4.246$, $p < .05$].

Waist Circumference

This measurement was used to compare the difference and/or change in participants' waist circumference from the beginning to the end of the intervention. Paired *t*-testing was used to determine the change in waist circumference at the end of the study. The results of the paired *t*-test demonstrated that coaching and attendant PA behaviour changes did have a significant impact on participants' waist circumference, [$t(18) = 5.548$, $p < .05$]. The mean starting waist circumference was 35.105 inches and the mean final waist circumference was 33.61 inches as depicted in Table 3.

	Mean	SD	P Value
Waist Circumference Start of Study (in)	35.105263	3.24	
Waist Circumference End of Study (in)	33.605263	3.62	<0.05

Table 3 Participants' Paired Waist Circumference Statistics Over The Study Duration (n = 19)

Hip Circumference

Hip circumference was measured to compare the difference in circumference between the beginning and end of the intervention. Results of the paired *t*-test showed that participants' hip circumferences significantly decreased throughout the study, [$t(18) = 6.302$, $p < .05$]. The mean starting hip circumference was 44.05 inches, and the finishing hip circumference was 42.42 inches as demonstrated in Table 4. As hip measurements are completed at the widest point of the hips (Heart and Stroke Foundation, 2010), the loss in hip circumference might be attributed to a loss in the gluteal region for the women who participated in this study.

	Mean	SD	P Value
Hip Circumference Start of Study (in)	44.052632	3.97	
Hip Circumference End of Study (in)	42.421053	3.87	<0.05

Table 4 Participants' Paired Hip Circumference Statistics Over The Study Duration (n = 19)

Waist to Hip Ratio

Waist to hip ratio was then calculated to compare differences in ratio over the study duration. Waist and hip ratio was calculated in accordance to guidelines presented by the Canadian Heart and Stroke Foundation (2010). Results from the paired *t*-test indicated that participants waist to hip ratio decreased significantly by the end of the study, [$t(18)=3.87$, $p<0.05$]. The mean starting waist to hip ratio was 0.7995, and the mean finishing waist to hip ratio was 0.7948, as demonstrated in table 5.

	Mean	SD	P-Value	
Waist to hip ratio Start of Study	0.7995		0.58	
Waist to hip ratio End of Study	0.7948		0.59	<0.05

Table 5 Participants Waist to Hip Ratio Results Over The Study Duration (n=19)

Physical Activity

Participants were asked to complete a weekly assessment of their activity levels by answering questions from the IPAQ-SF (IPAQ, 2005). The results of the IPAQ-SF were calculated by using a repeated-measures ANOVA. Mean averages of activity (measured in Metabolic Equivalent Task or MET minutes, a standardized measure of the energy cost of PA) were calculated to determine the changes in activity levels throughout the study. The mean scores indicated that PA rates, in general decreased after the first week. However, PA rates then slightly increased until week seven. Following this, PA rates then decreased for two weeks. PA rates then increased for two weeks. Finally PA rates decreased by the end of week 11, and then increased at the final measurement. This fluctuation in PA rates among weeks demonstrated the variability of engagement in PA throughout the study. Mauchly's test showed that sphericity had been violated, $X^2 = 593.945$, $p < .05$. After correcting for the violation in sphericity (the condition where the variances of the differences between all combinations of the related groups are equal, in this case the variances were not; Field, 2013), the Greenhouse-Geiser correction was used to obtain a valid critical *F* value. The sphericity correction was estimated at $\varepsilon = 0.093$. Results from the omnibus *F*-test revealed that coaching did not produce a significant effect on activity levels throughout the intervention, [$F(1.121, 20.181) = 0.836$, $p < .05$]. Time point results for the participant's activity levels are presented in Table 5. Activity scores were calculated in MET minutes, and a MET-minute mean is presented for each time point.

	Mean (MET minutes)	SD
IPAQ Time 1	9721.736842	32803.64
IPAQ Time 2	2186.926316	3164.95
IPAQ Time 3	2404.421053	2931.17
IPAQ Time 4	2670.263158	3542.06
IPAQ Time 5	2433.552632	2945.41
IPAQ Time 6	2470.736842	3225.27
IPAQ Time 7	3214.131579	3827.52
IPAQ Time 8	2902.763158	3662.98
IPAQ Time 9	2629.789474	2934.21
IPAQ Time 10	3225.210526	3967.81
IPAQ Time 11	2814.894737	3200.51
IPAQ Time 12	2533.552632	2333.64
IPAQ Final	2952.2368	2700.43

Table 6 Participants' IPAQ Scores at Weekly Time Points Over The Study Duration (n = 19)

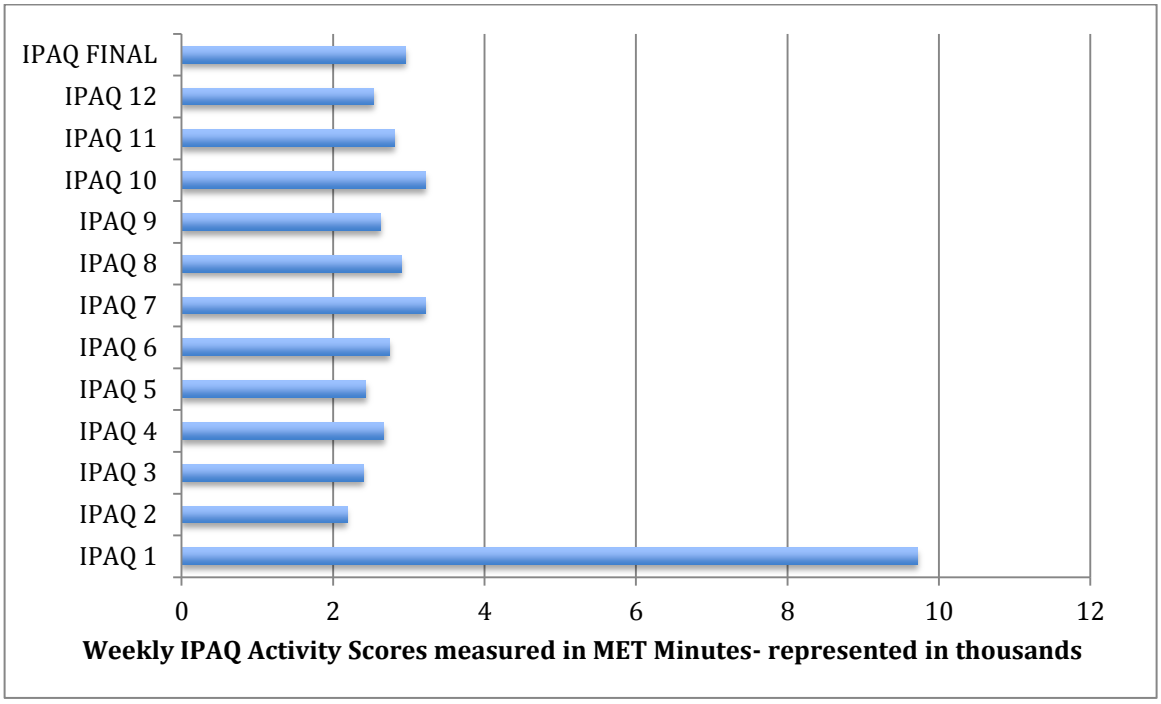

Figure 1 Fluctuations in participant IPAQ-SF scores

Task Self-Efficacy

Task self-efficacy was measured using the McAuley Exercise Self-Efficacy Scale (McAuley 1993. A repeated-measures ANOVA was used to determine if participants' scores had increased significantly as a result of the intervention.

Mauchly's test indicated that sphericity had not been violated, $X^2 = 3.68$, $p = .16$. The results of the *F*-test show that coaching did not have a significant effect on the participants EXSE scores, [$F(2, 36) = 1.75$, $p = .18$]. The mean scores for the participants did increase slightly. The mean scores were 59.93 at baseline, 58.38 at midpoint of the intervention, and 68.03 at the final measurement. These results are presented in Table 6. *Post hoc* testing was not done as the results that were reported were not statistically significant.

	Mean	SD	P -Value
EXSE Time 1	59.934211	20.71	
EXSE Time 2	58.383158	26.37	
EXSE Time 3	68.026316	24.78	0.18 (Not significant)

Table 7 Descriptive Statistics for Participants' EXSE Scores Over The Study Duration (n = 19)

Barrier-Specific Exercise Self-Efficacy

The BARSE (McAuley, 1992) was used to determine if commonly cited PA barriers affected participants' self-efficacy to exercise. A repeated-measures ANOVA was used to determine if the intervention had an effect on participants' confidence to overcome barriers. Mauchly's test indicated that the assumption of sphericity had not been violated, $X^2 = 3.11$, $p = .21$. The results showed that the coaching intervention had an impact on the participants BARSE score, [$F(2, 36) = 3.26$, $p = .05$]. *Post hoc* testing did not reveal where a significant difference in BARSE scores existed based on time points. The mean average for baseline scores was 54.71, 59.21 for the midpoint score, and 65.7 for the final score. The mean averages and standard deviation are seen in Table 8.

	Mean	SD	P-Value
BARSE Time 1	54.711989	13.80	
BARSE Time 2	59.210200	19.48	
BARSE Time 3	65.697526	20.62	< 0.05

Table 8 Descriptive Statistics for Participants' BARSE Scores Over The Study Duration (n = 19)

Self-Esteem

Participants were asked to record their level of agreement to statements that were aimed at assessing their self-esteem. The RSES (Rosenberg, 1965) has 10 predetermined questions that addressed self-esteem. Participants recorded their answers on a 4-point Likert scale, and scores were assigned based on a reverse point system. A repeated-measures ANOVA was used to determine if the intervention had an impact on participants' self-esteem. Mauchly's test revealed that the assumption of sphericity had not been violated, $X^2 = 5.73$, $p = 0.57$. The omnibus F-test determined that the intervention did have a significant effect on participants self-esteem levels, [$F(2, 36) = 8.11$, $p < .05$]. *Post hoc* testing showed that the RSES scores increased significantly between time point one and three ($p < .05$). Mean RSES scores were 19.0 at baseline, 21.6 at midpoint score, and 22.9 at participant's final score. RSES time point scores are presented in Table 9.

RSES Time	Mean	95% Confidence Interval		P-Value
		Lower Bound	Upper Bound	
1	19.000	16.705	21.295	
2	21.579	19.027	24.131	
3	22.895	20.776	25.013	<0.05

Table 9 Descriptive Statistics for Participants' RSES Scores Over The Study Duration (n = 19)

Discussion

The main purpose of this study was to determine the effectiveness of an intervention using MI-via-CALC as a tool for increasing task and barrier self-efficacy and self-esteem among a selective group of Canadian women aged 30-55. The parallel purpose was to determine if MI-via-CALC increased participation in PA and decreased BMI, hip, and waist circumferences.

A number of participants' task self-efficacy increased throughout the intervention. This result was not surprising to the researchers because these results were similar to those produced in a study

conducted by Ayotte et al. (2010) and White et al. (2011). White et al. (2011) suggested that the higher a participant's self-efficacy, the more he/she would engage in PA. They found that as the participants' self-efficacy increased, they participated in more PA. Through coaching, it can be postulated that the client may come to understand how her lower self-efficacy might have prevented her previously from engaging in PA. A tenet of CALC is that coaches believe that all aspects of peoples' lives need to be addressed when coaching, because all aspects are interrelated. Therefore, coaches focus on coaching the whole person (Kimsey-House et al., 2011). CPCC coaches utilize a 'whole person' approach to coaching, and understand that all clients are intrinsically creative and resourceful. In this intervention, the coaches might have helped their clients to clarify their thought processes and ultimately recognize that they were operating with low self-efficacy. Further studies need to be done to examine how self-efficacy levels can be maintained post-intervention, because previous research indicates that high self-efficacy correlates to long-term engagement in PA (White et al., 2011).

Trost et al. (2002) illustrated that women perceive a number of barriers that prevent them from engaging in PA. The feeling that one cannot overcome perceived barriers that prevent her from being physically active is the marker of having low barrier-specific self-efficacy. Low barrier-specific self-efficacy has detrimental effects on PA engagement. When a participant has low barrier-specific self-efficacy, she is less likely to engage in PA (Trost et al., 2002). In the current study there were small positive, although not statistically significant, changes to participants' barrier-specific self-efficacy. Previous research conducted by Gallagher et al. (2006) demonstrated that when women had higher task self-efficacy they were more confident in their ability to overcome all barriers that prevented their participation in PA. The combination of high task self-efficacy, and high barrier-specific self-efficacy resulted in more engagement in PA. As the current study demonstrates, the participants reported an increase in their confidence to overcome barriers, and reported a slight increase in their perceived ability to perform PA. It is evident that the coaching process evoked a transformation with participants because there was a significant shift in participants' perceived abilities to overcome barriers, perform activities, and to become more physically active. Ultimately, a larger sample size would have been beneficial to measure statistically significant changes. At the same time, in this study, MI-via-CALC may have had an impact on increasing task self-efficacy, barrier-specific self-efficacy, and engagement in PA.

Participant self-esteem scores increased significantly throughout the intervention. These results are congruent with research conducted by Sonstroem and Morgan (1989) wherein the researchers concluded that as PA participation increases, a participant's feelings of competency and general self-esteem also increased. As the Morgan study participants increased their engagement in PA, they started feeling better about themselves, which, in turn, increased long-term engagement in PA. This was confirmed in this study.

Together with the findings from previous research, and the results from this current intervention, MI-via-CALC can be deemed to be an effective tool for increasing self-esteem. From other studies, it has been determined that participants who have low self-esteem engaged in negative self-talk and negative thoughts about themselves (Brown, Ford, Burton, Marshall, & Dobson, 2005). It can be postulated that coaching can assist participants to shift their perspective about their negative thoughts and self-talk. For example, balance coaching, one of the three principles of CALC, is a technique where a coach works with the client to shift their perspective. When a participant suffers from low self-esteem, the coach can assist the client in confronting negative self-talk such that they might shift to a perspective that results in more positive self-talk. With respect to this intervention, balance

coaching can assist participants to tap into their own resources and enhance their existing skill-set so that ideally they can look at their negative talk in a different light. This is related to PA engagement because Bandura (1977) suggested that when people view their competency level as low, they may set less challenging goals to minimize the risk of failure. This can be applied to PA and self-esteem because a low feeling of competency can be a negative feeling about one's self. Coaching, as delivered by MI-via-CALC, could challenge the negative self-talk that may have previously prevented a participant from engaging in PA. When a participant engages in positive self-talk, they may develop increased feelings of competency that may allow her to set more challenging goals that may eventually enable them to engage in long-term PA. As the results from the current intervention indicated, participants' self-esteem scores increased significantly, thus demonstrating that MI-via-CALC can have a positive impact on participant self-esteem.

Although the focus of the current study centered on engagement in PA and psychosocial factors associated with the engagement in PA, weight, waist circumference, hip circumferences and waist to hip ratio were also assessed as parallel outcome measures of the impact of MI-via-CALC. Weight was either constant or, in most cases, decreased among participants throughout this intervention. Sixteen participants achieved weight loss, while three participants' weight remained constant. This result was surprising and promising. As previous research has indicated, half of the Canadian adult female population is inactive (CFLRI, 2009). In addition, half of the adult female population is either overweight or obese (CFRLI 2009; Clark, 2012; Statistics Canada, 2011). The Canadian Heart and Stroke Foundation (2010) suggest that where someone carries their weight is just as important as how many pounds they have. One way to determine where fat stores are deposited on one's body is to calculate waist to hip ratio. Carrying excess weight in the waist area has been associated with high blood pressure, high cholesterol, type-2 diabetes, heart disease and stroke (Heart and Stroke Foundation, 2010). So, applying any process, like coaching, that impacts a participant's likelihood of any weight reduction in the waist area may reduce chances of acquiring any of the aforementioned overweight-related conditions. In addition, the Canadian Heart and Stroke Foundation (2010) suggest that a waist circumference greater than 35 inches is correlated with an increased risk for overweight-related diseases. The participants in the current study started the intervention with a mean waist circumference of 35.11 inches, and finished the intervention with a waist circumference of 33.61. The data and findings presented indicate that participants went from a waist circumference that is defined as a risk factor for overweight-related diseases, to waist circumference that is defined as acceptable. These results are very positive in terms of utilizing an MI-via-CALC intervention as a cognitive behavioural tool for long-term engagement in PA and weight management for larger populations because the potential for positively impacting an important risk factor was so strongly evident in this current study. This result is similar to previous research conducted by Pearson et al., (2012) and van Zandvoort et al. (2009), whereby the researchers concluded that personalized CALC interventions can produce significant reductions in BMI.

The benefits of self-directed PA and variety in activity choices presented in this intervention might be perceived to be a very positive finding compared to the inconsistent results found in the IPAQ-SF scores. It was more important for the researcher that participants felt empowered to make healthy behavior choices than to have a prescriptive PA regimen to follow. These results were consistent with previous research conducted by Taxeira et al. (2002), where the researchers found that autonomous regulation of PA produced long-term engagement in PA, and sustained weight loss. Therefore, the self-directed nature of activity in the current study is promising for long-term engagement in PA.

The current study proved to be promising in terms of the statistically significant results for two of the quantitative measures (the BARSE and the RSES) and the positive findings from the remaining quantitative measures (EXSE Scale and IPAQ-SF) demonstrates the beneficial nature of an MI-via-CALC intervention for women who seek a more physically active lifestyle. The findings from this study established a basis to suggest that an MI-via-CALC intervention can have a positive impact on women's task self-efficacy, barrier-specific self-efficacy, self-esteem, and engagement in PA, in addition to having a positive impact on women's BMI, waist, and hip circumferences.

In the future, research should be employed on a larger scale, with a broader scope of participants with varied age-cohorts, and longer-term research studies, in order to provide more conclusive evidence to support the utility of MI-via-CALC for women struggling to integrate regular participation of PA in their lives. In addition, having a comparison group and/or control group in a larger, longer term study would add greater credibility to the findings of this study. Ideally, the evidence-based results and recommendations from this study should be used to integrate MI-via-CALC in a health promotion framework. A health promotion framework is based on three mechanisms – self-care, mutual aid, and healthy environments (Health Canada, 2004). MI-via-CALC can serve as a mechanism that allows women to employ self-care strategies that are congruent with the health promotion framework. In addition, mutual aid is when people attempt to deal with their health concerns by working together, often referred to as social supports (Health Canada, 2014). MI-via-CALC might be perceived as a mutual aid that could be made more accessible to all Canadians. People, especially in but not limited to high risk cohorts, we postulate, should be able to access coaching as part of their health insurance plans, so that everyone can be supported in learning to adopt practices that will preserve their health.

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