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To cite this article: Janet R. Bezner, Katherine A. Franklin, Lisa K. Lloyd & Sylvia H. Crixell (2018): Effect of group health behaviour change coaching on psychosocial constructs associated with physical activity among university employees, International Journal of Sport and Exercise Psychology, DOI: [10.1080/1612197X.2018.1462232](https://doi.org/10.1080/1612197X.2018.1462232)

To link to this article: <https://doi.org/10.1080/1612197X.2018.1462232>



Published online: 22 Apr 2018.



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## Effect of group health behaviour change coaching on psychosocial constructs associated with physical activity among university employees

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(Received 1 September 2017; accepted 28 March 2018)

Lifestyle behaviours are a contributing factor in approximately 80% of chronic diseases, making them a primary target for employee wellness programmes (EWPs). To effectively change health behaviours, EWPs should implement evidence-based strategies. One strategy is health behaviour change coaching, which is often delivered in a one-on-one format. While limited research exists, group health behaviour change coaching (group coaching) has potential to be an efficient alternative, impacting more people. The purpose of this study was to determine whether group health coaching improved psychological constructs related to physical activity and physical fitness among university employees in an EWP. Employees ( $n = 100$ ) were randomly selected from a pool of volunteers who registered for the EWP, were overweight/obese, and at risk for cardiovascular disease. The intervention consisted of three group coaching sessions based on the Transtheoretical Model and Self-Determination Theory. Paired *t*-tests compared pre/post-measures of psychological constructs related to physical activity and physical fitness. Additionally, multivariate regression analysis with post-coaching self-efficacy as the dependent variable was performed. Overall, 84 participants (83% female, average BMI = 31.2) completed the intervention, attending an average of 2.26 sessions. Stages of change, seven processes of change, self-efficacy, perceived competence, and the health care climate score improved. Attending group coaching sessions predicted post-test self-efficacy. All but one measure of physical fitness improved. Group coaching can be effective in improving physical fitness and psychological constructs related to physical activity behaviour. In programmes with limited funds, group coaching has potential to be an important EWP component to support health behaviour change.

**Keywords:** health coaching; behaviour change; physical activity; worksite wellness

### Introduction

Certain health behaviours, such as poor diet and inadequate physical activity, increase the risk for chronic health conditions in US adults, including those currently in the workforce (Centers for Disease Control and Prevention, 2017; Mattke et al., 2013). Given skyrocketing health care costs, businesses are paying more attention to the health of their employees (Mattke et al., 2013). Employee wellness programmes (EWPs) have potential to play a significant role in instigating and supporting positive changes in employees' health behaviours and, thus, reducing the incidence of serious medical conditions and mitigating at least to some extent the steady rise in health care costs (Baicker, Cutler, & Song, 2010; Dement, Epling, Joyner, & Cavanaugh, 2015).

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High-quality programmes, however, are only effective if they reach a significant number of employees. Unfortunately, most EWP's report low participation rates, engaging approximately 20% of the total eligible employee population (Mattke et al., 2013). Clearly, EWP's need to explore strategies that engage more employees and effectively facilitate positive changes in their health behaviours.

One promising strategy to promote health behaviour change is health behaviour change coaching, which is defined as:

A patient-centered approach wherein patients at least partially determine their goals, use self-discovery or active learning processes together with content education to work toward their goals, and self-monitor behaviours to increase accountability, all within the context of an interpersonal relationship with a coach. The coach is a healthcare professional trained in behaviour change theory, motivational strategies, and communication techniques, which are used to assist patients to develop intrinsic motivation and obtain skills to create sustainable change for improved health and well-being. (Wolever et al., 2013)

Health behaviour change coaching is predicated upon health behaviour change theories. Health behaviour change theories, such as the Transtheoretical Model (TTM) and the Self-Determination Theory (SDT), are often incorporated into coaching curricula (Wolever et al., 2013). The TTM, which merges many theories regarding the psychological and behavioural change, has been utilised in adopting positive health behaviours such as being physically active (Glanz & Rimer, 2005). This model is driven by several assumptions, including that behaviour change is too complex to be adequately addressed using only one theory; that behaviour change occurs over time through stages utilising different processes; and that programmes should be orientated to participants' stages of change. Stages of change, processes of change, decisional balance, and self-efficacy are core constructs of the TTM.

Stages of change embrace the idea that the passage of time is an important component of adopting positive health behaviours, and that most behavioural change takes place gradually rather than abruptly as discrete events (Prochaska, DiClemente, & Norcross, 1992). Individuals move through five stages of change in a cyclical manner, progressing and regressing as they move forward. These stages include precontemplation, contemplation, preparation, action, and maintenance. With this in mind, coaching strategies tailored to where individuals fall along this continuum are more likely to improve health behaviours. For example, clients in the precontemplation stage would likely benefit from learning about the positive impacts of regular physical activity, whereas clients in a later stage (e.g. preparation) are probably already aware of the positive impacts of activity, and thus would likely benefit more from other strategies, such as developing a plan to be active.

Processes of change explain how behavioural changes occur and include five experiential and five behavioural processes that modify an individual's thoughts, feelings, and/or environment in order to move through the stages of change (Prochaska & DiClemente, 1982). The experiential processes are increasing knowledge, warning of risks, caring about consequences to others, comprehending benefits, and increasing healthy opportunities; the behavioural processes are substituting alternatives, enlisting social support, and rewarding, committing, and reminding oneself (Marcus & Forsyth, 2003). Marcus, Rossi, Selby, Niaura, and Abrams (1992) identified a relationship between stages of change and processes of change for engaging in exercise, such that as one progresses towards the action and maintenance stages of change, he/she replaces experiential processes with more behavioural processes of change.

Decisional balance is the ratio of perceived benefits to barriers regarding changing a behaviour (Janis & Manning, 1977). Health behaviour change is more likely to occur when an

individual perceives that the benefits outweigh the barriers. In fact, decisional balance tends to shift as one moves through the various stages of change. For instance, in the precontemplation and contemplation stages, the cons of changing behaviour outweigh the pros, whereas in the action and maintenance stages, the pros outweigh the cons (Marcus, Rakowski, & Rossi, 1992). Self-efficacy is the degree of confidence an individual has that he/she can perform a behaviour even when faced with barriers, such as fatigue or lack of time. As with decisional balance, self-efficacy tends to shift as one moves through the various stages of change.

The SDT, a framework commonly used for the study of human motivation, explains how three types of motivation (i.e. intrinsic motivation, extrinsic motivation, and amotivation), falling along a continuum, affect health-related behaviours and the regulation of those behaviours (Deci & Ryan, 2002). The SDT further characterizes extrinsic motivation as either self-determined (integrated and identified regulation) or controlled (introjected and external regulation). Based on these postulates, extrinsically motivated persons tend to engage in a positive health behaviour simply: because the behaviour has been incorporated into their concept of self (i.e. integrated regulation); to improve health or physical appearance (i.e. identified regulation); to avoid feelings of guilt or shame (i.e. introjected regulation); and/or to receive compliments in social interaction (i.e. external regulation). Where someone falls on the broad motivation continuum depends on the satisfaction of three basic psychological needs: autonomy (the quality or state of being self-governed), competence (the capacity to function or develop in a particular way), and relatedness (a feeling of meaningful connection to others in one's social environment). In short, as people move through the process of changing their behaviours, self-regulation begins to develop and they become more autonomous and self-determined through the process of internalising their motivation and converting external regulatory processes into internal regulatory processes. An example of a coaching strategy aligned with the SDT is to meet with new clients at a fitness facility to help them get oriented and teach them how to use the equipment. This type of strategy will improve the quality of motivation by building competence, thereby increasing the likelihood that the clients will continue to visit that facility independently.

A recent systematic review concluded that health behaviour change coaching can be an effective strategy for changing health behaviours (e.g. food intake, physical activity) and related outcomes (e.g. body mass index (BMI) and perceived health status) (Hill, Richardson, & Skouteris, 2015). Most research on health behaviour change coaching has been conducted on coaching delivered via a one-on-one format. This format of delivery, though effective, is expensive (Armstrong et al., 2013). An alternative approach is group health behaviour change coaching, herein referred to as group coaching, which has the potential of impacting more people in a more affordable way (Armstrong et al., 2013). However, research investigating the effect of group coaching has primarily been limited to clinical settings (Armstrong et al., 2013; Dufour et al., 2015). There is a need to explore the impact of group coaching in other settings. Those with limited funds to support employee wellness initiatives, such as universities, could benefit greatly by implementing affordable wellness promoting strategies that have been proven to be effective. Universities are uniquely positioned to implement and test group coaching as part of EWPs, as they have: the need – university employees may be unhealthy, likely because they are overweight and inactive (Lloyd, Crixell, Bezner, Forester, & Swearingen, 2017), and their health care costs are skyrocketing (Hill-Mey et al., 2015); and the expertise – faculty engaged in health-related research can systematically deliver and evaluate the effect of group coaching. Thus, the purpose of this study was to explore whether group coaching, when offered as part of an EWP in a large university, has potential to improve physical activity-related psychological constructs and health-related physical fitness.

## Materials and methods

### *Design*

This exploratory study involved a subset of employees participating in a new university EWP. The EWP, free to all employees working at the university, included: health risk appraisal (HRA) feedback; wellness checks (BMI and blood pressure); weekly newsletters with information on how to change health behaviours, improve diet, increase physical activity, and reduce sedentary behaviour; online resources; Lunch-and-Learn sessions (2/month); group training classes (25/week); open swim; and open racquetball. Employees in this study had access to these services plus group coaching focusing on improving physical activity behaviour. Free membership to the student recreation centre was offered as an incentive for participation in the study. To determine the impact of group coaching, physical activity-related psychological constructs and physical fitness were assessed before and after a 15-week intervention. All aspects of this study were approved by the university institutional human ethics committee (Texas State Institutional Review Board #2014G2967).

### *Subjects*

In December 2014, all employees were invited to enrol in the new EWP via e-mail, announcements at campus events, and posted notices. To enrol in the EWP, employees had to register online, complete a HRA, and sign a liability waiver. During registration, employees had the option of designating interest in participating in the group coaching study. To be eligible for the study, participants had to be overweight or obese and at moderate or high risk for cardiovascular disease per their HRA (American College of Sports Medicine, 2014). These criteria were established to attract employees with the greatest need who were perhaps at risk for attrition. Of the 514 employees who enrolled in the new EWP, 347 employees designated interest in participating in the group coaching study and of these, 194 met the eligibility criteria. To select the study cohort, researchers used a random number generator to rank eligible applicants, invited the first 100 to participate, informed them about expectations, and asked them to sign a consent form and a contract indicating their willingness to commit to the 15-week intervention, in particular, to attending all group coaching classes and completing both pre- and post-testing. Overall, 22 withdrew after reviewing the contract and were replaced with the next people on the list. The final study cohort consisted of 20 men (BMI  $33.1 \pm 10.2 \text{ kg m}^{-2}$ ) and 80 women (BMI  $31.6 \pm 7.3 \text{ kg m}^{-2}$ ), ages 23–66 (average age  $47.8 \pm 10$  years). The sample included the same proportion of men and women as the pool of employees enrolled in the EWP.

### *Assessments*

To determine the effectiveness of group coaching, psychological constructs related to physical activity were measured via a survey instrument, and health-related physical fitness was measured via a battery of tests administered before and after the group coaching intervention. Immediately after finalization of the study cohort, researchers mailed packets to participants that included the survey and pre-test instructions for participating in health-related physical fitness testing (American College of Sports Medicine, 2014). Participants were asked to bring the completed survey to their testing appointment, which occurred during the week prior to the beginning of the intervention.

### *Psychological constructs*

Validated questionnaires, compiled into a single survey instrument, were used to assess psychological constructs related to physical activity. These constructs were based on several health behaviour theories, including the TTM and the SDT.

*Transtheoretical Model.* Stage of change for regular physical activity was measured using a 4-item validated and reliable (Kappa Index over 2 weeks = 0.78) instrument with yes/no forced response options (Marcus & Forsyth, 2003; Marcus, Selby, Niaura, & Rossi, 1992). To be consistent with current recommendations, regular physical activity was defined as 30 minutes or more per day at least five days per week (United States Department of Health and Human Services, 2008). Processes of change were assessed using 40 items, with 4 items covering each of the 10 processes (Marcus & Forsyth, 2003). Subjects were instructed to rate how often each item occurred over the previous month on a 5-point Likert scale, ranging from never (1) to repeatedly (5). The score for each process was determined by averaging the 4 items assigned to that process. Marcus, Rossi et al. (1992) reported good internal consistency utilising the processes of change scale, with Cronbach's alpha scores for each process ranging from 0.71 to 0.89 in two samples of subjects. Decisional balance as it relates to physical activity was measured using a 16-item instrument, with 6 "con" items and 10 "pro" items that influence decisional balance. The instrument has been shown to have satisfactory internal consistency, with Cronbach's alpha scores of 0.79 for the 6 con items and 0.95 for the 10 pro items (Marcus, Rakowski, & Rossi, 1992). Subjects were instructed to answer each item using a 5-point Likert scale, which ranged from not at all important (1) to extremely important (5). The decisional balance score was calculated by subtracting the average con score from the average pro score; the larger the score, the more benefits (or pros) the individual perceived compared to barriers (or cons) (Marcus & Forsyth, 2003). Physical activity self-efficacy was assessed using 5-items from a validated (internal consistency = 0.82) instrument (Marcus, Selby, et al., 1992). Subjects answered each question using a 5-point Likert scale, ranging from not at all confident (1) to extremely confident (5). Items were totalled to yield an overall score, with higher values indicating greater physical activity self-efficacy.

*Self-Determination Theory.* The Treatment Self-Regulation Questionnaire, Perceived Competence Scale, and Health Care Climate Questionnaire, all based on the SDT, were included in the measurement of psychological constructs.

The Treatment Self-Regulation Questionnaire, which assesses the degree to which a person's motivation for a particular behaviour or a set of behaviours is relatively autonomous (Williams, Ryan, & Deci, 2017), has been shown to have construct validity and internal consistency in different settings and for different health behaviours, including exercise (Levesque et al., 2007). Halvari and Halvari (2006) found this instrument to have adequate reliability (Cronbach's alphas were .76 at time one and .67 at time two) in their study investigating commitment to primary preventive dental health care. This questionnaire assesses various reasons for engaging in or changing exercise behaviour, and is organized into three subscales: autonomous motivation (6 items), controlled motivation (6 items), and amotivation (3 items). Responses are provided using a 7-point Likert scale ranging from not at all true (1) to very true (7). An average score was calculated for each of the three types of motivation.

The Perceived Competence Scale, which assesses the degree to which a person feels confident about being able to adopt and maintain a change in a particular health behaviour, has also been shown to be reliable and valid in different settings and for different health behaviours, including exercise (Haslem, Wilkinson, Prusak, Christensen, & Pennington, 2016; Williams et al., 2017). The four items in this scale for exercise explore one's confidence and capability to exercise regularly using responses to a 7-point Likert scale, with answers that range from not at all true (1) to very true (7) (Williams et al., 2017). Scores were averaged to determine each subject's level of perceived competence. The internal consistency of this scale has been reported to be 0.90 per the scale authors (Williams et al., 2017).

The Health Care Climate Questionnaire is a valid and reliable instrument that assesses the degree to which a person perceives that his/her health care providers (including health care programme leaders) are “autonomy supportive versus controlling in providing general treatment or with respect to a specific health-care issue,” including supporting the desire to become more physically active (Williams et al., 2017; Williams & Deci, 2001; Williams, Freedman, & Deci, 1998). In this study, the questionnaire included six items to assess the type of support subjects received from health practitioners regarding exercising regularly, using a 7-point Likert scale ranging from not at all true (1) to very true (7) (Williams et al., 2017). An example item was “I feel my health practitioners/counselors understand how I see things with respect to my being physically active.” The Cronbach’s alpha has consistently been 0.82 for the 6-item version of the Health Care Climate Questionnaire (Williams et al., 2017).

*Physical Fitness Testing.* Resting heart rate (HR, Polar Heart Rate Monitor, Model FT4; Stanford, CT) was measured while the participant sat quietly until HR decreased to a constant level and remained so for three minutes. Heart rate was recorded at the end of each minute; resting HR was the average value. Immediately after HR was measured, two resting blood pressure measurements (Baumanometer, Standby® Model; Copiague, NY), separated by 1 minute, were taken. If the measurements varied by more than 5 mmHg, a third measurement was taken. Resting blood pressure was the average of two measures that were within 5 mmHg of each other (National High Blood Pressure Education Program, 2004; Pickering et al., 2005).

Height and weight (in exercise clothes, without shoes) were measured in order to determine BMI using a calibrated physician’s scale (Detecto Scale Co.; Jericho, NY). Body composition was determined via air displacement plethysmography (COSMED USA, Inc., BOD POD™). Two waist circumference measurements were taken at the narrowest part of the torso with a spring-loaded tape measure (American College of Sports Medicine, 2014). If the measurements varied by more than 5 mm, then a third measurement was taken. Waist circumference was the average of two measures that were within 5 mm of each other.

Depending on the participant’s health status per HRA, aerobic fitness was determined one of two ways: moderate risk participants performed the Bruce graded submaximal exercise test on a Trackmaster treadmill (FullVision, Newton, KS) (American College of Sports Medicine, 2014), and high-risk participants performed the 6-minute walk test (Ross, Murthy, Wollak, & Jackson, 2010). During the Bruce test, expired air was analysed on a breath-by-breath basis with an automated metabolic measurement cart (TrueOne, ParvoMedics; Sandy, UT) calibrated before each test using a certified gas mixture ( $O_2 = 16\%$  and  $CO_2 = 4\%$ , Scott Medical Products; Plumsteadville, PA). Gas exchange variables were calculated from 60-second averages and HR was recorded at the end of each stage. Maximal oxygen consumption ( $VO_{2max}$ ) was predicted from two steady-state  $VO_2$  values measured at the end of two consecutive workloads using the following formula:  $m(HR_{max} - HR_2) + VO_{22}$ , where “m” refers to the slope  $(VO_{22} - VO_{21}) / (HR_2 - HR_1)$  and “ $VO_{21}$ ” and “ $VO_{22}$ ” refer to the  $VO_2$  measured at the end of the first and second workloads performed at an HR greater than  $110 \text{ beats min}^{-1}$ . For the 6-minute walk test,  $VO_{2max}$  was predicted using the following formula:  $4.948 + 0.023 \times D$ , where “D” refers to the distance in metres.

After aerobic fitness testing, the participant rested for at least 10 minutes. When HR was below 120 bpm and the participant felt recovered, a series of muscular fitness tests were administered. A hand-grip test was performed using a hand-grip dynamometer (Jamar®; Lafayette, IN) (American College of Sports Medicine, 2014). With the right elbow flexed at a right angle and both the right forearm and the right wrist in neutral positions, the participant squeezed the handle as hard as possible while standing still. This procedure was repeated with the left hand.

The participant performed two more trials at maximum effort for a total of three trials performed with each hand. The best score for each hand was used in data analysis. A push-up test (Canadian Society for Exercise Physiology, 2003) was performed with males starting in the “down” position with hands underneath the shoulders and pointing forward, back straight, head up, feet together, and toes serving as the pivot point, and females starting in the “down” position with the knees serving as the pivot point. The participant raised the body by straightening the elbows to a straight arm position and then lowered the body by bending the elbows until the chin (but not the stomach) touched the mat. The test was stopped when the participant achieved a point of exhaustion. A partial curl-up test (Diener, Golding, & Diener, 1995) was performed with the participant lying in a supine position on a mat with the knees bent (i.e. flexed at 90°) and the feet flat on the floor about 12 inches from the buttocks. With the arms by the side, palms facing down, and fingers extended forward with the middle finger touching a piece of masking tape, the subject curled up slowly sliding fingers to the second tape placed 12 inches from the buttocks and back to the starting position in time with a metronome set at a rate of 20 curl-ups min<sup>-1</sup>. The participant performed as many curl-ups as possible, without pausing, to failure. A sit-and-reach test was performed with the subject placing the soles of the feet flat against the edge of the box at the 23-cm mark (Kaminsky, 2014). With legs straight and fingertips in contact with the measuring scale of the sit-and-reach box, the participants reached forward with both hands as far as possible. Lastly, a right and left shoulder stretch test (Bryant, Newton-Merrill, & Green, 2014) was performed. To test the left shoulder, the participant placed the left arm at the side and extended the right arm straight up overhead, bent both elbows, and placed the back of the left hand on the lower back and reached upward as far as possible. The amount of overlap of the fingers was measured to the nearest ½ inch. To test the right shoulder, the steps listed above were repeated, but with the participant beginning with the right arm at the side and the left arm extended over the head.

### **Intervention**

Subjects were stratified into two groups based on their physical activity stage of change, with those in the early stages (precontemplation, contemplation) in one group and those in the later stages (preparation, action, maintenance) in another. During the 15-week period, each group participated in three, one-hour group coaching sessions tailored to the stage of change (Table 1). To accommodate schedules, several sessions, attended by 5–20 participants, were offered at different times, allowing participants to choose when to attend. The curriculum, grounded in health behaviour change theories, revolved around how to adopt and maintain physical activity habits. Sessions were led by coaches who were faculty members in the departments of physical therapy and health and human performance.

At the beginning of each of the three classes, a topic based on one or more of the guiding behaviour change theories was introduced, and small group discussion was encouraged to promote application and understanding of the concept. The theoretical basis for the coaching curriculum is delineated in Table 1. For example, when the topic of motivation was introduced in the first class, *Creating Positive Lifestyle Habits*, extrinsic motivators (e.g. my spouse wants me to exercise, my physician told me to exercise, my high school reunion is in 6 months and I want to lose weight) and intrinsic motivators (e.g. to be a better parent, to improve my effectiveness at work, to have more energy to achieve my life goals) were differentiated, and participants were asked to identify their primary motivators. Participants were then encouraged to recognize intrinsic motivators by focusing on the immediate impact of physical activity on mood, energy levels, sleep, relationships, etc. Working in small groups, participants shared their motivators and learned from each other as they were encouraged to identify personally relevant intrinsic motivators to promote



Table 1. Group health behaviour change coaching curriculum.

Class	Content	Homework/activities
1	<p><i>Creating positive lifestyle habits</i></p> <ul style="list-style-type: none"> <li>• Intrinsic vs. extrinsic motivation<sup>a</sup></li> <li>• Connecting values to health behaviours<sup>a</sup></li> <li>• Pros vs. cons of adopting physical activity<sup>b</sup></li> <li>• Explanation of fitness test results</li> <li>• Physical activity guidelines</li> <li>• Wellness programme offerings</li> </ul>	<ul style="list-style-type: none"> <li>• Goal setting related to weekly physical activity</li> <li>• Identifying an accountable buddy/friend</li> <li>• Schedule physical activity on calendar</li> <li>• Create and review daily a 3 × 5 card listing benefits of physical activity</li> </ul>
2	<p><i>Being a physically active person</i></p> <ul style="list-style-type: none"> <li>• Developing habits <ul style="list-style-type: none"> <li>o Trigger/reminder</li> <li>o Routine/behaviour</li> <li>o Reward</li> </ul> </li> <li>• Mental imagery<sup>b</sup></li> <li>• Addressing self-talk<sup>b</sup></li> <li>• Types of rewards (extrinsic vs. intrinsic)<sup>a</sup></li> <li>• Problem-solving of challenges/barriers<sup>b</sup></li> <li>• Physical fitness components</li> </ul>	<ul style="list-style-type: none"> <li>• Research about a type of physical activity you haven't done and are interested in pursuing</li> <li>• Mental imagery – imagine yourself as a physically active person</li> <li>• Being mindful about self-talk and reframing negative self-talk</li> <li>• Physical fitness self-assessment to determine if you are addressing all 5 components of physical fitness</li> </ul>
3	<p><i>Sustaining your health habits</i></p> <ul style="list-style-type: none"> <li>• Review of intrinsic vs. extrinsic motivation<sup>a</sup></li> <li>• Review of habits</li> <li>• Strategies for addressing lapses, boredom<sup>b</sup></li> <li>• Summer wellness programme offerings</li> <li>• General question and answer</li> </ul>	<ul style="list-style-type: none"> <li>• Worksheet to work through a lapse</li> <li>• Weekly goal setting worksheet</li> </ul>

<sup>a</sup>Content based on Self-Determination Theory.

<sup>b</sup>Content based on Transtheoretical Model.

sustainable behaviour change. In addition to the impact this approach was intended to have on the development of autonomous motivation, self-efficacy could also be enhanced through vicarious learning and verbal persuasion, as participants learned from and supported each other. In the second class, *Being a Physically Active Person*, the value of mental imagery was described. Participants were coached to see themselves being physically active, including being prepared to be active (for example, packing a bag with clothes and tennis shoes to bring to work), to imagine the feelings and thoughts they would have during physical activity, and to predict the way they would feel after being physically active. This technique was implemented to support two experiential processes from the TTM, comprehending benefits and increasing healthy opportunities, and to increase self-efficacy for being physically active. The concept of negative self-talk was also introduced and described in this second class, and the thread was pulled through into the third class, *Sustaining Your Health Habits*, after participants had a chance to notice and log incidences of negative self-talk. For participants, the process of catching themselves engaged in negative self-talk, substituting positive self-talk, and noticing the impact of opting for positive self-talk,

had potential to enhance self-efficacy and provide support for attempts to improve self-care through physical activity. During all sessions, coaches established an open and interactive environment and encouraged participants to share. In between sessions, coaches kept communication channels open and responded to individual questions or concerns that arose.

### **Analysis**

Paired *t*-tests were used to determine if group coaching impacted pre-/post-measures of psychological constructs related to physical activity and physical fitness. Because self-efficacy is associated with behaviour change (Bandura, 1977), Pearson's correlation was used to determine whether pre-test self-efficacy related to physical activity and participant use of major programme components (group fitness classes, group coaching, student recreation centre, "Lunch and Learn" classes) were associated with post-test physical activity self-efficacy. To explore these relationships further, a multiple regression analysis was performed using post-test physical activity self-efficacy as the dependent variable, and use of programme components as independent variables. Findings were considered significant at the  $p < 0.05$  level.

### **Results**

Of the 100 employees randomly selected to participate in the group coaching study, 84 completed the intervention. Most participants were female (83%), and the average BMI was  $31.2 \text{ kg m}^{-2}$ . On average, participants utilised components 24.8 times over the course of the study. Of the three group coaching sessions offered, participants attended an average of 2.26 sessions, with 86% of study participants attending two or more group coaching sessions, and 48% attending three sessions.

Paired *t*-tests revealed significant pre- to post-test increases in the following variables: stages of change, two experiential processes of change (increasing knowledge, increasing healthy opportunities), all five behavioural processes, physical activity self-efficacy, perceived competence, and the health care climate score (Table 2). There was a significant correlation between post-test physical activity self-efficacy and both pre-test physical activity self-efficacy (Pearson's  $r = 0.50$ ,  $\beta = 0.48$ ,  $p < 0.01$ ) and attendance at group coaching sessions (Pearson's  $r = 0.27$ ,  $\beta = 0.24$ ,  $p < 0.05$ ), but not between post-test physical activity self-efficacy and use of other programme components (Table 3). For example, there was no difference in post-test physical activity self-efficacy between those who attended three coaching sessions versus those who attended two sessions. Additionally, attending group coaching sessions was significantly predictive of post-test physical activity self-efficacy through multivariate regression analysis ( $p < 0.05$ ) (Table 4).

Paired *t*-tests revealed that, with the exception of BMI, there were significant changes in all measures of health-related physical fitness (Table 5). Specifically, there were improvements in cardiovascular fitness, body size and composition, muscular strength, muscular endurance, and flexibility.

### **Discussion**

Health coaching has garnered support as an effective method for helping people improve health-related behaviours and associated health outcomes (Hill-Mey et al., 2015). To date, limited research has addressed the efficacy of taking a group approach to health coaching. Indeed, in a 2015 systematic review on health behaviour change coaching, only one study reported utilising a group format (Edelman et al., 2006), and that study did not indicate that a theoretical basis was employed for curriculum development (Hill et al., 2015). Thus, the current study, which explored

Table 2. Pre- and post-test changes in psychological constructs related to physical activity ( $n = 77$ ).

Transtheoretical model	Pre-test Mean (SD)	Post-test Mean (SD)	Overall change Mean (SD)	$p$ value
Stages of change	2.773 (1.120)	3.909 (1.106)	+1.136 (1.391)	3.784E-09*
Processes of change				
<i>Experiential processes</i>				
<i>Increasing knowledge</i>	3.222 (0.833)	3.451 (0.882)	+0.229 (0.744)	0.005*
<i>Warning of risks</i>	2.750 (0.858)	2.872 (0.953)	+0.122 (1.040)	0.162
<i>Caring about consequence to others</i>	2.882 (0.678)	2.979 (0.938)	+0.097 (0.741)	0.135
<i>Comprehending benefits</i>	3.941 (0.729)	3.955 (0.775)	+0.014 (0.587)	0.421
<i>Increasing healthy opportunities</i>	3.163 (0.709)	3.319 (0.815)	+0.156 (0.633)	0.020**
<i>Behavioural processes</i>				
<i>Substituting alternatives</i>	3.007 (0.895)	3.691 (0.804)	+0.684 (0.921)	1.094E-08*
<i>Enlisting social support</i>	2.448 (1.060)	2.892 (1.074)	+0.444 (1.156)	0.001*
<i>Rewarding yourself</i>	2.951 (0.803)	3.306 (0.836)	+0.354 (0.860)	4.094E-04*
<i>Committing yourself</i>	3.722 (0.737)	4.101 (0.664)	+0.378 (0.645)	2.133E-06*
<i>Reminding yourself</i>	2.128 (0.843)	2.913 (0.920)	+0.784 (0.838)	1.073E-11*
Decisional balance	1.831 (0.941)	2.013 (0.984)	+0.182 (0.953)	0.055
Self-efficacy	2.756 (0.666)	2.967 (0.847)	+0.211 (0.770)	0.011**
Self-Determination Theory				
<i>Treatment self-regulation</i>				
<i>Autonomous motivation</i>	36.087 (5.845)	36.736 (5.634)	+0.623 (5.407)	0.171
<i>Controlled motivation</i>	18.130 (6.301)	19.261 (7.638)	+1.130 (5.960)	0.06
<i>Amotivation motivation</i>	6.377 (3.232)	6.203 (3.075)	-0.174 (2.584)	0.289
<i>Perceived competence</i>	5.322 (1.372)	5.620 (1.316)	+0.297 (1.349)	0.036**
<i>Health care climate</i>	3.860 (1.454)	4.800 (1.745)	+0.940 (1.759)	1.716E-05*

Note: SD = standard deviation.

\* $p < 0.01$ .

\*\* $p < 0.05$ .

Table 3. Correlation between post-test self-efficacy and both pre-test self-efficacy and participant use of major programme components ( $n = 77$ ).

	Pearson coefficient	Significance ( $p$ value)
Pre-test self-efficacy	0.503	0.000*
Group fitness classes	0.020	0.433
Group coaching sessions	0.266	0.012**
Student recreation centre	0.195	0.050
Lunch and learn classes	0.001	0.495

\* $p < 0.01$ .

\*\* $p < 0.05$ .

the effect of implementing a theory-based group coaching approach focused on enhancing physical activity behaviours among high-risk participants in a university EWP, adds to the literature on health coaching. Because group coaching was effective in improving physical activity-related psychological constructs as well as physical fitness, group coaching has been permanently added to services offered in the university EWP. The description of the group coaching intervention in this manuscript may be of use to other universities interested in developing or enhancing an EWP tailored to their setting.

The primary reason for the success of this intervention may be attributed to the fact that group coaching was based on two well-established theories, the TTM and the SDT. Results of the assessments implemented in the study, aligned with these theories, confirmed the extent to which the

Table 4. Multiple regression of post-test self-efficacy and participant use of programme components ( $n = 77$ ).

	Beta coefficient	<i>t</i>	Significance ( <i>p</i> value)
Group fitness classes	0.140	1.124	0.265
Group coaching sessions	0.240	2.026	0.047*
Student recreation centre	0.188	1.734	0.088
Lunch and learn classes	0.155	1.343	0.184

\* $p < 0.05$ .Table 5. Pre- and post-test changes in measures of health-related physical fitness ( $n = 77$ ).

Systolic blood pressure (mmHg)	Pre-test	Post-test	Overall change	% change	<i>p</i> value
	133.1 (16.7)	129.1 (15.6)	-4.1 (12.4)*	-2.5 (10.3)	0.0054926*
Diastolic blood pressure (mmHg)	80.7 (10.4)	78.5 (10.9)	-2.2 (7.9)*	-2.3 (10.1)	0.0190802*
Resting heart rate (beats min <sup>-1</sup> )	76.6 (10.7)	73.4 (9.7)	-3.2 (7.8)*	-3.6 (9.4)	0.0006225*
Abdominal circumference (cm)	100.3 (15.5)	99.3 (16.0)	-1.0 (4.1)*	-1.0 (3.8)	0.0378483*
Weight (lb)	181.2 (45.6)	182.0 (45.1)	-2.2 (6.2)*	-1.1 (3.1)	0.0033983*
Body mass index	30.8 (7.2)	30.6 (7.3)	-0.2 (1.0)	-0.7 (3.2)	0.0790109
% Body fat	40.9 (8.5)	39.3 (8.9)	-1.6 (2.3)*	-4.2 (6.7)	4.273E-08*
Estimated VO <sub>2</sub> max (ml kg <sup>-1</sup> min <sup>-1</sup> )	25.6 (7.4)	28.1 (8.4)	2.8 (6.6)*	14.0 (21.1)	0.0005005*
Hand-grip strength	60.3 (17.1)	62.5 (17.2)	2.3 (6.9)*	4.9 (13.7)	0.004895*
Push-ups	4.4 (6.3)	8.3 (7.3)	3.9 (4.8)*	121.3 (148.9)	3.794E-10*
Curl-ups	12.6 (23.9)	27.8 (32.8)	15.4 (20.7)*	166.3 (274.3)	1.059E-08*
Sit-and-reach	25.3 (9.4)	27.8 (9.0)	2.9 (4.1)*	13.5 (18.0)	1.006E-10*

\* $p < 0.05$ .

group coaching curriculum positively impacted the psychological constructs associated with these theories (Hill et al., 2015; Wolever et al., 2013). The TTM was applied in several ways. For example, participants were grouped into coaching sessions according to their physical activity stage of change, allowing for tailoring of the curriculum. Also, multiple strategies were incorporated to impact experiential and behavioural processes of change, including, but not limited to: providing information about physical activity guidelines and the opportunities available through the EWP; identifying an accountability partner; and rewarding oneself as small goals were achieved. Additionally, because research has clearly shown that physical activity is associated with self-efficacy (Bauman et al., 2012), many of the strategies employed during group coaching were designed to build self-efficacy (Olander et al., 2013), an important construct in the TTM. The success of these strategies is evidenced by the fact that after group coaching, the average stage of change for the participants moved from between the contemplation and preparation stages towards the action stage (16 subjects were in the action and maintenance stages combined at the beginning of the study and 46 were in these two stages at the end of the study). These results suggest that, as with one-on-one coaching (Krok-Schoen et al., 2017), group coaching can support significant stage of change movement towards the action and maintenance stages for physical activity, thereby increasing participants' likelihood to engage in regular physical activity.

With respect to the SDT, strategies as described in Table 1 were incorporated to increase intrinsic motivation by meeting the psychological needs of autonomy, competence, and

relatedness. Some of these strategies revolved around: creating structure (e.g. goal setting, positive feedback, autonomy support and involvement); helping clients recognize that they have choices regarding behaviour; and fostering relationships that are critical for providing psychological and emotional support (Moore, Jackson, & Tschannen-Moran, 2016; Teixeira, Carraça, Markland, Silva, & Ryan, 2012; Van Hoecke, Delecluse, Bogaerts, & Boen, 2014). Clearly, these strategies were effective, as the scores for both perceived competence and health care climate improved. These improvements suggest that as a result of group coaching, participants felt more supported by their health care providers (including group coaches) and more confident about being able to adopt and maintain higher levels of physical activity. While both perceived competence and health care climate have been shown to be critical constructs in meeting basic psychological needs and thereby bringing about health behaviour change, most research involving strategies related to these constructs has been limited to a one-on-one coaching delivery-style approach (Murray et al., 2015; Teixeira et al., 2012; Williams & Deci, 2001). This study adds to the literature by reporting that improvements in perceived competence and health care climate can be attained via a group coaching format in a worksite wellness programme. With supportive health care practitioners (coaches, in our case) that bolster confidence in their client's ability to engage in physical activity, it is likely that outcomes will improve. Indeed, in this study, this was evidenced by improvements in physical fitness.

Another reason for the success of group coaching may be attributed to the "sense of community" that developed within each cohort (Armstrong et al., 2013; Befort, Donnelly, Sullivan, Ellerbeck, & Perri, 2010). The group facilitators noticed that participants learned from each other, supported each other to problem solve and overcome barriers, shared different approaches to being successful, and in general, provided moral support for each other. Previous studies have documented the benefit of social support inherent in group coaching. Befort et al. (2010) provided group counselling for obesity treatment in women living in rural areas and their participants indicated that the most helpful aspects of the group were "group support, accountability, and information-sharing" (p. 15). Similarly, Dufour et al. (2015) found that the group dynamic, defined as the perceived positive impact of interacting with others, was viewed by their participants in group health coaching to enhance self-management of chronic health conditions as the key to programme effectiveness. The "sense of community" found to be effective in this and other studies warrants greater attention in future studies to quantify its importance and strength.

This study is not without limitations. First, though group coaching focused on promoting physical activity, changes in physical activity were not measured. However, because physical activity and fitness are related (American College of Sports Medicine, 2014), improvement in physical fitness is a reasonable indicator that physical activity improved. Second, due to limited funds, this study did not include a control group or a comparison group (e.g. individual coaching). Despite these limitations, results of this exploratory study suggest that group coaching has potential to be an inexpensive and effective strategy to engage and improve the health-related physical fitness of at-risk employees, who typically do not participate in EWPs. This study provides a template for delivery of group coaching and relevant assessments that can be easily adapted to other EWP settings. Furthermore, this study paves the way for future, more rigorous studies that examine the long-term effects of group coaching, such as whether group coaching improves not only physical activity levels of employees but also their health risk profiles.

### **Acknowledgements**

The authors are grateful to the staff and students who supported this study and to the employees who participated in the study.

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