The Effects of Health Coaching in a Canadian Workplace: A Mixed-Method Approach

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ABSTRACT

Health coaching is an innovative health promotion strategy that integrates goal-oriented partnership between the client and the health coach to promote health behaviour changes, and prevent and manage chronic conditions. This study investigated the effects of six month long smartphone-assisted health coaching trial on self-reported health behaviour outcomes among Canadian employees (n=73). Participants reported general health status, physical activity, perceived stress, depressive distress, life satisfaction and health risks at baseline and completion of the program. Post-intervention interviews were conducted to gain insight into key components of health coaching that are associated with greater behaviour change and program adherence. Analyses revealed a significant increase in overall general health status ($p<0.001$). Participants reported overall positive experience under the themes: (1) "belonging and connectivity" in relation to their self-experience, the coach, and the electronic (smartphone) tools; (2)"comprehensive approaches to individual goal directions", which described achieving a comprehensive approach towards healthier lifestyle. These results have important implications for future workplace health interventions specifically that electronic connectivity aids in accountability to changes in health behaviour.

Keywords: workplace intervention, health coaching, smartphone application, health risks, health behaviour change, wellness program, healthy lifestyle

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1.0 INTRODUCTION

Statistics Canada (2010) reports that 37% of Canadian workers are highly stressed, 62% of whom report work to be the main source of their stress. Additionally, these same workers rate their mental health as being 'fair to poor'. These findings must be considered in the context of past epidemiological studies that attribute ~25% of healthcare costs to unhealthy lifestyle behaviours (e.g., physical inactivity, unhealthy dietary habits, anxiety, tobacco and alcohol consumption) (Alexander et al., 2013) which could be modified in workplace settings (Chapman et al., 2007). Given these conditions, many corporate organizations make efforts to promote modification of unhealthy lifestyle behaviours to reduce the risks employees face that can exacerbate work stress and mental health problems (Després, Alméras, & Gauvin, 2014).

The recent Sun Life-Buffett National Wellness survey involves a large sampling of Canadian companies employing fifty to several thousand employees. The survey covers health risk topics such as work-related stress, sedentary lifestyles, anxiety and depression (Sun Life Wellness Institute, 2013). As few as about 14% of companies surveyed completed a needs assessment of the health of employees, and only 9% of those reported consistently evaluating their wellness initiatives.

Despite the challenges of obtaining current data on program status, work-based interventions can potentially reach a large proportion of the adult population (Martin, Sanderson, & Cocker, 2009). It is arguably increasingly common for employers, especially for large corporations, to offer multi-faceted health management programs to improve employee health, well-being, and performance, while reducing absenteeism and rising health care costs (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009; Lamontagne, Keegel, Louie, Ostry, & Landsbergis, 2005; Martin et al., 2009; Ni Mhurchu, Aston, & Jebb, 2010).

Several industry surveys reveal employer implementation of health promotion and/or wellness programs (Grossmeier, 2013; Linnan et al., 2012) is increasing, but stronger evidence is needed to support identification of the best programs and strategies. Common workplace programs include health risk questionnaires, biometric screening, flu shots, health awareness campaigns, health information portals, telephonic nurse lines, internet based interventions, employee coaching, chronic management programs and lifestyle-based health coaching programs. These programs have shown beneficial impacts on both health behaviours and health care utilization. Beyond the improvements to employee health and well-being, effective health interventions in the workplace can be beneficial for employers as well. Health Canada (2008) estimated the cost of absenteeism due to staff experiencing role overload as between $4.5 – $6 billion/year. The Sun Life-National Buffet Survey (2013) highlights the reduction of absenteeism and increased productivity as strong motivators for wellness initiatives, signaling the recognition of many employers of the potential for more tangible benefits. Workplace interventions can help tackle poor nutrition and sedentary living leading to CVD morbidity which represent a major burden to the Canadian economy (estimated at $4.6 billion Canadian dollars in 2008) and to the economy of many other countries throughout the world.

The problem is that the scope of workplace-based health interventions for disease prevention and health behaviour change remains limited. Traditional health education interventions focus on setting and achieving behavior change through instruction, goal setting, and social support, or most commonly the distributing health information (Després et al., 2014). Telephone-based health coaching is a growing workplace intervention that has an emerging base of evidence as a common adjunct or alternative to other workplace interventions (Terry, Seaverson, Staufacker, & Gingerich, 2010). Studies that use

telephone- based health coaching in combination with another modality are very few in number (Hughes et al., 2011; Terry, Fowles, Xi, & Harvey, 2011). Furthermore, to our knowledge there has been no study that delivered health coaching in conjunction with smartphone-connected software in a corporate setting. In order to address this gap, and better understand the elements and strategies required for successful health coaching interventions in the workplace, we have conducted a smartphone-based health coaching study in a Canadian workplace. The following literature review begins with a description of various workplace health interventions approaches, followed by the exploration of emerging health coaching studies in health interventions, particularly in chronic disease care and workplace. The review on health coaching in workplace supports the rationale and hypothesis of the present study. Section 3 details the research questions, hypotheses, research design, study population, sampling procedures, instrumentation, data collection, data management and analyses. Results of this study are detailed in section 4, and implications, strengths and limitations of this study are discussed in section 5.

2.0 LITERATURE REVIEW

Workplace health interventions have used various approaches like face-to-face groups, mail-based programs, environmentally-based programs and internet-based programs to improve health behaviour and outcomes (Coffeng, Hendriksen, van Mechelen, & Boot, 2013; Kolbe-Alexander et al., 2012; Robroek, Lindeboom, & Burdorf, 2012; Terry, Seaverson, et al., 2010). In the past decade, the focus of workplace interventions has been largely on altering the built environment of the workplace (Coffeng et al., 2012; Gilson ND, Ainsworth B, Biddle S, Faulkner G, Murphy MH, Niven A, Pringle A, Puig-Ribera A, Stathi A, 2009; Matson-Koffman, Brownstein, Neiner, & Greaney, 2005), changing individual/group targeted behaviour, emphasizing physical and mental health changes

associated with health risk reduction (Naito et al., 2008; Plotnikoff et al., 2007; Sternfeld B, Block C, Quesenberry CP Jr, Block TJ, Husson G, Norris JC, Nelson M, 2009) and using Cognitive-behaviour-therapy (CBT) to promote employee physical and mental well-being (Anshel, Brinthaupt, & Kang, 2010; Marie B Jørgensen, Charlotte DN Rasmussen, Dorte Ekner, 2010). Interventions using web-based connectivity within the workplace have targeted increased participation in behaviour-change programs by introducing web-based tools like self-monitoring of food frequency and related websites devoted to increasing daily and weekly occurrence of health behaviours (i.e. exercise, diet) (Morgan et al., 2011; Robroek et al., 2012).

2.1 Definition of Health Coaching

Health coaching is defined as "a patient-centred process that entails patient goal setting and encourages self-discovery in addition to content education and incorporates mechanisms for developing accountability in health behaviours" (Wolever et al., 2013). Despite the apparent specificity of this definition, health coaching refers to diverse interventions that share the dual aims of 1) clear goal setting and 2) positive health behaviour change. The effectiveness of health coaching varies in relation to the characteristics of the health coach, participants, mode of delivery, and the duration/number/frequency of sessions. Health coaching often involves an integration of evidence-based approaches such as Cognitive Behavioural Therapy (CBT), Motivational Interviewing (MI), Acceptance and Commitment Therapy (ACT) and other patient activation strategies (Lawson et al., 2013). While CBT aims to reduce distress by modifying cognitive content and process reality (Beck, 2011), MI emphasizes reflective 'active' listening, empathy, and resolution of ambivalence towards behaviour change targets (S. Butterworth, Linden, McClay, & Leo, 2006). ACT emphasizes self-acceptance,

mindfulness, and commitment, accenting behaviour strategies that increase psychological flexibility (Hayes, 2004). An increasing number of studies indicate the effectiveness of ACT for psychological and health disorders such as chronic pain, smoking, diabetes and work-related stress (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). CBT, MI and ACT could all be categorized as patient activation approaches that involve teaching skills of question formulation and information-seeking that improve collaborations with healthcare providers of all kinds (Alegría et al., 2008).

2.2 Health Coaching and Chronic Disease Care

The inclusion of health coaching in the context of healthcare services is a growing trend. Health coaching aims to prevent chronic disease through promotion of pro-active health behaviours implemented at stages of elevated risk prior to disease onset (Chapman, Lesch, & Baun, 2007). Telephone-based health coaching programs have emerged in the past 15 years as a common adjunct or alternative to internet-based and-other health education programs (Terry, Seaverson, et al., 2010). Health coaching is an increasingly utilized counselling mode as indicated by a recent literature review that identified more than 284 peer-reviewed articles published on the topic (Wolever et al., 2013) that evaluated telephone-based interventions addressing chronic disease care. Studies reviewed showed a positive effect on health behaviours for patients with diabetes (Bray, Turpin, Jungkind, & Heuser, 2008; Sacco, Morrison, & Malone, 2004; Whittemore, Chase, Mandle, & Roy, 2001; Wolever et al., 2010), obesity (Appel et al., 2011; Befort, Donnelly, Sullivan, Ellerbeck, & Perri, 2010), cancer (Galantino et al., 2009) and the risk (Edelman et al., 2006) or diagnosis of cardiovascular disease (Vale et al., 2003; Vale, Jelinek, Best, & Santamaria, 2002). However, the review of evaluations of health coaching also found non-significant benefits on health outcomes (Butz et al., 2011; Frosch, Uy, Ochoa, & Mangione, 2011;

Leveille et al., 2009; Nguyen, Gill, Wolpin, Steele, & Benditt, 2009). The reason for this variability of effectiveness could be the heterogeneity of the samples addressed and the methodologies used in the coaching process. These mixed results suggest the need for evidence-based assessments of the conceptual and interventional components of health coaching in reducing health risks and improving health outcomes. The use of mobile phones and internet-based technology introduce unprecedented tools in support of health-related behaviour change, by facilitating responses to immediate needs while maintaining communication consistency. Incorporating newer (internet-based) technologies to enhance communication and self-monitoring in health coaching studies is a worthwhile but incomplete enterprise. Some studies have focused on interactive websites to combine self-monitoring with online exercise recommendations and food tracking in improving physical activity and weight loss (Morgan et al., 2011; Robroek et al., 2012). Other studies emphasize smartphone applications in enabling participants and coaches to maintain multiple contact channels via remote monitoring, and voice/text communications (Wayne & Ritvo, 2014). Investigating health coaching along with electronic connectivity in the worksite has the potential to reduce absenteeism and disease risks, and lower lost productivity costs (Butterworth, Linden, & McClay, 2007).

2.3 Health Coaching and Workplace

This literature search was confined to the MEDLINE database within the online York University library system, using the keywords: 'health coaching' and 'workplace', executed in April 2015. Altogether, 70 worksite clinical trials were found and articles were then selected for retrieval based on the relevance to the terms above and brief reviews of study abstracts. The studies reviewed primarily focused on health coaching as the main worksite intervention in improving health outcomes and behaviour among employees.

Articles were disregarded if they met any of the following exclusion criteria; article was not on human subjects, article was not available in English, article was not published in the past ten years, article was not from a peer-reviewed source. Additional articles were identified by looking in the references from the obtained article. Full-text articles were retrieved from the York University EBSCO database and the York University library catalogue.

Out of 70 articles returned, only five studies used health coaching as the main intervention for health behaviour change. The retrieved workplace health coaching interventions mostly focused on weight loss (Thiese MS, Effiong AC, Ott U, Passey et al., 2015), smoking cessation (Hughes et al., 2011; Terry, Seaverson, Staufacker, & Tanaka, 2011) and health risks (stress, physical activity, dietary behaviour, body mass index) (S. Butterworth et al., 2006; Grossmeier, 2013; Hughes et al., 2011; Merrill, Bowden, & Aldana, 2010; Terry, Seaverson, Grossmeier, & Anderson, 2011; Terry, Seaverson et al., 2010). Three additional articles were included by reviewing references from the above five articles (Linden, Butterworth, & Prochaska, 2009; Terry, Fowles et al., 2011; Terry, Seaverson, Grossmeier et al., 2011). The eight studies are summarized in Table 1.

Table 1. Literature Review on Health Coaching Intervention at Workplace

Study	Design	Population	Intervention/Variables	Findings
Thiese et al., (2015)	One-armed trial with exit interviews (mixed-method)	N= 13 Truck Drivers	Weekly telephonic health coaching program for 12-weeks Provided audio materials, print materials, exercise equipment, health eating tools The Study access the feasibility intervention with a weight loss goal of 10% of initial body weight	N= 12 completed the study. Weight loss 3.2 kg (p = 0.03) Exit interview derived *accountability* and *awareness* of healthier food as main themes
Hughes et al., (2011)	Randomized Controlled Trial (RCT)	N= 423 COACH group n=150 RealAge group n= 135 Control group n= 138	COACH = 12-month health coaching intervention with in-person assessment at 6-month and 12-month time period. Bi-weekly health coaching sessions RealAge = Website access which reviewed individual's risk profile, email-tips and indicated health improving areas Control group: handed printed health-promotion materials Study examined the effects of 2 interventions – compared with an education control group on self-reported participation in healthy behaviours related to diet, physical activity (PA), stress and smoking	Diet = COACH reported eating significantly more fruits and vegetables than control group at 6-month (p=0.026) and at 12-month (p <0.001). No difference for either time point for RealAge PA= COACH significantly increased more minutes of moderate PA than control group at 6 months (p=0.05) and at 12 months (p= 0.013). No difference seen for COACH vigorous PA and RealAge for either time point Stress and smoking cessation=No significant difference at either time point for any group
Terry, Seaverson et al., (2011)	One-armed trial Pre/post Quasi-experimental	N=391	Tobacco cessation program over a median of 7 months Tools used: stress management, resiliency and cognitive behavioural techniques, to engage and guide participants toward achieving their goal(s). Established SMART goals This study examined the relationship of stages of change at baseline to smoking quit rates and tobacco risk reduction	N=253 completers Tobacco risk (p = 0.130) and health status (p=0.109) are not significantly different between program completers and non-completers Among completers, a significantly higher percentage (p= 0.026) of those who were ready to

			for program completers and non-completers Variables: Tobacco risk status, health status, motivational attributes	change achieved risk reduction (51%) than those who were not ready to change (36%) and similar among non-completers
Terry et al., (2011)	One-armed Pre/Post Quasi – experimental	N= 1298 overweight and obese participants	Telephone-based weight management program over a median of 8 months Measures: weight, body mass index and lifestyle behaviour assessed via health risk assessment at baseline and 1-year follow up The study examines the long-term impact of a program by comparing weight loss and related behaviors between program completers and noncompleters	48% of program completers and 47% of noncompleters lost weight, but program completers averaged 2.6 times more weight loss than noncompleters Improvements in physical activity, eating habits, and overall health status were reported for completers
Terry, Fowels et al., (2011)	RCT	N= 320 employees Traditional Health Promotion- N= 136 Activated Consumer- N= 85 Control- N= 99	18-month intervention Measures: Health Risk Status, general health status, consumer activation, productivity, and the ability to evaluate health information This study compared a traditional worksite health promotion program with an activated consumer education program, using a personal development education program as a control group	Traditional Health Promotion = an increase in Patient Wellness Profile (PWP) composite score from 47.8 to 53.3 ($p < .001$) Activated Consumer = No significant change in PWP There were no significant changes in general health status and self-reported productivity for either of the intervention group
Terry et al., (2010)	Non-RCT	N= 6055 Health coaching group n= 3536 Mail-based group n= 2519	12-month telephone-based health coaching based on Self-efficacy, theory of behaviour change, cognitive behavioural techniques, SMART goal Mail-based program= six personalized, serial monthly mailings of educational materials related to one of the eight health topic areas previously mentioned. Each mailing was tailored to a certain	Health risks was significantly greater for health coaching completers (–0.44 ± 1.5) compared to mail completers (–0.31 ± 1.5), both groups achieved high levels of risk reduction (–10.7% vs. –7.8%) Nearly 30% of those in the health coaching program reduced back care risk,

			stage of readiness for behavior change. Measures- self-reported data on health status, chronic conditions, health risk status, motivational attributes	whereas 25.3% of those in the mail program reduced back care risk ($\chi 2$ = 13.570, p = 0.001) Health coaching program completers were 20% more likely to reduce both stress risk ($\chi 2$ = 15.953, p < .001) and weight risk ($\chi 2$ = 14.883, p = 0.001)
Linden, Butterworth & Prochaska, (2009)	Non-RCT Quasi-experimental design	N=106 chronically ill programme participants	8-month telephonic health coaching intervention based on MI technique Measures- Patient activation measure (PAM) and perceived global health status To evaluate the impact of motivational interviewing-based health coaching on a chronically ill group of participants compared with non-participants	Compared with non-participants, participants improved their self-efficacy (p = 0.01), patient activation (p = 0.02), lifestyle change score (p = 0.01) and perceived global health status (p = 0.03)
Butterworth et al., (2006)	Retrospective case-controlled design	N= 276 employees Treatment N= 145 Control N= 131	3-month health coaching intervention with a minimum of 1 initial session and 2 follow-up contacts Measures: Mental Composite Score (MCS) and Physical Composite Score (PCS) The study evaluated the impact of MI-based health coaching on the physical and mental health status of employees at a large medical university in the Northwest.	The treatment group showed significant improvement in both SF-12 physical (p = 0.035) and mental (p = 0.001) health status compared to controls

These studies on health coaching at workplace used telephone-based health coaching with applications of tools like SMART goals (Terry, Seaverson et al., 2010; Terry, Seaverson, Staufacker et al., 2011; Thiese MS, Effiong AC, Ott U, Passey et al., 2015), cognitive behavioural techniques (Terry, Fowles et al., 2011; Terry, Seaverson, Grossmeier et al., 2011; Terry, Seaverson et al., 2010; Terry, Seaverson, Staufacker et al., 2011),

motivational interviewing (S. Butterworth et al., 2006; Hughes et al., 2011; Linden et al., 2009; Merrill et al., 2010) and multiple theories of behaviour change (Hughes et al., 2011; Merrill et al., 2010).

During the early years of health coaching at workplace, Butterworth and colleagues evaluated telephone-based health coaching programs based on motivational interviewing (MI) techniques that aimed to improve physical and mental health status amongst 145 employee-participants (Butterworth et al., 2006). The case-controlled trial compared a three-month health intervention program to a usual care control group. The health coaching group had a minimum of one initial session and two follow-up sessions. Follow-up sessions were scheduled based on each participant's risk profile, needs and interests The coaching was conducted by health care professionals trained in MI in resolving ambivalence by moving through the stages of change and following up on desirable lifestyle change. The treatment group had significant improvement in the SF-36 physical (1.69 points, $p= 0.035$) and mental composite scores (4.40 points, $p<0.001$), while the control group showed no significant change on either scale. In another study, the same health coaching program was introduced to a chronically ill subset of employees, comparing health outcomes between participants and non-participants (Linden et al., 2009). The study assessed measures on chronic illness: self-efficacy for chronic illness management, patient activation, stages of readiness to change, lifestyle change and perceived health status. Per the MI model, counseling efforts focus on increasing intrinsic motivation, self-efficacy, patient activation and readiness to change. In this quasi-experimental design, both participants (n=106) and non-participants (n=230) completed a health risk survey instrument at baseline and 8-month follow-up. Compared with non-participants, participants improved their self-efficacy ($p= 0.01$), patient activation ($p = 0.02$), lifestyle change score ($p = 0.01$) and

perceived health status ($p = 0.03$). Fewer participants increased their stages of change risk over time than non-participants ($p < 0.01$), and more participants decreased their stages of change risk over time than non-participants ($p = 0.03$).

Similar to the Linden et al., 2009, a RCT study addressed employees at high risk for coronary disease or premature mortality (Terry, Fowles et al., 2011). The RCT compared two intervention groups; a traditional health promotion group (n=136) and an activated consumer group (n=85) to a minimal-treatment control group (n=99). The traditional health promotion group used MI techniques to help participants improve lifestyle choices, focusing on lifestyle and disease management with 2 in-person visits and 11 telephone calls over 18 months. The activated consumer program used health coaching focused on health care decision making with 1 in-person visit and 6 telephone calls over 18 months. The control group received information every three months based on personal development topics. Health risks were obtained by a Patient Wellness Profile (PWP) that assessed lifestyle factors such as exercise, nutrition, stress and tobacco use. Workers productivity was measured by Health and Worker Performance Questionnaire short-form and patient activation measures were measured by Patient Activation Measure (PAM). The traditional health promotion group had an increase in PWP composite score from 47.8 to 53 ($p < 0.001$), whereas active consumer group showed no significant change. There were no significant changes in general health status for any of the study groups, it improved in all the groups and self-reported productivity did not improve for any intervention groups. All three groups showed improvement in their ability to recognize reliable health websites.

Terry and colleagues compared a 12-month telephone-based health coaching program (n= 3536) to a solely mail-based program (n= 2519) (Terry, Seaverson, et al., 2010). This non-randomized study compared the impact of these two programs on health

risk status and behaviour-specific risk reduction. The health coaching program focused on stress management/resiliency, stages of change and cognitive behavioral techniques, to engage participants to achieve their SMART goal(s). Mail-based group received six personalized sets of monthly educational materials in their program. The health coaching group achieved a significantly greater health risk reduction than the mail-based group in health risks related to back care, physical activity and stress management. Both groups achieved high levels of cumulative health risk status reduction (-10.7% for health coaching vs, -7.8% mailed programs).

Terry and colleagues used the same health coaching approach to see effects of the program on tobacco cessation in another study (Terry, Seaverson, Staufacker, et al., 2011). The study used a pre/post, quasi-experimental design to examine intervention effects on tobacco use (cigarette smoking quit rates and tobacco risk reduction) between program completers (n=253) and non-completers (n=138) over a median of 211 days (range from 1-451 days). Tobacco risk ($p = 0.130$) and health status ($p=0.109$) were not significantly different between program completers and non-completers. Amongst participants, 42% of those who completed the tobacco cessation program reduced self-reported tobacco risk compared to 37% of those who did not complete the program.

An RCT conducted by Hughes et al., 2011 compared a 12-month traditional health coaching intervention (MI + cognitive behaviour techniques) termed COACH (n=150) with a web-based intervention, termed RealAge (n=135) to a control group (n=138) in older workers in Chicago, Illinois, US (Hughes et al., 2011). The COACH group employed an implementation plan, health coaching sessions and in-person assessments at 6 month and 12 month time points. During months 1 through 6, health coaching sessions were delivered bi-weekly and during months 7 through 12, sessions were delivered monthly via telephones or

emails. The RealAge group was assigned a web-based program addressing multiple prevalent chronic disease conditions. The control group received printed health promotion materials and web-based risk assessment. The COACH group experienced three times more positive outcomes than the RealAge group at 6 and 12 months for diet and physical activity, when both interventions were compared with the control group. The COACH group reported eating significantly more fruits and vegetables than control group at 6-month ($p=0.026$), at 12-month ($p <0.001$) measured by National Cancer Institute's All- Day Fruit and Vegetable Screener Questionnaire. The COACH group significantly increased more minutes of moderate physical activity than the control group at 6 months ($p=0.05$) and at 12 months ($p= 0.013$). No difference for either time point was found for the RealAge group. There were no significant differences amongst groups for perceived stress and rates of smoking cessation (RealAge or COACH relative to control group) at either time point.

The most recent one-armed study conducted to evaluate health coaching intervention focused on n=13 truck drivers who aimed to achieve a weight loss goal of 10% of their initial body weight (Thiese MS, Effiong AC, Ott U, Passey et al., 2015). The 12-week health coaching program focused on successes and barriers in healthy eating and physical activity. The health coach touched on the three SMART goals set and asked the drivers what they would like to focus on for the next week. The Health coaching program used regular telephone-based sessions in addition to employing print materials, home-based exercise equipment and healthy diet-tracking tools. There was a significant weight reduction from baseline, 125.6 (38.7) kg to exit, 123.5 (44.4) kg in 13 drivers ($p= 0.03$) however, only 4 drivers reported loss of 5% or more of their starting body weight at follow-up. Researchers also obtained exit-interviews from 12 drivers post-intervention. Exit interviews were not analyzed qualitatively but use as feedback on the elements of the

program that worked and did not work. Drivers indicated that the health coaching sessions were the main factor that attributed to the weight loss. Health coaching reportedly increased *awareness* of healthier food and *accountability* to the health coaches. Drivers stated that they would prefer longer study duration in the future, suggesting an additional 6–12 months in order to complete study goals and adjust to the changes in lifestyle.

2.4 Limitations of Health Coaching Studies

While these programs are interesting and indicate some effectiveness in reducing health risks, these are inconsistent effects complicated by varied measurement approaches and design weaknesses. The health coaching delivery duration ranges from a minimum of 12-weeks (Thiese MS, Effiong AC, Ott U, Passey et al., 2015) to 18-months (Terry, Fowles et al., 2011). Only one study conducted exit-interviews and reported employees' feedback on health coaching program, which is important for understanding the modalities used and future implication of the program (Thiese MS, Effiong AC, Ott U, Passey et al., 2015).

Moreover, none of these aforementioned studies have looked into the responsiveness and efficacy of health coaching in comparing males and females. Studies have shown that females are more likely to enroll in the health coaching studies (Grossmeier, 2013; Terry, Fowles, & Harvey, 2010) and continue in the health coaching intervention (Merrill et al., 2010) but if females are more responsive to health coaching program is still unknown. Research is required to compare sex differences in evaluating health coaching program in workplace.

Given program budgets, goals, and demographic targets, there is a need to determine the most effective levels of intervention intensity and identify those modalities that are most appropriate to effectively change target health behaviours (Allen, Lewis, & Tagliaferro, 2012; Leveille et al., 2009; Terry, Seaverson et al., 2010). Given the increasing importance

of workplace health promotion, innovative intervention solutions (e.g. new program delivery modalities, new theoretical frameworks) with low intensity (and costs) but high levels of effectiveness are desirable. Some reviewers have recommended a research focus on generalizability, program dissemination, and behaviour change maintenance (De Bourdeaudhuij, Stevens, Vandelanotte, & Brug, 2007; Hughes et al., 2011; Terry, Seaverson et al., 2010). Other reviewers have identified three levels of integration believed important in health coaching interventions: Level 1 (internal) integration focuses on individual tracking, reminders, referrals and selective information sharing; level 2 integration (organizational) focuses on connecting health promotion programs to other relevant health-related activities; and level 3 (external) integration focuses on external and internet-based resources, tracking and health information (Chapman et al., 2007). Despite such observations and theoretical speculations, the need for more precise research is clear.

3.0 RESEARCH METHODS

3.1 Research Questions

This study had two major research objectives:

a) Evaluate whether participation in a 6-month health coaching intervention improve self-reported health status, physical activity, life satisfaction, and reduce health risks (perceived stress, depressive distress) for optimal health.
b) Determine what elements of the health coaching process, as identified by intervention participants in semi-structured interviews, were associated with positive behaviour change outcomes, including program adherence.

3.2 Research Design

Mixed Methodology – Sequential Explanatory Design

This study conducts a quantitative single armed study to evaluate smartphone-assisted health coaching intervention in a large Canadian corporation on self-reported health behaviour outcomes.

As the subjective experience of the client-coach relationship is central to health coaching effectiveness, the inclusion of qualitative analyses of semi-structured post-intervention interviews was intended to delineate important factors in these relationships. These factors include elements of the health coaching intervention deemed most helpful and least helpful by participants in improving greater behaviour change and program adherence. This mixed-method design provides opportunities for presenting a greater diversity of views and can provide stronger interpretations of the intervention (Teddlie & Tashakkori, 2009). The present study used a sequential explanatory design using quantitative data and results to provide input for the interviews (Plano-Clark & Creswell, 2008). Figure 1 represents the data collection and analysis procedure.

Ethics approval was been obtained from Human Participants Review Committee (HPRC), York University Research Ethics Board in Ontario, Canada.

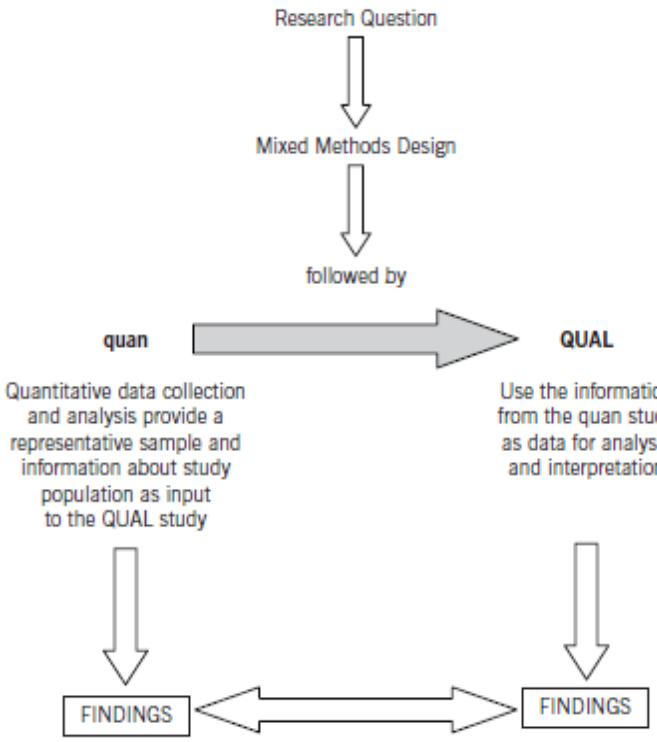

Figure 1. Mixed Methodology – Sequential Explanatory Design (Hesse-Biber, 2010)

3.3 Hypotheses

Based on the reviewed literature and the general research objectives outlined above, this study tested the following sets of study hypotheses:

1) Health coaching program will improve health behaviour outcomes at post-intervention measures for all participants.
2) Females are more responsive to the delivered health coaching program.
3) The smartphone application would effectively support the health coaching program.

4) Co-monitoring of the weight, food intake and exercise on health coaching online portal would increase the intake of healthier foods and the frequency of physical activity.

3.4 Sample and Selection Criteria

3.4.1 Sample

In this study, employees of a large Canadian corporation (Rogers Communications, Inc.) were recruited from worksites in Toronto and Brampton, Ontario to participate in a six-month health coaching intervention aimed to reduce health risks: perceived stress, depressive distress, physical inactivity, and improve health behaviour and outcomes. Employees were informed about the study using email, poster, and brochure advertisements distributed around the offices and in the on-site health clinics at both campuses. In addition, promotional events at worksites were conducted by the health coaches and the Principal Investigator, Dr. Paul Ritvo.

3.4.2 Inclusion Criteria

Participants were required to meet the following criteria: be a Rogers employee or a spouse of a current Rogers employee, be age 18 years or older, and be fluent in English.

3.4.3 Recruitment and Consent

Participants were recruited using a variety of methods including snowball sampling at Rogers' worksites in Brampton, ON and Toronto, ON between April and November of 2013. At the site-based recruiting events, posters and item giveaways were useful in establishing person-to-person contacts during 'health fairs'. These events were closely coordinated with and supported by the onsite healthcare providers, the employee wellness program, and associated health centre staff. Email advertisements were also sent to

employees describing the program and providing contact information. Participants could join by calling investigators directly, or by contacting the local health centre, who would in turn connect them to us. By offering multiple methods of establishing initial contact, we hoped to ensure participants were comfortable with our presence in the workplace, while assuring that participants could initiate contact and participate in the study without any exposure to their employer. Participant confidentiality was carefully maintained, although participants generally were open about participation, and spoke freely in the workplace to encourage others to join the study. These initial recruitment efforts were followed up by telephone and email contact, where study objectives were further explained, informed consent was obtained, and any questions or concerns were addressed.

3.5 Procedure

Participants were given access to an online questionnaire package consisting of an informed consent document (see appendix A) and a questionnaire consisting of a number of self-reported measures (see appendix B). The individual electronic consent informed individuals that their de-identified data might be used for research purposes. Self-report measures were collected regarding physical activity, self-reported general health, perceived stress, depressive distress, and health risks at baseline and 6 month follow-up. Participants were contacted via telephone and/or e-mail at the completion of the health coaching intervention to request their participation in semi-structured interviews (see appendix C) and those who agreed were scheduled for interviews, which were conducted by telephone, audio recorded, and then transcribed. Two trained interviewers conducted this process and transcribed the audio along with research assistants. The collected data was maintained in a secured, password-protected online storage.

The following questionnaires were administered at baseline and 6 month follow up: International Physical Activity Questionnaire (IPAQ), Satisfaction with Life Scale (SLS), Perceived Stress Scale (PSS), Self–Rated Health (SRH), Centre for Epidemiologic Studies Depression Scale (CES-D), Manulife Health Risk Assessment (HRA), and a demographic questionnaire that focused on age, gender, marital status, ethnicity, income, education and employment status (see appendix B). Participants were reached out to conduct semi-structured interviews (SSI). Concurrent design of Data from the questionnaire packages was triangulated with the qualitatively analyzed interview responses.

3.6 Health Coaching Intervention

3.6.1 Health Coach Program

Each participant worked with a health coach to establish a goal for the intervention at the first phone call by using SMART goal setting principles (**S**pecific, **M**easurable, **A**ttainable, **R**elevant and **T**imely) from the perspective of participants. During the first health coaching phone call, the health coach explained how to access and operate the smartphone application (Nex J Systems, Inc.), and the related online portal. This initial phone call determined the initial frequency and schedule for telephone-based health coaching sessions. Educational materials on goals and other web-based resources were provided if deemed helpful. Health coaches logged all phone calls and other communications on the online portal, which was also visible to participants when they logged in using established accounts. Once an employee decides on the intensity-frequency-duration of health coach contacts, it's possible to detect non-adherence lapses quickly so supportive-corrective responses can be enacted while the pattern of non-adherence is unfolding. Overall, each client-health coach communication can vary in call frequency and duration but reminder and reinforcement messages of different kinds can, theoretically, be

sent to clients at any hour of day-evening, enabling interactions that purposefully blend with the client's daily lifestyle. Such 'just in time' communications need not be lengthy in duration if they coincide with important experiences of change in client-participants. The health coaching intervention consisted of three components:

1. Telephone-based Health Coaching Sessions:

Telephone-based health coaching sessions were scheduled once per week with a consistent day/time when possible by assigned health coaches. There was no set duration for the sessions, and they varied between 15-120 minutes, with an average duration of 60 minutes per week across all participants. If the health coach called the participant at the appointed time and the call was missed, he/she left a voicemail with a request to return the call. All the sessions, when conducted, centered on the client's interests and perceived needs, and focused on discussion of participants' goals, progress and challenges in lifestyle change. Phone sessions were supplemented by text messages and email exchanges throughout each week per the interest of the employee and by health coach (and study supervisor) judgment.

2. Health Coach - Smartphone Application:

The Health Coach application allowed clients to record food intake, exercise routine, stress level, mood, and weight once, or at multiple times, each day (Figure 1). Food intake tracking was advanced by a photo-journaling feature, enabling participants to take photos of their meals during the day. After the photo was taken, users were able to input the source of the food (homemade, restaurant) and rate the healthiness of the food consumed. Participants were provided with smartphones pre-installed with the health coach app, if they did not own one.

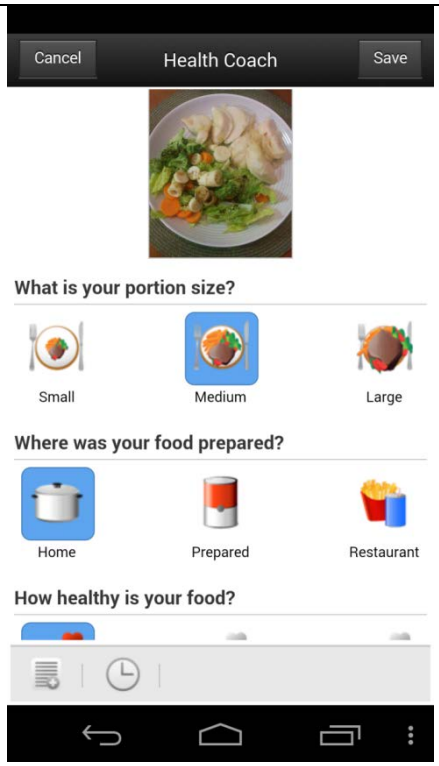

Figure 2. Screenshot of the Health Coach Application

3. Online Portal:

The participant's measured activity and other measures were displayed on the web portal with line graphs and scatterplots (Figure 3). All meal photos were shown according to the day of photographing in a different menu, and data on the source of food, healthiness could also be plotted on a variety of illustrative graphs adjustable by the participant and/or the health coach.

Figure 3. Screenshot of Health Coaching Online Portal

3.6.2 Health Coach Personnel

The health coaching program was primarily delivered by university students, some of whom were certified personal trainers, kinesiologists, and/or exercise physiologists. These individuals had or were in the process of gaining degrees in health education, kinesiology, public health, and/or psychology. There were 10 health coaches who were randomly assigned participants throughout the program.

3.6.3 Health Coach Training

Health coach training was carried out in weekly seminars and teleconferences, supplemented by access to training manuals. Seminar training involved interactive role-plays, lectures on therapeutic alliance and use of case studies with other health coaches, supervised by a registered clinical psychologist (Dr. Ritvo). Weekly teleconferences were

also held with the study coordinators (senior PhD students N. Wayne & D. Perez) for training and team-building and to discuss high risk or unusual cases. The training manual covered four main sections. The first section covered psychotherapeutic models of behaviour change (e.g., cognitive behavioural therapy, motivational interviewing, acceptance and commitment therapy, relationship-based therapies) as well as case studies. Emphasis was placed on non-directive coaching styles that involved precise reflective listening and empathic expression. The second section focused on the importance of electronic (smartphone/internet-based) connectivity and co-monitoring. The third section focused on key clinical data on chronic and co-morbid conditions, and their impact on behaviour change. The fourth area focused on strategies for communication using phone calls and emails. All coaches were trained to use the NexJ platform.

3.7 Measures

3.7.1 Self-Report Measures

International Physical Activity Questionnaire (IPAQ) - Long form (Craig et al., 2003)

The items in the long IPAQ form provide separate domain specific scores for walking, moderate-intensity and vigorous-intensity activity within work, transportation, domestic chores and gardening (yard) and leisure-time domains. Computation of the total scores for the long form is done by summation of the duration (in minutes) and frequency (days) for all activity types in all domains. IPAQ evaluates physical activity in both categorical and continuous indicators. Categorical analysis categorizes total physical activity in three domains: inactive, minimally active and highly active based on physical activity recommended for adults in current public health recommendation (Haskell et al., 2007). Reliability of the measures to categorize participants into these categories was 0.44 (95% CI = 0.27-0.89) among 106 diverse American population (Evenson & Mcginn, 2005).

Continuous variables are analysed by its energy requirements as defined in METs (METs are multiples of the resting metabolic rate) to yield a score in MET-minutes and reported in median. The test-retest reliability values for long form-IPAQ averaged 0.80 in a study of 1880 adults with a median of 3699 MET-min reported weekly (Craig et al., 2003). The questionnaire also provides composite measure of sitting that has been tested with a validity coefficient of 0.75 among 46 healthy males and females (Hagströmer, Oja, & Sjöström, 2006).

The Satisfaction with Life Scale (SLS) (Diener, Emmons, Larsen, & Griffin, 1985)

The SLS is a 5-item questionnaire that measures general life satisfaction. The questionnaire is evaluated by scoring 7-point scale ranging from "strongly agree" to "strongly disagree." SLS was determined to have good internal consistency with a Cronbach's alpha of 0.87 (Diener et al., 1985). It strongly correlates with personality indicators of well-being and shows a correlation ranging from 0.814 to 0.887 with social activities-related, self-reported daily life satisfaction scale (Okamoto, 2010).

Perceived Stress Scale (PSS) (S. Cohen & Williamson, 1988)

PSS is the most widely used 10-item psychological instrument for measuring overall stress as observed during the preceding month. It is a measure of the degree to which situations in one's life are appraised as stressful. PSS has shown high internal consistency across different samples and test-retest reliability, and has been associated with objective measures of physiological dysregulation (i.e. cardiovascular, metabolic, and inflammatory risk factors) and stress hormone concentrations(S. Cohen & Williamson, 1988). PSS scores are obtained by reversing responses (e.g., 0 = 4, 1= 3,2 =2, 3=1 & 4 = 0) to the 4 positively stated items (items 4,5,7 & 8) and then summing across all scale items.

The Cronbach's alpha values of the full scale is calculated among general Greek population (n=941) mainly including full-time employees to be 0.82 (Andreou et al., 2011).

Self- Rated Health (SRH) (Idler & Angel, 1990)

SRH is an item scale questionnaire asking to rate health in general from a range from "Excellent" (lowest number, 1) to "Poor" (highest number, 5). It was used in the National Health Interview Survey and was found to be an excellent predictor of future health with a test-retest reliability of 0.92 when tested among 1,129 participants with chronic disease (Loring, Stewart, Ritter, González, & Laurent, 1996).

Centre for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977)

The CES-D is a 20-item questionnaire designed to measure self-reported depressive symptoms in general population. The possible range of scores is zero to 60, with the higher scores indicating more symptoms, weighted by frequency of occurrence. Responses indicate the frequency of experiencing psychologically distressing symptoms on a 4-point likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Past studies have shown a high degree of reliability and validity with Cronbach's alpha values of 0.85 and 0.90 for the general population and for psychiatric populations respectively (Wada et al., 2007). The significance of depression as an indicator is suggested by its correlations with medical expenditures, health care service use, chronic disease risks and workplace injuries (Swaen, van Amelsvoort, Bultmann, Slangen, & Kant, 2004). Participants having a total CES-D score of less than 16 across all 20 questions are not evaluated as clinically depressed.

Manulife Health Risk Assessment (Manulife-HRA,2014)

Manulife HRA assess the change in risk status of the most important behaviour change area; diet, physical activity, smoking, alcohol intake, sleep, social ties, coping with

stress, workplace hazards, sun exposures and doctor visits. HRA was developed from multiple scales and national consensus standards by Manulife, Inc. to categorize health behaviours into low, medium and high-risk levels statistically correlated with coronary heart disease incidence and severity, health care costs and work productivity gains and losses. For example, sleep health risks are analyzed based on items from the Epworth Sleepiness Scale which has a Cronbach's alpha of 0.88 for patients with sleep disorders and 0.73 for students (Johns, 1992). The Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Social Support Instrument (ESSI) is used to measure health risks associated with varying levels of social support. The Cronbach's alpha value for the ESSI is calculated from data on 155 patients with acute myocardial infarction and reported as 0.86 (ENRICHD Investigators, 2000). Other risk categories pertaining to diet, smoking and alcohol intake were based on national consensus standards (Butt, Beirness, Stockwell, Gliksman, & Paradis, 2011; Health Canada, 2014; Public Health Agency of Canada, 2011). Participants completed the HRA and their reported risk scores were grouped in categories relevant to general health and chronic illness prevention.

Demographic Questionnaire

This questionnaire provides information on age, gender, marital status, ethnicity, language, income status, educational status, and employment status.

3.7.2 Semi-Structured Interviews

Participants participated in digitally audio-recorded, one-on-one, semi-structured interviews over the phone at the completion of six-month program. Interview duration was 30-45 minutes and was conducted by two interviewers. Initial interview guides were developed based on research team discussion. The interview questions began with the question, "To get started off, you can tell me why you decided to sign up for the study," and

then focused on program design, communication, impact, health coach software, future directions, health behaviour goals and program issues (appendix C for the full structured interviewed script). The wording of interview questions was purposely flexible to enable interviewers to support elaborations of subject responses on appropriate topics. All interviews were transcribed verbatim by two independent graduate students.

3.8 Data Analyses

All data was examined for normality prior to statistical testing. Comparisons of demographic, and physical and psychometric data between completers and non-completers were conducted using independent t-tests and Fisher's exact test of independence (Table 2).

The effect of the intervention was analyzed by mixed-design analysis of variance (ANOVA) within the same group (pre vs. post intervention) with two factors (independent variables): one factor is a within-subjects factor (i.e time) and the other factor is a between-subjects factor (i.e. gender). Significant interaction effects were set to the alpha level of 0.01 (Bonferroni Type 1 error rate correction) for all multiple comparison tests to reduce type 1 errors and the chance of false positives. For categorical analysis, the alpha level value of 0.05 was divided by number of comparisons used in the categorical analysis.

Results of ANOVA were interpreted using F statistic values (F), significance values (p) and effect size eta squared (η^2). In interpreting effect size for ANOVA, guidelines of Cohen (1988) were followed for small ($\eta^2 = 0.01$), medium (0.06), and large (0.14). Comparisons of means results are provided with means (M) and standard deviation (SD).

For the categorical data, an exact McNemar's test (2x2 table) was used to evaluate change in health risk categories between pre vs post intervention. Results of these tests were interpreted using p-values. Quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS Statistics, 2013). Outliers in the current analysis were checked,

where possible, to see if the data was incorrectly measured, recorded, entered or otherwise manipulated. Missing data was treated as missing (not imputed).

The interview transcripts were imported into QSR NVivo (NVivo for Mac, 2014). A constant comparative method was used in thematic analysis of the interviews. In this process, the analysis is performed through the process of coding and undergoes multiple phases. These phases include familiarization with data, generating initial codes, searching for themes among codes, reviewing themes, defining and naming themes, and producing the final report (Guest, MacQueen, & Namey, 2012). After familiarizing myself with the data, open coding was employed to put ideas from the transcripts into codes according to idea meanings. Transcripts were coded line-by-line to identify meaningful phrases and/or paragraphs. The initial coding was inclusive, and multiple codes were assigned where necessary. The second stage of coding involved searching for themes and their subcategories according to the similarity of patterns or topics discussed. The third stage involved integrating and differentiating meanings between subcategories, and reviewing the themes. These themes were later defined and reduced to underpin concepts and patterns that formed the core themes. The data were reanalyzed throughout this process until no new themes or subcategories emerged.

4.0 RESULTS

4.1 Data Preparation

Health Risk Categories. The 'moderate' and 'high' risk categories were combined into one, high category to perform 2 x 2 classification table for two sample McNemar test.

4.2 Recruitment

Out of 86 individuals who completed the informed consent form, 73 individuals (25 males, 48 females) proceeded to join the study, complete the initial questionnaires, and

initiated health coaching. Twenty-one participants dropped out for a variety of reasons, but a plurality of those who provided a reason for drop-out indicated a lack of time or interest in continuing. Fifteen participants completed the health coaching intervention, but did not complete the exit questionnaires. A total of 37 participants completed both pre and post-intervention survey measures, and 30 participants participated in the post-intervention qualitative interviews. The flow of participants is shown in Figure 2.

4.2.1 Participant Characteristics

Participants were predominately female (65%) ranging from 23 to 62 years of age, with a mean age of 39.56 (SD= 10.12). Most participants had some post-secondary education with 46.9% having a University degree, 25% having a College diploma and 9.4% having a graduate degree. Table 2 contains baseline demographic, physical and psychometric characteristics between completers and non-completers. No significant differences were found in the demographic characteristics of completers and non-completers (Table 2). In addition to non-significant group difference in demographics, there were no significant difference with respect to physical and psychometric measures ($p>0.05$). The missing data in both completers and non-completers made it difficult to analyze group differences among all 73 participants.

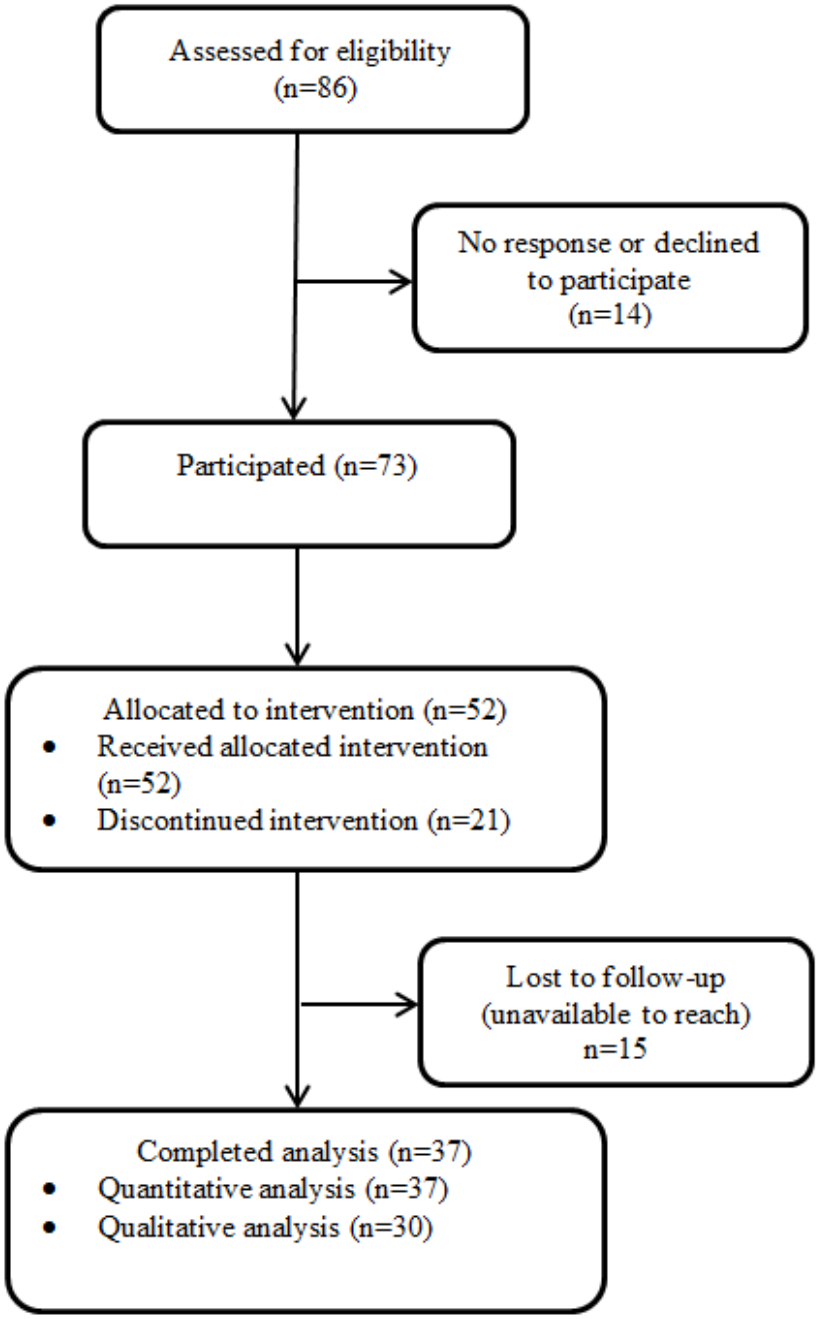

Figure 4. Flow diagram of participants through the study

Table 2. Demographic, Physical and Psychometric Measures at Baseline

Measures	Completers	Non-Completers / Lost to Follow-up	P-Value (p)
Gender n (%)	37	36	
Male	13 (35.1%)	12 (33.3%)	0.534[1]
Female	24 (64.9%)	24 (66.7%)	
Age (years) *(SD)*	39.30 (10.12)	39.20 (9.17)	0.308[1]
Total	36	30	
Ethnicity n (%)			
Total	32	36	0.326[2]
Hispanic/Latin-American	1 (3.1)	1 (2.8)	
African	2 (6.2)	1 (2.8)	
Caribbean	5 (15.6)	3 (8.3)	
South Asian/West Asian	6 (18.8)	15 (41.7)	
Asian (Chinese, Filipino, Japanese, Korean)	6 (18.8)	2 (5.5)	
Caucasian	9 (28.2)	13 (36.1)	
Aboriginal	1 (3.1)	0 (0)	
Arabic	2 (6.2)	1 (2.8)	
Education n (%)			
Total	32	36	0.299[2]
High school/vocational/trade school/ certificate	1 (3.1)	5 (13.9)	
College diploma	8 (25)	8 (22.2)	
University degree	15 (46.9)	11 (30.6)	
Graduate Degree	3 (9.4)	5 (13.9)	
Others	5 (15.6)	7 (19.4)	
Perceived Stress *M (SD)*			
Scores	17.51 (6.07) (n = 35)	17.45 (6.20) (n =31)	0.780[1]
General Health *M (SD)*			
(1-5:Excellent->Poor)	3.36 (1.01) (n =36)	3.11 (0.85) (n = 36)	0.236[1]
Life Satisfaction *M (SD)*			
Scores	21.45 (6.16) (n =37)	21.40 (6.37) (n =35)	0.804[1]
Physical Inactivity *M (SD)* (Seated hrs/day)	10.54 (4.02) (n =38)	8.80 (3.10) (n =45)	0.153[1]
Depressive Distress *M (SD)*	13.48 (8.45)	11.96 (8.33)	0.822[1]
Risk Scores	(n = 35)	(n =30)	

Note. SD= Standard Deviation; M= Mean. [1.] p-value based on independent sample t-test. [2.] p-value based on Fisher Exact test for more than two categorical variables.

4.3 Hypothesis Testing

4.3.1 Quantitative measures

Participants reported significantly improved self-reported general health status ($F_{(1,34)=} 20.58, p<0.001, \eta^2 = 0.37$) at 6 months post-intervention. There were no significant findings for any other outcomes ($p>0.05$).

Table 3. Results of Health Coaching on Primary Outcome Measures

		(T1-T2)		Within Subject factor		
Measures	N	T1 Mean (s.d)	T2 Mean (s.d)	F	P	η^2
General Health[1] (1-5:Excellent->Poor)	36	3.36 (1.01)	2.83 (0.87)	20.58	<0.001*	0.37
Life Satisfaction[2] (5-35 score)	37	21.45 (6.16)	23.45 (6.47)	5.81	0.02	0.14
Perceived Stress[3] (10-40 risk score)	32	17.46 (6.28)	15.31 (6.98)	4.15	0.05	0.12
Physical Inactivity (Sitting-hours/day)	31	10.42 (4.26)	9.5 (3.88)	0.78	0.38	0.026
Depressive Distress[5] (0-60 score)	33	13.66 (8.68)	12.42 (11.21)	0.72	0.40	0.02

Note. Data is presented as mean (standard deviation); Within-Subject analysis: p-value reported for ANOVA when adjusting for baseline value. [1] reported by General Health Scale; [2] reported by Satisfaction with Life Scale; [3] reported by Perceived Stress Scale; [4] reported by International Physical Activity Questionnaire; [5] reported by Clinically Epidemiologic Scale- Depression; T1 = Time Point 1 (baseline); T2 = Time Point 2 (post-test)

The gender * intervention interaction effect. Participants showed no significant effect on gender * intervention interaction in any of the outcome measures [self- reported health ($F_{(1,34)=} 2.96, p = 0.09, \eta^2 = 0.08$), perceived stress ($F_{(1,30)} =1.02, p= 0.32, \eta^2 =$ 1.22), life satisfaction ($F_{(1,35)} =1.49, p= 0.23, \eta^2 = 0.04$), sitting minutes ($F_{(1,30)} =1.72, p=$

0.20, $\eta^2 = 0.05$) and depressive distress scores ($F_{(1,31)} = 0.53$, $p = 0.47$, $\eta^2 = 0.01$) respectively]. The changes in outcome measures are shown in Figure 5.

Physical Activity

Participants showed a non-significant improvement in physical activity ($p = 0.127$) with almost 54.3% reporting minimally active, 31.4% highly active and 14.3% reporting inactive at 6 months follow up.

Table 4. Physical Activity Cross Tabulation

	Post Intervention			
	Inactive	Minimal Active	Highly Active	Total
Pre Intervention				
Inactive	1	9	1	11
Minimal Active	2	8	3	13
Highly Active	2	2	7	11
Total	5	19	11	35

N=35 P>0.05

Health Risk Changes

Most of the participants self-rated as "Low-risk" in categories like smoking habits (n= 68.6%), drinking habits (n=88.5%), social ties (n=50%), and sleeping (n=85.3%) at baseline. At follow-up, participants reported no statistically significant reduction using an exact McNemar's test in these risk categories ($p>0.01$), due to the number of categories being tested. However, participants did report a 7.7% reduction in drinking habits, 9.4% reduction in social ties, 16% reduction in stress, 8.54% reduction in smoking cessation and 5.9% reduction in sleep health.

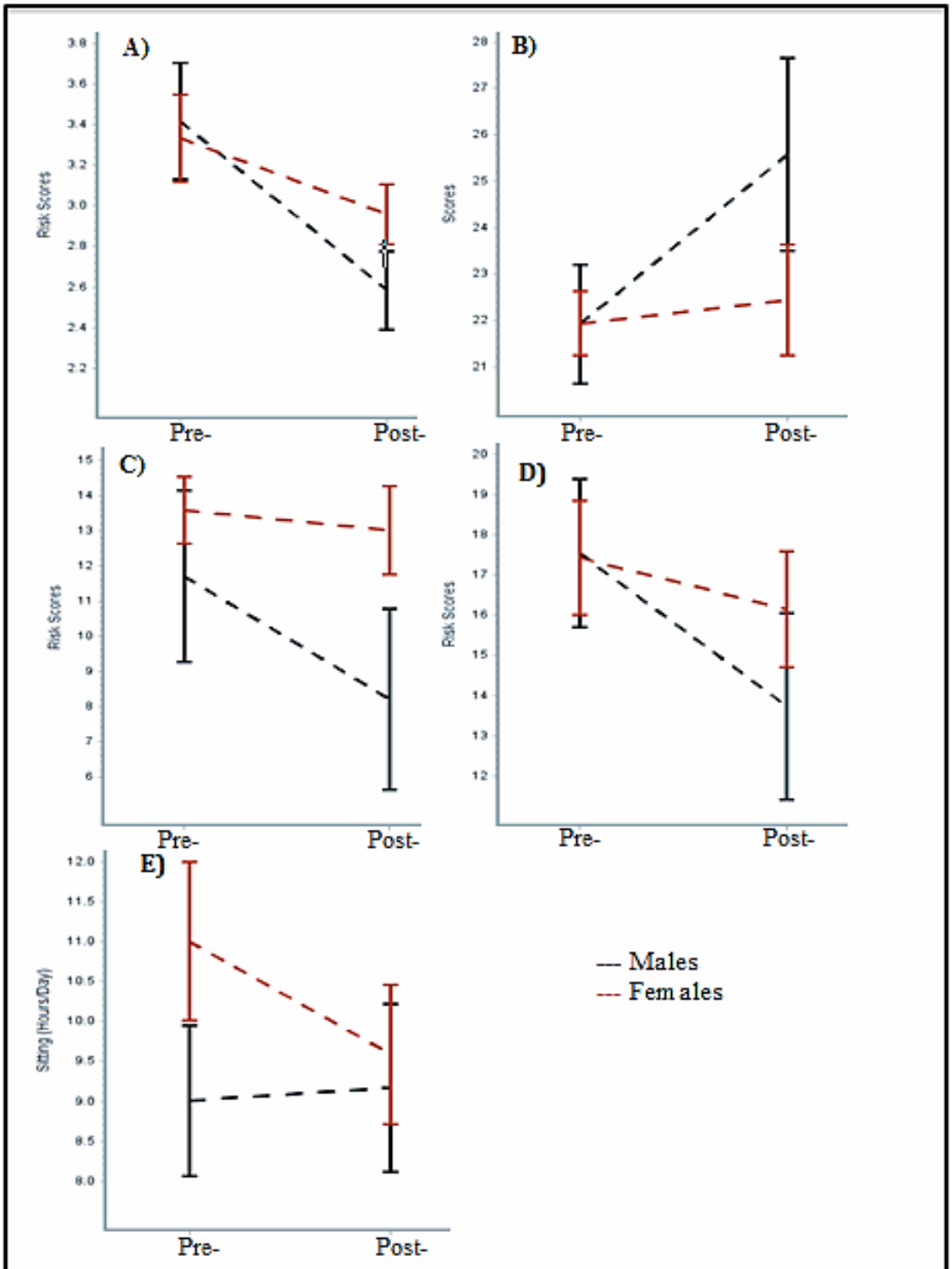

Figure 5. Mean (± SEM) changes in self-rated health (**A**), satisfaction with life (**B**), depressive distress (**C**), perceived stress (**D**), and physical inactivity (**E**) among males and females.

4.3.2 Qualitative Themes

In total, 30 interviews were thematically analyzed, with apparent saturation reached after 26 interviews (all interviews were coded regardless). Initial analysis of the interviews identified over 50 codes that were grouped into three fundamental categories: (1) health coaching and its influence on health behaviour (2) feedback on health coaching program; (3) sustainability of health behaviour changes. The themes identified in these categories were related to two core ideas: "belonging and connectedness" and the value/importance of "comprehensive approaches to individual goal directions." "Belonging and connectedness" became apparent as a theme after the first several interviews and was discussed by nearly every participant. Additional analyses revealed codes that appeared to represent responses to '"comprehensive approaches to individual goal directions." These themes provided a better understanding of the changes in health behaviours and achievement of health behaviour goals.

Core Theme 1: "Belonging and Connectedness"

This core theme pertained to all intervention participants and their overall experience in the health coaching intervention program. The core theme is furthered explained in codes by referencing a sense of *belonging* to and *connectivity* with: 1) their 'self' experience; 2) the coach; 3) the electronic (smartphone) tools. Illustrative quotes from interviews are provided in Table 5.

Belonging *to* and Connectedness *with* their 'self' experience;

Self-acceptance and Awareness

The focus on self-acceptance was identified as a distinctive feature of the health coaching program, and was perceived to increase self- awareness and self-support.

Accountability

Participants consistently reported positive interactions with their health coach and many provided specific examples of the ways in which their relationship provided accountability. They cited the importance of having someone who provided direction, reviewed their self-reports and personal reflections, and provided structure to their efforts to make health behaviour changes.

Belonging *to* and Connectedness *with* the coach

Therapeutic Alliance

Participants described their health coaches as resourceful, patient, thoughtful, supportive and good reflective listeners. Many stated that they felt responsible to report back and did not want to let the health coach down about how they were progressing with their health behaviour goals. This proved to lead to an interesting negotiation between the desire to demonstrate improvements and the desire to be honest with their trusted coaches. Some participants who were evasive or misleading about health changes in conversation with coaches were nevertheless honest when reporting the same behaviours through the app interface, or vice versa (i.e., by not logging unhealthy behaviours on the app, but openly discussing them in conversation). The health coach played an important role in helping clients navigate their unique life circumstances, particularly in navigating episodes of ambivalence, relapse and contemplation while enhancing adherence to health behaviour changes.

Personality Match

In the coaching relationship, the matching of personality (particularly introversion/extroversion) between coaches and participants was important in the success of coaching, and in the capacity for making meaningful progress towards goals. A majority of participants emphasized how good their relationship with their health coach was, and how

important that was to progress towards their goals. In contrast, a small number of female participants talked about feeling mismatched with their health coaches. Only one of these participants requested (and received) a change of coach from a male to a female. Interestingly, this participant's main concern related to her perception of her coach as somewhat subdued or introverted and a desire for a more 'energetic' or outgoing coach, and no particular concern with the coaches' gender was raised.

Belonging *to* and Connectivity *with* the Electronic (Smartphone) Tools

Co-Monitoring / Accountability

Some participants indicated co-monitoring (with the coach) stimulated reflection on portion sizes and, by doing so, increased the likelihood of consuming smaller portions throughout the typical week. Participants viewed the food photo-journaling and exercise trackers as particularly important tools in "accountability" to the health coach.

Technological Challenges

Most of the participants were technologically adept and operated multiple applications on their smartphones, which was expected given the population and industry being studied. Several participants ran into problems with software that was incompatible with their personal smartphones, some software bugs, and usability issues that affected connectivity and program adherence.

Table 5. Qualitative Themes

"Belonging and Connectedness"	
Theme	**Responses**
…with 'self' experience *Self-acceptance and awareness*	ID 20: …sometimes we have to just do what's best and not worry so much. I have a control problem; I've already acknowledged that so she was happy to hear… it's very hard for people to acknowledge their flaws, right? So, she goes "if you recognize that, then let's make it a positive thing, what are we gonna do to help you deal with that?"
Accountability	ID10: For me the biggest thing is the accountability. In the past I've never really had that. I mean when you're trying to lose weight you usually don't want to tell anybody because you usually you don't want to hear "oh have you lost the weight?" So you don't usually talk to anybody about it so it's easier to kind of 'fall off' the wagon and not continue because you don't want anyone to know anyways
…with the coach *Therapeutic Alliance*	ID1: … completely different (in respect to relationship to other health care professionals) like I said they (the other health care professional) usually had one way of doing things and either you did it or you didn't and you're kind of made to feel bad if you didn't but I never felt like [that] even if I didn't fulfill something (planned) I never felt (that) I failed at it anything I tried was [seen as] a good thing like I said it was very, very supportive. ID 13: Oh you really have to focus right? You have to cooperate with your coach because there's no point in doing this program if you're going to ignore your coach and not listen to his suggestions and everything… it was great. It was easy for me because he worked around what I could do, didn't impose. It wasn't a boot camp, it worked pretty much based on what I can do and um…I was happy with the results. Exactly what I was expecting to accomplish.
Personality match	ID 1: Oh he was fantastic! It was fantastic! We were kind of a perfect match. It was umm...we kind of had this same sort of attitudes of values and it's weird cause I have a theatre background so does he and sort of similar things that we've gone through so it was like the perfect match. ID 9: …part way through my program my health coach changed… based on my personality and so forth, the person I was with originally really wasn't a good match, the person I was changed to was a good match and I'm really glad I was able to spend time with her and just get input and energy, and motivation.

…with electronic (smartphone) tools *Co-monitoring/Accountability*	ID 13: Well, it's self-monitoring too. So, that was the main, main purpose, it helped me monitor everything for me. ID6: The app was really easy to use, at first I was having a hard time remembering to use it and then I got into a really good groove of like pictures. The things – [Health coach] also set up like, reminders for like, energy and how you feel and things like that and time of the day, which was really good cause as soon as I saw it, I was like okay, I can do it right there.
Technological Challenges	ID9: I saw a few things … definitely with this program…[you must] get an application that is … compatible … that actually works properly and everything [on all phones]

Core Theme 2: "Comprehensive Approaches to Individual Goal Directions"

The sessions with the health coach allowed participants to recognize their feelings, values and desires as part of a process working towards their self-selected goals. The health coaching approach emphasized the use of a comprehensive approach towards those goals, inclusive of social, physical, and mental health. For example, if a client was having difficulty initiating change towards increasing physical activity, a health coach could help them reflect on multiple aspects of the person's environment, values, desires and emotions to identify and respond to those things hindering behaviour change. Sample questions the health coach would ask: How is your diet? Do you work overtime or have new stresses related to work? What else is going on in your life? Do you find it hard to get to the gym? Do you have past experience with an exercise routine? Is your family supportive? Do you find you don't have enough time to exercise? How are your social life, sleep patterns and stress levels?

Health coaches also provided participants resources like video materials, meditation tutorials, and exercise guides to help in their journey to achieve healthier goals. Many participants specifically discussed how valuable it was to have access to the health coach as a trusted source of information and guidance, and often asked coaches factual questions about diet, exercise, and other health practices.

Illustrative quotes relating to these themes are presented below in Table 6.

Mindful Eating

Most participants reported becoming more aware of what they ate, and how they felt after a certain meal and about the benefits or relative healthiness of different meals or foods.

Reaching SMART Goals

The most common initial goals were weight loss, becoming more physically active, smoking cessation and healthy eating. Later, many participants broadened their goals (as per the comprehensive approach discussed earlier) chose to work on multiple goals including stress management and sleeping habits. A number of participants with chronic health conditions discussed significant successes in working towards their self-selected goals - one obese participant was able to postpone his knee surgery and regain his hip mobility by losing 25 pounds in six months. He was previously unable to achieve this weight reduction despite medical recommendations, engagement with a personal trainer and joining a community fitness center, and he was tremendously satisfied with this progress.

Social Connectivity

Some participants discussed how their work with their health coach helped them improve their communication and social skills, which helped them in their interpersonal and working relationships.

Sustainability of Change/Habits

Participants mentioned that the health behaviour changes made with their coaches felt more sustainable in nature because these changes were a gradual shift, rather than an abrupt or dramatic alteration. Some of the reported 'sustainable' health behaviour changes were choosing healthier grocery items, parking further from the office building (in order to walk more), introducing meditation practises, and walking during lunch hour.

General Lifestyle Change

Health coaches helped participants break down initial goals into smaller, more incremental goals that were more achievable, realistic, and sustainable.

Life Coaching

Some participants discussed multiple topics with respect to how the coaching intervention changed their outlook on life. They used health coaching in a broadly supportive way to help deal with a variety of issues they may have experienced at the time.

Coaches functioned as a general source of social support, as well as a relatively neutral sounding board for life issues, career direction, and other discussions.

A series of questions to ascertain interviewees' opinions about things that can be done differently in the study and recommending studies to others were asked. Participants proposed a longer duration of intervention and a follow up contact with the health coach after the intervention. Overall, a substantial majority (>80%) of participants said they would recommend the program to other employees.

The primary concerns cited with regard to the program were problems with the technology (i.e. the app) and how it complicated their interactions with their coach and the program. Some participants expressed negative views of the software because of the interface, software bugs, or compatibility issues between their phones and the application, although many participants loved the self-report monitoring elements of the smartphone application, and some used alternate apps or platforms to perform a similar monitoring-sharing function with their coaches. Most participants who described such technological problems were older in age.

Table 6. Qualitative Themes

"Comprehensive Approaches To Individual Goal Directions"	
Theme	**Responses**
Mindful eating	ID26: I've become way more mindful about what I eat like I said he [health coach] didn't have anything strict about what I should do or shouldn't do. We kind of agreed to add more fruits and eat less processed foods. I found that little by little as we went along, it just naturally became a choice rather than forcing myself to go and buy fruit and eat fruit like I don't really want the chips [I] go for fruit instead if I'm really hungry.
Reaching goals	ID16: It [Health coaching program] was great .. the proof is in the pudding, I lost 25 pounds since the start of the program and I'm on a regular exercise routine.
Social connectivity	ID 20: I find that conversation-wise I have learned to kind of watch what I say. For example, one issue was my relationship status and so when I communicated with my partner, it wasn't productive – so I learn[ed] how to communicate with him in a different manner-[the] health coach told me [what] I would have never thought. And that kind of de-stressed me because now I listen and watch what words you choose when speaking to this individual
Sustainability of change/habits	ID6: I actually like, go to the gym twice a week if I don't, I'm doing something at home like, in front of the TV or … before bed? … I should be doing something .. and making sure I get enough sleep after a workout.. they all work together. I slept a lot better, knowing - after a day at the gym, that night I would sleep really well …things like that…really helped .. now it's become like a routine … it's slow progress, but I feel like "okay, at least I'm getting into a habit"
General lifestyle change	ID9: just finding different ways to… incorporate activity in your daily life .. at lunch time, you know, 5 minute or 10 minute walk around the building… you've been in motion as opposed to … just sitting down and having your lunch and going back to work. So she was very instrumental in getting me to understand that exercise is not necessarily an hour of sweating… exercise can be you know, 10 to 15 minutes squeezed in here and there.
	ID1: I'm normally an all-or-nothing type of person and any one thing that's negative can put me in a downwards spiral, he helped me with some coaching strategies for that also introduced meditation … things I would have never thought about really influence weight loss.

	ID21: … I did not plan … a goal. As in [a change of lifestyle in general as much as paying attention to what I do and [finding] smaller goals … specific [goals].
Life coaching	ID 18: I kind of 'no-holds barred' it and… told him literally everything that was going on in my health.. in my mind… in my body… that was going wrong regardless of weight or fitness or anything like that…it was literally anything that came up.

5.0 DISCUSSION

5.1 Overview of Study Findings

This study examined the effects of a smartphone assisted health coaching intervention on a range of health-related outcomes. Global self-reported health status was significantly improved according to self reported measures obtained at post-intervention compared to baseline (Table 3). Contrary to one of the hypotheses, females did not achieve significantly greater effects than males in health behaviour outcomes from the health coaching program. In fact, males seem to have shown larger improvements in the health behaviour outcomes measured (Graph 5). Importantly, the lack of a significant intervention effect on life satisfaction, sedentary sitting, depressive distress, perceived stress, and health risks (sleeping habits, social ties, drinking habits, healthy eating, and smoking habits) raises questions about the self-selected goals of participants and their experience with the health coach.

Favourable opinions were apparent about the overall experience in the health coaching program. In particular, "belonging and connectedness" experiences with coaches, and supported by electronic (smartphone) tools supported health behaviour changes. As hypothesized, smartphone application and co-monitoring of weight, food intake, and

exercise on the online portal effectively aided the health coaching program by increasing intakes of healthier food alternatives and the frequency of physical activity. Interview findings point to the relevance of multiple self-report trackers on the smartphone and the co-monitoring of the behaviour changes related to these trackers. "Belonging and connectedness" in relation to 1) their own 'self' experience; and 2) the health coach were critical in facilitating the participants experiences of accountability, belonging, self-awareness and therapeutic alliance. The "comprehensive approaches to individual goals" theme shows how the participants made progress towards self-selected goals within a comprehensive approach to overall health even if a particular health behaviour goal was not met.

The qualitative data on 30 interviews represents an opportunity to capture information that might not otherwise be collected and analyzed. Trust developing relationships between coaches and clients allow personal disclosures and openness within the ongoing relationship with a coach. This relationship-building provided a forum for timely and specific interventions by coaches.

5.2 Clinical Implications

The present study extends the literature on health coaching in the workplace by assessing the effects of our smartphone-assisted health coaching intervention through both qualitative and quantitative assessments. The larger number of interviews than typical in qualitative (interview-based) studies (N = 30) arguably adds to the depth and breadth of results. The sample included four additional interviews after saturation was reached at N = 26. Additionally, the degree of success experienced in delivering a health coaching program in a large Canadian corporation is significant as far as demonstrating feasibility for future implementations of health coaching. It is notable that the Rogers Communication

provides on-site access to primary care and adjunctive health care providers (e.g. RMT, chiropractic), a fitness center and adequate (indoor) space to walk during lunch time, as well as a wellness program promoting healthier lifestyles.

The present findings to some degree replicate other studies demonstrating the effects of health coaching in generating significant improvements in health status (Linden et al., 2009; Terry, Seaverson, Staufacker et al., 2011). The improvement in physical activity is consistent with recent research by Hughes et al., 2011 reporting an increase in moderate physical activity among the group receiving health coaching when compared to controls. Improvements in physical activity can reduce chronic disease risks (Haskell et al., 2007), improve well-being (Troiano & Berrigan, 2008), save on healthcare costs and reduce absenteeism (Proper, Staal, Hildebrandt, Beek, & van Mechelen, 2002).

Due to a lack of qualitative research on health coaching programs in the workplace, it is difficult to compare the results of this study with others. A study by Thiese et al. (Thiese MS, Effiong AC, Ott U, Passey et al., 2015) involved exit-interviews aimed at collecting feedback on a weight management health coaching program for truck drivers. Similar results were found in this study, emphasizing the influence on *accountability* and *awareness* of healthier food choices in the achievement of positive health behaviour change. However, only 4 out 13 truck driver participants reported a loss of 5% or more of their baseline body weight at 12 weeks of follow-up.

The results of the present study do not support the hypothesis of an intervention effect on perceived stress, depressive distress, life satisfaction score, and health risks (smoking, drinking habits, social ties, healthy eating and sleeping health) as participants did not exhibit statistically significant changes. However, the limited number of participants

and the range of participant goals pursued are important considerations in evaluating specific outcome measure results.

Our analyses found interesting gender differences in measures that mediated contemplation about health behaviour changes (Figure 5). Males showed a 30% reduction in depressive distress whereas females only showed a 2% reduction. Studies have consistently documented higher rates of depression in women than men; the female-to-male ratio averages 2:1 (Bland, 1997). In addition, women are more likely to seek help from health professionals compared to men. This larger reduction in symptoms of depression in men might result from their alliance experiences identified in the "belonging and connectedness" theme in relation to the health coach. Reductions in symptoms of clinical depression can help in reducing medical expenditures, use of health care services, chronic disease risks and workplace injuries (Swaen, van Amelsvoort, Bültmann, Slangen, & Kant, 2004).

Similar patterns were observed in perceived stress, where males showed a 22% reduction in perceived stress compared to a 7% change in perceived stress for females (Figure 5). Literature on perceived stress has shown that females experience higher levels of stress than males (Wiegner, Hange, Björkelund, & Ahlborg, 2015), but we found both males and females reported similar stress scores at baseline. One explanation for this result may be that the sample size of males (n=11) in the study was nearly 50% lower than females (n=21), and likely less representative of the male workplace population, and with a reduction of available statistical power. Another possibility is that the similar stress scores at baseline was an artefact of this population where the workplace roles of males and females involve higher levels of stress. Overall, the present study showed a 12% stress reduction among participants. Much like the present study, no significant stress reduction

was reported among older workers when comparing a health coaching group to a control group (Hughes et al., 2011).

According to the International Prevalence Study (2002–2004), Canada reported a median of 300 minutes of sitting time per weekday (Bauman et al., 2011). Population studies in developed countries have reported a typical sitting time of 6-7 hours per day, which is substantially less than what was reported in the present study (Jans, Proper, & Hildebrandt, 2007). Female participants reported a decrease of 1 hour of sitting per day; whereas no change was seen in sitting time in males. Prolonged sitting is associated with increased risk of all-cause mortality (Patel et al., 2010), cardiovascular disease risk (Katzmarzyk, Church, Craig, & Bouchard, 2009), obesity, and type 2 diabetes (Hu, 2003). Although it would etiologically useful to identify a threshold duration for sitting time that poses an increased risk for adverse health outcomes, it is impossible to do so with current data, because there were no comparisons with health outcomes (Bauman et al., 2011). Given that the program ran through the fall and into the winter holiday season, with both celebratory eating patterns and cold weather limiting activity, weather and holiday factors might have contributed to the lack of significant change in sedentary behaviour among participants. Participants did, however, provide examples of *sustainability of change/habits* that helped reducing sedentary behaviour at work and would continue into the future, such as walking during lunch hour at work, or parking one's vehicle further away from the office.

Although a majority of participants described improvements in healthier eating, sleeping, social ties and perceived stress, explained under "comprehensive approaches to individual goal directions", there is no significant reduction in any of the health risk categories. The present study showed a risk reduction of 6 to 16% in participants, similar to

the study reporting health risk reductions of 5% to 25% in the health coaching program when comparing to a mail-based program, with a considerable variability of reductions between risk categories (Terry, Seaverson, et al., 2010). A majority of participants were already at low risk for smoking habits (n= 68.6%), drinking habits (n=88.5%), social ties (n=50%), and sleeping (n=85.3%) at baseline.

This qualitative analyses yielded a *personality match* theme, described by individuals who have had successful relationships (or less successful ones) through the study. Matching was important in achieving a therapeutic relationship in health coaching, and in the capacity for making meaningful progress towards goals. Published studies suggest that matching on salient characteristics is more important than simply matching on gender for the effectiveness of coaching programs (Terry, Fowles, et al., 2010). It is possible that the combination of competence and the perception/establishment of a caring relationship may have been responsible for eliciting behavioural change. The benefits of proactively matching program participants with coaches on the basis of personality or other personal factors must be explored in future studies. Another such potential predictor of health behaviour change and engagement identified in the qualitative analyses was the presence of chronic health conditions in participants. If a participant had one or more chronic conditions, he/she appeared to be more motivated to change health behaviours.

Our results provide compelling evidence for long-term involvement with such participants and suggest that this approach appears to be effective in positively influencing health behaviour changes, which might have the additional advantage of improving productivity at work.

5.3 Limitations

The present study has several limitations. The major limitation was the absence of an RCT design. Without such a design, it impossible to assess the intervention in comparison with a control condition. Self-report data can also introduce response bias issues such as social desirability, but are, nonetheless, fundamental to the lived experience of health and illness in participants. Furthermore, the study population primarily involved a young, majority female, well educated workforce sample. Accordingly, the results of the health coaching program may not generalize to other workforces, or to differing industrial sectors.

Better understandings of why participants left the program or did not complete the post-intervention measure are critical because overall program results are influenced by the success level of participants who complete the program. There were considerable missing data on participants who completed the program but failed to complete post-intervention measures. Participants might have become anxious about their follow up health evaluation, or simply lacked time or the interest in completing them. Considering the fast paced work environment reported by the participants, and the participants who dropped out due to a lack of time, this may have been a significant factor.

Incompatibility issues between the software and smartphone models may have caused frustration and loss of motivation to change health behaviour. Lastly, qualitative analysis revealed some personality mismatches between participants and health coach, which might have affected the relationship and therefore adherence to the program. It would be interesting to explore additional studies in determining the benefits of matching participants with their health coaches.

5.4 Recommendations for future research

Additional research is needed to evaluate the efficacy of smartphone-assisted health coaching in workplace, particularly employing studies using a RCT design. Studies must address different types of intervention approaches to assess their relative strengths and weaknesses. The software used in the study for self- and co-monitoring has been tested in an RCT of Type 2 Diabetes patients, and these findings contribute to the array of ongoing research studies being conducted that revolve around use of the software application. Possible solutions to the intervention completion problem in future workplace studies may also involve more in-person contacts & less burdensome measurements.

6.0 CONCLUSION

It appears that more organizations are appreciating and reporting tangible benefits from wellness programming. When such programming is effective, there can be the win – win of health employees engaging in greater productivity, with lower health-related costs (e.g. from absenteeism). This research has partially bridged a gap in published research concerning the interaction of health coaching and electronic connectivity at workplace.

Our study builds on previous research by adding electronic support to the practice of health coaching applied to behaviour change. Study findings indicated that our smartphone-assisted health coaching program is effective in improving self-reported general health, and bringing more belonging and connectivity among employees to account for healthier changes in their lifestyle. It also throws light on the distinctive effects of gender of the coach on the relationship with male and female participants. These findings have important implications for future methodology in workplace health intervention, particularly in electronic connectivity that aids in accountability to the health behaviour changes.

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APPENDICES

Appendix A: Informed Consent Form

Informed Consent Form

Date: November 24, 2014

Study Name: Health Coaching in the Workplace – A Mixed Method Analysis

Researchers:

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Purpose of the Research: You have been asked to participate in a study designed to help you reduce your health risk. You will largely define the risk reduction goal with some assistance in face-to-face meetings and telephone contacts with carefully trained and supervised health coaches. The study involves using innovative Smartphone-based software that will enable you to record and track your behaviour on a day-by-day basis.

What you will be asked to do in the research: Your participation in this study will entail a time commitment of 6 months. If you agree to participate in this study, you will be asked to complete a set of questionnaires that help us understand your health and physical activity habits and, more generally, understand you better. These questionnaires will be provided to you online and all information that you submit will be securely collected and stored.

Once you have enrolled in the study and completed the introductory questionnaires, we will configure the free Health Coaching software on your smartphone and demonstrate its usage. We will help you to track and improve your health behaviours over the course of the 6-month period of the study.

Benefits of the Research to you: You may benefit from participating in this study by improving your nutrition, increasing your physical activity levels, and maintaining a healthier lifestyle.

Risks and Discomforts: There are no known risks associated with participation in this study however, you will not be exposed to any additional risks beyond those associated with activities of daily living and the types of exercise you would normally choose to participate in.

Voluntary Participation & Withdrawal from the study: Your participation in the study is voluntary. You may withdraw from the study at any time, and you can also choose not to answer any questions that you do not feel comfortable answering. This will not affect your care. Your refusal to participate or your withdrawal from the study will not affect your relationship with the researchers, York University or your employer, Rogers Communications. If you decide to withdraw from the study and you wish us to destroy the information and data you have provided, we will do so upon your request.

Confidentiality: All information obtained during the study will be held in strict confidence. A study number and initials will identify you and names or identifying information will not be used in any publication or presentation. Absolutely no information regarding your individual participation in the study will be shared with your employer.

Your data will be safely stored in a locked facility and only research staff will have access to this information. Data will be securely retained for five years after publication of the study results. Data entered into the HealthCoach program is stored in encrypted files on a secure server and not stored on the device. It is not considered research data and you can choose to have it deleted at any time. The Health Coach with whom you work will be able to monitor the data you store in your smartphone, using the HealthCoach program. This is done to assist you with positively modifying your health activities (i.e, diet and exercise).

Questions about the Research?: If you have questions about the research in general or about your role in the study, please feel free to contact Dr. Paul Ritvo (York University) by telephone at (416) 736-2100 ext. 22396 or by e-mail (pritvo@yorku.ca) or Rachel Chan, National Wellness Coordinator at Rogers/bWell (telephone 647-747-9758). This research study has been reviewed and approved by the Human Participants Review Committee; York University's Ethics Review Board and conforms to the standards of the Canadian Tri-Council Research Ethics guidelines.

Legal Rights and Signatures

I, _____, consent to participate in this study. I have understood the nature of this project and wish to participate. I am not waiving any of my legal rights by signing this form, and may withdraw my consent at any time without penalty. Typing my full name below confirms my consent.

_____ _____ _____

Name of Participant **Signature of Participant** **Date**

Center for Epidemiologic Studies Depression Scale (CES-D), NIMH

Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

	During the Past Week			
	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. I was bothered by things that usually don't bother me.	☐	☐	☐	☐
2. I did not feel like eating; my appetite was poor.	☐	☐	☐	☐
3. I felt that I could not shake off the blues even with help from my family or friends.	☐	☐	☐	☐
4. I felt I was just as good as other people.	☐	☐	☐	☐
5. I had trouble keeping my mind on what I was doing.	☐	☐	☐	☐
6. I felt depressed.	☐	☐	☐	☐
7. I felt that everything I did was an effort.	☐	☐	☐	☐
8. I felt hopeful about the future.	☐	☐	☐	☐
9. I thought my life had been a failure.	☐	☐	☐	☐
10. I felt fearful.	☐	☐	☐	☐
11. My sleep was restless.	☐	☐	☐	☐
12. I was happy.	☐	☐	☐	☐
13. I talked less than usual.	☐	☐	☐	☐
14. I felt lonely.	☐	☐	☐	☐
15. People were unfriendly.	☐	☐	☐	☐
16. I enjoyed life.	☐	☐	☐	☐
17. I had crying spells.	☐	☐	☐	☐
18. I felt sad.	☐	☐	☐	☐
19. I felt that people dislike me.	☐	☐	☐	☐
20. I could not get "going."	☐	☐	☐	☐

SCORING: zero for answers in the first column, 1 for answers in the second column, 2 for answers in the third column, 3 for answers in the fourth column. The scoring of positive items is reversed. Possible range of scores is zero to 60, with the higher scores indicating the presence of more symptomatology.

Demographics

- Sex
  - What is your gender?
    - ☐ Male
    - ☐ Female
- Age
  - What is the year of your birth? _____

- Ethnicity
  - Which of the following racial or ethno-cultural groups best describes you?
    - ☐ Aboriginal (Inuit, Métis, North American Indian)
    - ☐ West Asian (e.g., Armenian, Egyptian, Iranian, Iraqi, Lebanese, Moroccan)
    - ☐ Black - African (e.g., African, Somali, etc)
    - ☐ Black – Caribbean (e.g. Haitian, Jamaican, etc)
    - ☐ White (Caucasian – European/American)
    - ☐ Hispanic
    - ☐ Latin American
    - ☐ Chinese
    - ☐ Filipino
    - ☐ Japanese
    - ☐ Korean
    - ☐ South Asian
    - ☐ South East Asian
    - ☐ Other (Fill in): _____

- Language
  - What language(s) do you speak?
    - ☐ English
    - ☐ French
    - ☐ Do you also speak another language (s) _____

- Time-in-country
  - How many years have you lived in Canada?
    - ☐ # of years or “Since birth”: _____

- Educational Status
  - What is the highest level of education you have completed?
    - ☐ Elementary School
    - ☐ Middle School
    - ☐ High School
    - ☐ Some College, or University or Trade/ Vocational Training,
    - ☐ Trade, Vocational Training or Certificate
    - ☐ College Diploma
    - ☐ University Degree
    - ☐ Post-Graduate Degree

- Employment Status
  - What is your employment status?
    - ☐ Unemployed
    - ☐ Student
    - ☐ Part-Time
    - ☐ Full-Time
    - ☐ Retired
    - ☐ Self-Employed
    - ☐ Work in the home (take care of children, etc)

- Income Status
  - What is your annual income status?
    - ☐ $0 – $9999
    - ☐ $10,000 – $25,000
    - ☐ $25,000 – $50,000
    - ☐ $50,000 – $75,000
    - ☐ $75,000 – $100,000
    - ☐ $100,000 – Up
    - ☐ Prefer not to answer

- Car ownership
  - Do you own or have access to a car?
    - ☐ Own
    - ☐ Have access
    - ☐ No car access

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

   ☐ Yes

   ☐ No → ***Skip to PART 2: TRANSPORTATION***

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

   _____ **days per week**

   ☐ No vigorous job-related physical activity → ***Skip to question 4***

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

   _____ **hours per day**
   _____ **minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

   _____ **days per week**

   ☐ No moderate job-related physical activity → ***Skip to question 6***

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?

_____ **hours per day**
_____ **minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **as part of your work**? Please do not count any walking you did to travel to or from work.

_____ **days per week**

☐ No job-related walking → ***Skip to PART 2: TRANSPORTATION***

7. How much time did you usually spend on one of those days **walking** as part of your work?

_____ **hours per day**
_____ **minutes per day**

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

_____ **days per week**

☐ No traveling in a motor vehicle → ***Skip to question 10***

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?

_____ **hours per day**
_____ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

☐ No bicycling from place to place → ***Skip to question 12***

11. How much time did you usually spend on one of those days to **bicycle** from place to place?

_____ **hours per day**
_____ **minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

_____ **days per week**

☐ No walking from place to place → ***Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?

_____ **hours per day**
_____ **minutes per day**

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?

_____ **days per week**

☐ No vigorous activity in garden or yard → ***Skip to question 16***

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

_____ **hours per day**
_____ **minutes per day**

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

_____ **days per week**

☐ No moderate activity in garden or yard → ***Skip to question 18***

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

_____ **hours per day**
_____ **minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

_____ **days per week**

☐ No moderate activity inside home → ***Skip to PART 4: RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

_____ **hours per day**
_____ **minutes per day**

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?

_____ **days per week**

☐ No walking in leisure time → ***Skip to question 22***

21. How much time did you usually spend on one of those days **walking** in your leisure time?

_____ **hours per day**
_____ **minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

_____ **days per week**

☐ No vigorous activity in leisure time → ***Skip to question 24***

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time?

_____ **hours per day**
_____ **minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

_____ **days per week**

☐ No moderate activity in leisure time → ***Skip to PART 5: TIME SPENT SITTING***

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?
_____ **hours per day**
_____ **minutes per day**

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?

_____ **hours per day**
_____ **minutes per day**

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?

_____ **hours per day**
_____ **minutes per day**

Manulife – Health Risk Assessment (HRA)

Let's get started assessing your health risks.

1. How old are you:

2. Gender: Male / Female

3. Do you visit your doctor regularly (e.g., at least once a year)?
    a. Usually [low risk]
    b. Sometimes [moderate risk]
    b. Rarely [high risk]

[Stages of Change question, include only if user is moderate or high risk]

Have you ever thought about taking steps to visit your doctor more regularly?*
    a. Never [4]
    b. I have been thinking about it, but I'm not ready yet. [3]
    c. I am already preparing to visit my doctor more regularly. [2]
    d. I was visiting my doctor on a more regular basis, but it's been quite some time since I last visited my doctor. [1]
    a. I am already visiting my doctor regularly. [0]

* [Report as below:
    4 = Pre-contemplation
    3 = Contemplation
    2 = Preparation
    1 = Relapse]
    0 = Maintenance]

4. Have you been diagnosed with a long-term condition?
    a. Yes
    b. No

[Go to question 5 if question 4 answer is Yes]

[Useful fact]
Examples of long-term medical conditions include (click on the link to learn more about the condition):

- asthma [link to condition article]
- angina [link to condition article]
- arrhythmia [link to condition article]
- chronic obstructive pulmonary disease (COPD) [link to condition article]
- Crohn's disease [link to condition article]

- diabetes [link to condition article]
- heart disease (coronary artery disease) [link to condition article]
- high blood pressure [link to condition article]
- high blood cholesterol [link to condition article]
- low thyroid [link to hypothyroidism condition article]
- depression [link to condition article]
- anxiety disorders [link to condition article]
- attention deficit hyperactivity disorder [link to condition article]
- multiple sclerosis [link to condition article]
- osteoarthritis [link to condition article]
- osteoporosis [link to condition article]
- rheumatoid arthritis [link to condition article]
- sexually transmitted infections [link to condition article]
- ulcerative colitis [link to condition article]

5. Have you been prescribed medication(s) by your doctor for your long-term condition?
    a. Yes
    b. No

[Go to question 6 if question 5 answer is Yes]

6. Do you take your medication as prescribed by your doctor? [compliance question]
    a. Usually [low risk]
    b. Sometimes [moderate risk]
    c. Rarely [high risk]

[Stages of Change question, include only if user is moderate or high risk]

Have you ever thought about taking your medication as prescribed by your doctor more regularly?*

a. Never [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to make changes to help me with taking my medication as prescribed. [2]
d. I was regularly taking my medication as prescribed, but I'm not as consistent with it now. [1]
e. I am currently working on taking my medication as prescribed regularly. [0]

* [Report as below:
4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse]
0= Maintenance]

Assessing Your Weight

Maintaining a healthy weight is an important factor in good health. Being overweight can actually increase your risk of many illnesses, including high blood pressure.

Answer the following questions and find out if your weight is putting you at risk.

1. What is your gender?
   [this question does not actually display – use information from General section]
   - Female
   - Male

2. What is your weight?
   - _____ kg OR
   - _____ lb
   [use radio buttons to list option of units: kg or lb]

3. What is your height?
   - _____ cm OR
   - _____ ft _____ in
   [use radio buttons to list option of units: cm or ft/in]

4. What is your waist circumference? [instructional tip below will show on page near here]
   - _____ cm OR
   - _____ in
   [use radio buttons to list option of units: cm or in]

5. What is your hip circumference? [instructional tip below will display on page near here]
   - _____ cm OR
   - _____ in
   [use radio buttons to list option of units: cm or in]

[Useful fact]
Waist circumference: Measure your waist circumference using a tape measure just above the upper hip bone, right around your navel, at the smallest part of your waist. The tape measure should be snug but not tight. [include image]

Hip circumference: Measure your hip circumference using a tape measure around the widest part of your hips. The tape measure should be snug but not tight. [include image]

[End of Weight Assessment questions]

[The following is the calculation algorithm for the programmers.]

Body Mass Index BMI calculation:

$$BMI = \frac{\text{weight (kg)}}{\text{height (m)}^2}$$

Waist-to-Hip ratio calculation:

$$WHR = \text{Waist-to-Hip ratio} = \frac{\text{waist circumference (cm)}}{\text{hip circumference (cm)}} \text{ OR } \frac{\text{waist circumference (in)}}{\text{hip circumference (in)}}$$

Either can be used, as long as they are in the same units.

Conversion Factors:
1 ft = 12 in
1 ft = 30.48 cm
1 in = 2.54 cm
1 kg = 2.20 lb
1 m = 100 cm

Risk Categorization:

Low Risk

- BMI is 18.5 to 24.9 AND
    - If female (question 1) and WHR < 0.8 OR
    - If male (question 1) and WHR < 1.0

Moderate Risk

- BMI < 18.5 OR
- BMI is 25.0 to 29.9 OR
- If female (question 1) and WHR ≥ 0.8 OR
- If male (question 1) and WHR ≥ 1.0

High Risk

- BMI ≥ 30.0

[Stages of Change question, include only if user is moderate or high risk]

Have you ever thought about taking steps to reach a healthy weight?*

a. Never [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to start losing weight in the next month. [2]
d. I lost some weight, but I've gained some of it back. [1]
e. I am currently taking steps to reach a healthy weight. [0]

* [Report as below:

4 = Pre-contemplation
3 = Contemplation

2 = Preparation
1 = Relapse]
0= Maintenance]

Healthy Eating

Healthy eating is fundamental to good health and is a key element in healthy human development. Answer the following questions to see how your nutrition stacks up.

1. How many servings of fruits and vegetables do you eat per day? A serving is considered to be one medium orange, apple, or banana; 1 cup of raw leafy vegetable (like spinach, cabbage, or lettuce); ½ cup of chopped, cooked, or canned fruit/vegetable, or ¾ cup of fruit/vegetable juice.
    a. None [0]
    b. 1 to 2 [1]
    c. 2 to 4 [2]
    d. 5 or more [3]

2. How often do you crave chocolate or sugar?
    a. A few times a week [3]
    b. A few times a day [2]
    c. All the time [1]

3. How many servings of refined starch such as white bread, white rice, or white pasta do you eat per day? A serving is one slice of bread, 1 ounce of sugary breakfast cereal, or ½ cup of cooked pasta or rice.
    a. 0 to 3 [3]
    b. 3 to 7 [2]
    c. 8 or more [1]

4. How many servings of whole grains such as whole-wheat bread, whole-grain pasta, brown rice, or whole grain breakfast cereal do you eat per day? A serving is one slice of bread, 1 ounce of breakfast cereal, or ½ cup of cooked pasta or rice.
    a. 0 to 3 [1]
    b. 3 to 7 [2]
    c. 8 or more [3]

5. How many servings of fibre-rich foods such as legumes, oats, bran, barley, or rye do you eat per day?
    a. 0 to 2 [1]
    b. 2 to 4 [2]
    c. 5 or more [3]

6. How many servings of red meat do you eat per week? A serving is 4 ounces (roughly the size of a deck of playing cards).
    a. 0 to 3 [3]

b. 3 to 5 [2]
c. 5 or more [1]

7. Do you take a multivitamin and/or a B complex supplement on most days?
    a. Yes [2]
    b. No [0]

8. How many servings of fish do you eat per week?
    a. None [0]
    b. 1 [1]
    c. 2 [2]
    d. 3 or more [3]

[Useful tip]
Supplements are not insurance for a poor diet! Enjoy a diet rich in fruits and vegetables, whole-wheat grains, lean protein, and healthy fats. It will provide you with the energy as well as the vitamins and minerals you need to keep you moving through your day.

[Scoring]
0-10 – High risk [red]
11-17 - Moderate risk [yellow]
18-23 - Low risk [green]

[Stages of Change question, include only if user is moderate or high risk]

Have you ever thought of eating healthier?*
    a. Never [4]
    b. I have been thinking about it, but I'm not ready yet. [3]
    c. I am already preparing to eat healthier in the next month. [2]
    d. I began eating healthier, but I'm starting to get into old eating habits again. [1]
    e. I am currently taking steps to eat healthier. [0]

* [Report as below:
    4 = Pre-contemplation
    3 = Contemplation
    2 = Preparation
    1 = Relapse]
    0= Maintenance]

Physical Activity in Your Life

Physical activity and your health go hand-in-hand. Being sedentary and doing little physical activity can affect your health.

In each case, please select the response that best reflects you.

1. How often do you engage in exercise (walking, sports, working out, etc.)?
   a) Never
   b) An average of less than once per week
   c) 1 to 4 times per week
   d) 5 or more times per week

[if answer "Never", then skip to Stages of change question]

2. How would you describe the type of physical activity you do?
   a) Light intensity (e.g., light walking, household tasks)
   b) Moderate intensity (e.g., brisk walking, biking, swimming)
   c) Vigorous intensity (e.g., jogging or running, aerobics, basketball)

3. How long do you spend or how much time do you accumulate (in at least 10-minute periods) when you engage in these physical activities?
   a) Less than 30 minutes
   b) 30 to 60 minutes
   c) 60 minutes or more

4. How interested are you in becoming more physically active?
   a) I'm not active and I'm not interested in becoming more physically active.
   b) I want to start getting more physically active within the next 3 to 6 months.
   c) I want to start getting more physically active within the next few weeks.
   d) I'm already physically active and I plan on staying that way.

[Useful fact]
How do you determine the difference in levels of exercise?[1]

[list the 3 types: light intensity, moderate intensity, and vigorous intensity only. The definitions should be displayed as a rollover or only when the user clicks on the word]

Light intensity – You start to feel warm with the exercise and your breathing rate increases slightly. [display definition as a rollover/click on]
Moderate intensity – You feel even warmer and there is a greater increase in your breathing rate. [display definition as a rollover/click on]
Vigorous intensity – You are now quite warm and definitely more out of breath. [display definition as a rollover/click on]

[The following is the algorithm for the programmers.]

Risk Categorization:

High Risk
- If answer to question 1 is "a" or "Never"

[1] Public Health Agency of Canada. Healthy Living Unit: Why physical activity is important to you. Available at: http://www.phac-aspc.gc.ca/pau-uap/paguide/why.html. Accessed February 23, 2009.

Moderate Risk

- All other combinations that do not fit into the High Risk and Low Risk categories

Low Risk

- If answer to question 1 is d AND answer to question 2 is b AND answer to question 3 is b or c **OR**
- If answer to question 1 is d AND answer to question 2 is c AND any answer to question 3]

[Stages of Change question, include only if user is moderate or high risk]

Have you ever thought of getting more physically active?*

a. Never [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to increase my physical activity in the next month. [2]
d. I increased my physical activity, but it's gone back down again. [1]
e. I am currently increasing the amount of physical activity in my life. [0]

* [Report as below:

4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse]
0= Maintenance]

Your Smoking Habits [2]

Smoking or exposure to second-hand smoke can put you at risk for many health problems. For this portion of the assessment, smoking refers to inhaling the smoke from cigarettes or cigars.

In each case, please select the response that best reflects you.

1. Do you smoke regularly (every day)?

a. No, never [0]
b. Not now, but I used to [1]
c. Yes [2]

[If 0, then user goes to Q3. If 1, user goes to Q2. If 2, user goes to Stages of Change question]

2. How long ago did you quit smoking?

[2] Health Canada. Health Living: On the Road to Quitting – Guide to becoming a non-smoker. Available at: http://www.hc-sc.gc.ca/hl-vs/pubs/tobac-tabac/orq-svr/improvehealth-amelioresante-eng.php. Accessed February 20, 2009.

a. Less than 1 year ago [2]
b. 1 to 10 years ago [1]
c. More than10 years ago [0]

3. Are you regularly exposed to secondhand smoke?
a. Yes [1]
b. No [0]

[Useful fact]
Did you know that within just 48 hours of quitting smoking, your risk of a heart attack begins to go down?[3]

[Useful fact]
Smoking can slow wound healing.[4] It can also put a person at increased risk for other conditions such as heart disease, chronic bronchitis, the common cold, the flu, heart attack, high blood pressure, high cholesterol, kidney cancer, lung cancer, mouth cancer, and osteoporosis.[5]

[Score only questions 1-3.
Q1 = 0 and Q3 = 0 then green
Q1 = 0 and Q3 = 1 then yellow
Q1 = 1 and Q2 = 0 and Q3 = 0 then green
Q1 = 1 and Q2 = 1 and Q3 = 0 then yellow
Q1 = 1 and Q2 = 1 and Q3 = 1 then yellow
Q1 = 1 and Q2 = 2 and Q3 = 0 or 1 then red
Q1 = 2 then red]

[Stages of Change question – include only in scenario where Q1 = 2
Q1 = 1 and Q2 > 0 and Q3 = 0]

Have you ever thought of quitting smoking?*
a. Never [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to quit within the next month. [2]
d. I quit smoking but I've started again. [1]
e. I quit smoking and I am currently smoke-free. [0]

[Stages of Change question – include only in the following scenarios:

[3] Health Canada. Health Living: Benefits of Quitting. Available at: http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/quit-cesser/now-maintenant/road-voie/benefits-avantages-eng.php. Accessed February 23, 2009.
[4] Pudner R. Cigarette smoking and its effect on wound healing. Journal of Community Nursing. 2002;16(8). Available at: http://www.jcn.co.uk/journal.asp?MonthNum=08&YearNum=2002&Type=backissue&ArticleID=500. (Accessed 9 March 2009)
[5] Health Canada. Healthy Living: Overview of Health Risks of Smoking. Available at: http://www.hc-sc.gc.ca/hl-vs/tobac-tabac/res/news-nouvelles/risks-risques-eng.php. Accessed 9 March 2009.

Q1 = 0 and Q3 = 1
Q1 = 1 and Q2 > 0 and Q3 = 1]

Have you ever thought of reducing your exposure to secondhand smoke?*

a. Never [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to reduce my exposure to secondhand smoke within the next month. [2]
d. I avoided secondhand smoke but I've started becoming exposed to it again. [1]
e. I am currently reducing my exposure to secondhand smoke. [0]

* [Report as below:

4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse
0= Maintenance]

Alcohol: Your Drinking Habits

Answer the questions as honestly as you can. This assessment does not diagnose alcohol problems, but reveals behaviours that may be indicative of potential problems.[†]

In each case, please select the response that best reflects you.

1. How often do you have a drink containing alcohol?

a. Never [assessment finished] [0]
b. Monthly or less [Go to Q2] [1]
c. 2 to 4 times per month [2]
d. 2 to 3 times a week [3]
e. 4 or more times a week [4]

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

a. 1 or 2 [0]
b. 3 to 4 [1]
c. 5 to 6 [2]
d. 7 to 9 [3]
e. 10 or more [4]

3. How often do you consume 6 or more drinks on one occasion?

a. Never [0]
b. Monthly or less [1]
c. Monthly [2]
d. Weekly [3]

e. Daily or almost daily [4]

[If Total Score for Q 2 and 3 = 0 then go to Q 9,10]

4. How often during the last year have you found that you were not able to stop drinking once you had started?

a. Never [0]
b. Monthly or less [1]
c. Monthly [2]
d. Weekly [3]
e. Daily or almost daily [4]

5. How often during the last year have you failed to do what was normally expected from you because of drinking?

a. Never [0]
b. Monthly or less [1]
c. Monthly [2]
d. Weekly [3]
e. Daily or almost daily [4]

6. How often during the last year have you needed a morning drink to get yourself going after a heavy drinking session?

a. Never [0]
b. Monthly or less [1]
c. Monthly [2]
d. Weekly [3]
e. Daily or almost daily [4]

7. In the last year, have you ever felt guilty after drinking?

a. Never [0]
b. Monthly or less [1]
c. Monthly [2]
d. Weekly [3]
e. Daily or almost daily [4]

8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

a. Never [0]
b. Monthly or less [1]
c. Monthly [2]
d. Weekly [3]
e. Daily or almost daily [4]

9. Have you or someone else been injured as a result of your drinking?

a. No. [0]
b. Yes, but not in the last year [2]

c. Yes, during the last year [4]

10. Has a relative, friend, doctor, or other health worker told you to cut down on your drinking or that they are concerned about your drinking?

a. No. [0]
b. Yes, but not in the last year [2]
c. Yes, during the last year [4]

[Useful fact]

What is considered a drink?[6]

The following drinks contain the same amount of alcohol:

- 341 mL (12 oz) of regular beer – 5% alcohol
- 145 mL (5 oz) of wine – 12% alcohol
- 45 mL (1.5 oz) of spirits or liquor (e.g., rum, vodka) – 40% alcohol

[Scoring:
0–8 = low
8–15 = medium
16+ = high]

[Stages of Change question – include only if user is moderate or high risk]

Have you ever thought of reducing how much alcohol you consume?*

a. Never, I don't have any issues with it. [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to reduce how much alcohol I consume within the next month. [2]
d. I tried cutting back but I've slipped back to old habits again. [1]
e. I am currently reducing the amount of alcohol I consume. [0]

* [Report as below:

4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse]
0= Maintenance]

† Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG. AUDIT: The Alcohol Use Disorders Identification Test – Guidelines for Use in Primary Care. 2nd ed. Geneva: World Health Organization; 2001. This copyrighted material is used with permission granted by the World Health Organization – February 2009. Unauthorized copying, printing or distribution of this material is strictly prohibited.

[6] Government of Ontario. EatRight Ontario: Alcohol and Nutrition. Available at: http://www.eatrightontario.ca/en/viewdocument.aspx?id=117. Accessed February 23, 2009.

[use small font – should only appear on pages where we display questions for Alcohol: Your Drinking Habits assessment]

Your Sun Habits

For questions 1-7, think about how you protect yourself from the sun when you will be outside for 30 minutes or more:

1. Do you cover your skin with tightly woven long clothing and/or sunscreen with a minimum SPF of 30 that protects against both UVA and UVB?
    - Most of the time
    - Sometimes
    - Rarely or never
2. Do you wear a lip balm with a minimum SPF of 30 that protects against both UVA and UVB?
    - Most of the time
    - Sometimes
    - Rarely or never
3. Do you apply your sunscreen 20 minutes before going outside (if you do not use sunscreen, answer "Rarely or never")?
    - Most of the time
    - Sometimes
    - Rarely or never
4. Do you reapply your sunscreen every 2 hours and after swimming or sweating (if you do not use sunscreen, answer "Rarely or never")?
    - Most of the time
    - Sometimes
    - Rarely or never
5. Do you apply a generous amount of sunscreen (for the average adult, this means at least 5 mL or one teaspoon for each arm, leg, the front of the body and the back of the body and 2.5 mL or one-half teaspoon for the face, adding up to about 35 mL or 7 teaspoons of sunscreen for the whole body)? If you do not use sunscreen, answer "Rarely or never".
    - Most of the time
    - Sometimes
    - Rarely or never
6. Do you wear a wide-brimmed hat (at least 7.5 cm or 3 inches) when you are out in the sun?
    - Most of the time
    - Sometimes
    - Rarely or never
7. Do you wear sunglasses that wrap tightly around your head and provide 100% UVA/UVB protection when you are out in the sun?
    - Most of the time

- Sometimes
- Rarely or never

For questions 8 to 10, think about your habits over the past year.

8. In the past year, have you sunbathed without sun protection or used tanning beds/booths?
    - Frequently
    - Sometimes
    - Rarely or never
9. Do you or a partner check your whole body for signs of skin cancer (moles or spots that are larger than a pencil eraser, have different colors, have an irregular border, look different from your other moles, change over time, or are asymmetrical [one half that is not like the other half]) every month?
    - Yes
    - No
10. How many times in the last 12 months have you had a red, blistering, peeling, or painful sunburn (lasting 12 hours or longer)?
    - 5 or more
    - 4
    - 3
    - 2
    - 1
    - 0

Scoring:

Use Table 1 to calculate the score for each question. Because Q1 (lack of sunscreen/cover-up clothing), Q8 (tanning beds/sun bathing) and Q10 (sunburns) are such important risk factors (as they represent unprotected sun exposure), they can bump a user up to a higher risk category on their own.

Table 1: Scoring each question

Question (Q)	Scoring
1	Most of the time = Low risk (0) Sometimes = Medium risk Rarely or never = High risk
2-7	Most of the time = 0 Sometimes = 1 Rarely or never = 2
8	Frequently = High risk

	Sometimes = Moderate risk Rarely or never = Low risk (0)
9	Yes = 0 No = 2
10	5 or more = High risk 4 = high risk 3 = high risk 2 = high risk 1 = moderate risk 0 = low risk

Add up the points for each question, then assign a risk level based on Table 2 using total score on question (Q) 2-7 and 9, modified by the scores on Q1, Q8 and 10. **Scores on Q1, Q8 and Q10 can only increase the risk level; they cannot lower the risk level**.

Table 2: Finding risk level from total score

Total score on Q2-7 and Q9	**Scores on Q1, Q8 and Q10**	**Risk level**
11-14	Does not change risk level; already high	Red: High risk
4-10	"Rarely or never" on Q1, "Frequently" on Q8 or "2, 3, 4, or 5" on Q10	Red: High risk
	Any other scores on Q1, Q8 or Q10	Yellow: Moderate risk
3 or less	"Rarely or never" on Q1, "Frequently" on Q8 or "2, 3, 4, or 5" on Q10	Red: High risk
	"Sometimes" on Q1, "Sometimes" on Q8 or "1" on Q10	Yellow: Moderate risk
	"Most of the time" on Q1, "Rarely or never" on Q8 AND "0" on Q10	Green: Low risk

References:

1. Borschmann RD, Cottrell D. Developing the readiness to alter sun-protective behavior questionnaire. Cancer Epidemology 2009;33:451-462.
2. Kristjansson S, Helgason AR, Rosdahl I, Holm L-E, Ullen H. Readiness to change sun-protective behaviour. European Journal of Cancer Prevention 2001;10:289-296.
3. Oh SS, Mayer JA, Lewis EC, Slymen DJ, Sallis JF, Elder JP, et al. Validating outdoor workers' self-report of sun protection. Preventive Medicine 2004;39:798-803.
4. Glanz K, Yaroch AL, Dancel M, Saraiya M, Crane LA, Buller DB, et al. Measures of sun exposure and sun protection practices for behavioral and epidemiologic research. Arch Dermatol 2008;144(2):217-222.

5. Marrett LD, Northrup DA, Pichora EC, Spinks MT, Rosen CF. The second National Sun Survey: overview and methods. Can J Public Health 2010;101(4):I10-I13. (Survey available at http://www.uvnetwork.ca/NSS2Compquestionnaire.pdf. Accessed April 12, 2011.)

[Stages of Change question, include only if user is moderate or high risk]

Have you ever thought of doing more to protect yourself from the harmful effects of the sun?*

a. Never [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to protect myself more from the sun in the next month. [2]
d. I began protecting myself more from the sun, but I'm not as consistent about it as I once was. [1]
e. I am currently taking steps to protect myself from the sun. [0]

* [Report as below:
4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse]
0= Maintenance]

[use small font – should only appear on pages where we display questions for Your Sun Habits assessment]

Your Sleep Health

The following questions relate to your sleep habits and are intended to gauge your daytime sleepiness in various situations that are commonly met in daily life or in your way of life in recent times.[7]

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your way of life in recent times.[†] Even if you haven't done some of these things recently, try to work out how they would affect you if you had. [if questions are broken up into batches, this text should appear at the top of the page]

In each case, please select the response that best reflects you.

1. Sitting and reading

[7] Murray J. Rethinking the assessment of sleepiness. Sleep Medicine Reviews 1998 2(1): 3-15.

a. Would never doze [0]
b. Slight chance of dozing [1]
c. Moderate chance of dozing [2]
d. High chance of dozing [3]

2. Watching TV
    a. Would never doze [0]
    b. Slight chance of dozing [1]
    c. Moderate chance of dozing [2]
    d. High chance of dozing [3]

3. Sitting and inactive in a public place (e.g., a theatre or a meeting)
    a. Would never doze [0]
    b. Slight chance of dozing [1]
    c. Moderate chance of dozing [2]
    d. High chance of dozing [3]

4. As a passenger in a car for an hour without a break
    a. Would never doze [0]
    b. Slight chance of dozing [1]
    c. Moderate chance of dozing [2]
    d. High chance of dozing [3]

5. Sitting and talking to someone
    a. Would never doze [0]
    b. Slight chance of dozing [1]
    c. Moderate chance of dozing [2]
    d. High chance of dozing [3]

6. Sitting quietly after a lunch without alcohol
    a. Would never doze [0]
    b. Slight chance of dozing [1]
    c. Moderate chance of dozing [2]
    d. High chance of dozing [3]

7. In a car, while stopped for a few minutes in traffic
    a. Would never doze [0]
    b. Slight chance of dozing [1]
    c. Moderate chance of dozing [2]
    d. High chance of dozing [3]

[Useful fact]

Did you know that approximately 3.3 million Canadians are affected by a sleep disorder?[8]

[Your Score]
[Score: 0-10 – Low risk - Green]
[Score: 11-15 – Moderate risk - Yellow]
[Score: 16-24 – High risk - Red]

[Stages of Change question – include only if user is moderate or high risk]

Have you ever thought of looking for ways to improve your sleep?*

a. Never [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to improve my sleep within the next month. [2]
d. My sleep did improve, but it's gotten worse again. [1]
e. I am currently taking steps to improve my sleep. [0]

* [Report as below:
4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse]
0= Maintenance]

† Johns MW. A new method for measuring daytime sleepiness: the Epworth sleepiness scale. Sleep 1991;14(6):540-545. This copyrighted material is used with permission granted by the Associated Professional Sleep Societies – February 2009. Unauthorized copying, printing or distribution of this material is strictly prohibited.
[use small font – should only appear on pages where we display questions 1 to 9]

Social Ties

Answer the following questions to find out how strong your social support system is.[†]

1. Is there someone available you can count on to listen to you when you need to talk?
   a. None of the time [1]
   b. A little of the time [2]
   c. Some of the time [3]
   d. All of the time [4]

2. Is there someone available to give you good advice about a problem?
   a. None of the time [1]
   b. A little of the time [2]

[8] The University of British Columbia. Centre for Health Services and Policy Research: Sleep Disorders and Work-related Injury in British Columbia. Available at: http://www.chspr.ubc.ca/research/worksafebc/sleep. Accessed February 23, 2009.

c. Some of the time [3]
d. All of the time [4]

3. Is there someone available who shows you love and affection?
    a. None of the time [1]
    b. A little of the time [2]
    c. Some of the time [3]
    d. All of the time [4]

4. Is there someone available to help you with daily chores?
    a. None of the time [1]
    b. A little of the time [2]
    c. Some of the time [3]
    d. All of the time [4]

5. Can you count on anyone to provide you with emotional support (talking over problems or helping you make a difficult decision)?
    a. None of the time [1]
    b. A little of the time [2]
    c. Some of the time [3]
    d. All of the time [4]

6. Do you have as much contact as you would like with someone you feel close to, someone you can trust and confide in?
    a. None of the time [1]
    b. A little of the time [2]
    c. Some of the time [3]
    d. All of the time [4]

[Useful fact]
Some studies even suggest that a good social support system can help prevent certain medical conditions or help you recover more quickly from events like heart attack or stroke.

[Scoring]
[Score: 0-12 – High risk (low perceived social support) - Red]
[Score: 13-18 – Moderate risk (moderate perceived social support) - Yellow]
[Score: 19-24 – Low risk (high perceived social support)- Green]

[Stages of Change question, include only if user is moderate or high risk]

Have you ever thought that you needed to increase your social support network?*
    a. Never [4]
    b. I have been thinking about it, but I'm not ready yet. [3]
    c. I am already preparing to do this in the next month. [2]
    d. I began working on my social support network, but I'm not getting very far. [1]

e. I am currently working on my social support network. [0]

* [Report as below:
4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse]
0= Maintenance]

† Blumenthal JA, Babyak M, Baldewicz T, Barefoot J, Bennett J, Carels R et al. Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD): Study design and methods. Am Heart J 2000 139: 1-9.
[use small font – should only appear on pages where we display questions for Social Ties assessment]

Coping With Stress

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, please select how often you felt or thought a certain way.†

1. In the last month, how often have you been upset because of something that happened unexpectedly?
    a. Never [0]
    b. Almost never [1]
    c. Sometimes [2]
    d. Fairly often [3]
    e. Very often [4]

2. In the last month, how often have you felt that you were unable to control the important things in your life?
    a. Never [0]
    b. Almost never [1]
    c. Sometimes [2]
    d. Fairly often [3]
    e. Very often [4]

3. In the last month, how often have you felt nervous and "stressed"?
    a. Never [0]
    b. Almost never [1]
    c. Sometimes [2]
    d. Fairly often [3]
    e. Very often [4]

4. In the last month, how often have you felt confident about your ability to handle your personal problems?

a. Never [4]
b. Almost never [3]
c. Sometimes [2]
d. Fairly often [1]
e. Very often [0]

5. In the last month, how often have you felt that things were going your way?
    a. Never [4]
    b. Almost never [3]
    c. Sometimes [2]
    d. Fairly often [1]
    e. Very often [0]

6. In the last month, how often have you found that you could not cope with all the things that you had to do?
    a. Never [0]
    b. Almost never [1]
    c. Sometimes [2]
    d. Fairly often [3]
    e. Very often [4]

7. In the last month, how often have you been able to control irritations in your life?
    a. Never [4]
    b. Almost never [3]
    c. Sometimes [2]
    d. Fairly often [1]
    e. Very often [0]

8. In the last month, how often have you felt that you were on top of things?
    a. Never [4]
    b. Almost never [3]
    c. Sometimes [2]
    d. Fairly often [1]
    e. Very often [0]

9. In the last month, how often have you been angered because of things that were outside of your control?
    a. Never [0]
    b. Almost never [1]
    c. Sometimes [2]
    d. Fairly often [3]
    e. Very often [4]

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
    a. Never [0]

b. Almost never [1]
c. Sometimes [2]
d. Fairly often [3]
e. Very often [4]

[Useful fact]
Did you know that the impact stress has on your health depends on how you perceive a stressful situation and how you react to it?[9]

[add up score]
[0 to 10 = Low risk – Green]
[11 to 20 = Moderate risk – Moderate]
[21 to 40 = High risk – Red]

[Stages of Change question – include only if user is moderate or high risk]

Have you ever thought of looking for ways to help cope with your stress?*

a. Never, everyone gets stressed out. [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to cope with my stress better within the next month. [2]
d. My coping strategies for stress are not working anymore. [1]
e. I am currently working on strategies to cope with stress. [0]

* [Report as below:
4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse]
0= Maintenance]

† Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. Journal of Health and Social Behavior 1983 Dec 24(4): 385-396 - Appendix A. This copyrighted material is used with permission granted by the American Sociological Association – February 2009. Unauthorized copying, printing or distribution of this material is strictly prohibited.

[use small font – should only appear on pages where we display questions for Coping With Stress assessment]

Workplace Health and Safety [10] [11]

General questions[12,13,14,15,16]

[9] Canadian Mental Health Association. Coping with Stress. Available at: http://www.cmha.ca/bins/content_page.asp?cid=2-28-30&lang=1. Accessed February 19, 2009.
[10] University of Surrey: Robens Centre for Health Ergonomics. Further development of the usability and validity of the Quick Exposure Check (QEC). Guildford: University of Surrey; 2005. Available at: www.hse.gov.uk/research/rrpdf/rr211.pdf.
[11] David G, Woods V, Li G, Buckle P. The development of the Quick Exposure Check (QEC) for assessing exposure to risk factors for work-related musculoskeletal disorders. Applied Ergonomics 2008; 39: 57-69

When answering these questions, think about the activities you do during a typical week on the job.

1. Have you received workplace safety training to help you stay safe on the job (this includes training on avoiding repetitive strain injuries for people with repetitive tasks or a desk job where they use a computer)?
   - ☐ Yes
   - ☐ No
2. Do you feel that you know how to safely perform your work tasks?
   - ☐ Yes
   - ☐ No
3. Do you know what to do if you are injured on the job (e.g., where to find first aid, how to report the injury)?
   - ☐ Yes
   - ☐ No
4. Do you know what to do if you encounter an unsafe work situation?
   - ☐ Yes
   - ☐ No
5. Do you feel comfortable refusing unsafe work?
   - ☐ Yes
   - ☐ No
6. Do you know how to and take the time to adjust your workstation to fit you?
   - ☐ Yes
   - ☐ No
   - ☐ Does not apply to my job
7. Do you know the type, location and how to use the personal protective equipment (e.g., safety goggles, ear plugs, hard hats, steel-toe boots) needed to safely perform your job?
   - ☐ Yes
   - ☐ No
   - ☐ Does not apply to my job

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[12] Workplace safety and insurance board – Ontario. Starting a new job. http://www.wsib.on.ca/en/community/WSIB/230/ArticleDetail/24338?vgnextoid=2c58b4a0fea38210VgnVCM100000449c710aRCRD. Accessed April 12, 2011.

[13] Ontario Ministry of Labour. Training, supervision and protection. http://www.worksmartontario.gov.on.ca/scripts/default.asp?contentID=2-3-2&mcategory=health. Accessed April 12, 2011.

[14] Ontario Ministry of Labour. If I am injured at work. http://www.worksmartontario.gov.on.ca/scripts/default.asp?contentID=2-5-0&mcategory=health. Accessed April 12, 2011.

[15] Ontario Ministry of Labour. What is a hazard? http://www.worksmartontario.gov.on.ca/scripts/default.asp?contentID=2-6-1&mcategory=health. Accessed April 12, 2011.

[16] Ontario Ministry of Labour. My basic health & safety rights. http://www.worksmartontario.gov.on.ca/scripts/default.asp?contentID=2-2-2&mcategory=health. Accessed April 12, 2011.

8. How often do you use the protective equipment you need for your job? [Do not show this question if respondent answered "does not apply to my job" to question 7]
   - ☐ Always
   - ☐ Most of the time
   - ☐ Sometimes
   - ☐ Rarely
   - ☐ Never
9. Have you had any work-related injuries in the past year that could have been avoided if you followed safe work practices?
   - ☐ Yes
   - ☐ No

Scoring for general questions:

Questions 1 to 8 are used to calculate the total score. For questions 1 to 7, give 0 points for every Yes answer and 1 point for every No answer. For question 8, give 0 points for "Always", 1 point for "Most of the time", 2 points for "Sometimes" and 3 points for "Rarely" or "Never". Then add up the total score for questions 1 to 8 and map it to a risk level using Table 1.

- For people who answer "does not apply to my job" to question 6 (but not to question 7), question 6 does not apply to the scoring; for these people, multiply the score on questions 1 to 7 by 7/6 and round to the nearest whole number.
- For people who answer "does not apply to my job" to question 7 (but not to question 6), question 8 is not shown, and questions 7 and 8 do not contribute to the scoring; for these people, multiply the score on questions 1 to 7 by 7/6 and round to the nearest whole number.
- For people who answer "does not apply to my job" to both questions 6 and 7, question 8 is not shown and questions 6, 7 and 8 do not apply to the scoring; for these people, multiply the score on questions 1 to 7 by 7/5 and round to the nearest whole number.

Table 1: Risk levels

Total score	Risk level
0-1	Low (green)
2-5	Medium (yellow)
6-10	High (red)

Question 9 does not contribute to the total score but can move someone up to high risk if they answer Yes. If they answer No, the risk level does not change.

If user is at moderate or high risk, ask them the Stages of Change question:

Have you ever thought of doing more to help yourself stay safe at work?*

a. Never [4]
b. I have been thinking about it, but I'm not ready yet. [3]
c. I am already preparing to help myself stay safe at work. [2]
d. I made some changes, but I'm not as consistent with them as I once was. [1]
e. I am currently taking steps to help myself stay safe at work. [0]

Scoring:

4 = Pre-contemplation
3 = Contemplation
2 = Preparation
1 = Relapse
0 = Maintenance

I consider my workload reasonable. (Yes/No)

I can complete my assigned workload during my regular working hours. (Yes/No)

I have a say in decisions and actions that impact on my work. (Yes/No)

I get adequate recognition from my immediate supervisor when I do a good job. (Yes/No)

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts **during the last month**. In each case, you will be asked to indicate by circling *how often* you felt or thought a certain way.

Name _____ Date _____

Age _____ Gender (*Circle*): **M F** Other _____

	0 = Never	**1 = Almost Never**	**2 = Sometimes**	**3 = Fairly Often**	**4 = Very Often**
1. In the last month, how often have you been upset because of something that happened unexpectedly?	**0**	**1**	**2**	**3**	**4**
2. In the last month, how often have you felt that you were unable to control the important things in your life?	**0**	**1**	**2**	**3**	**4**
3. In the last month, how often have you felt nervous and "stressed"?	**0**	**1**	**2**	**3**	**4**
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	**0**	**1**	**2**	**3**	**4**
5. In the last month, how often have you felt that things were going your way?	**0**	**1**	**2**	**3**	**4**
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	**0**	**1**	**2**	**3**	**4**
7. In the last month, how often have you been able to control irritations in your life?	**0**	**1**	**2**	**3**	**4**
8. In the last month, how often have you felt that you were on top of things?	**0**	**1**	**2**	**3**	**4**
9. In the last month, how often have you been angered because of things that were outside of your control?	**0**	**1**	**2**	**3**	**4**
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	**0**	**1**	**2**	**3**	**4**

Please feel free to use the *Perceived Stress Scale* for your research. The PSS Manual is in the process of development, please let us know if you are interested in contributing.

References

The PSS Scale is reprinted with permission of the American Sociological Association, from Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24,* 386-396.

STANFORD PATIENT EDUCATION RESEARCH CENTER

Self-Rated Health

In general, would you say your health is....(circle one number)

Excellent	1
Very good	2
Good	3
Fair	4
Poor	5

Scoring

Score the number circled. If two consecutive numbers are circled, choose the higher number (worse health); if two non-consecutive numbers are circled, do not score. The score is the value of this single item only. A higher score indicates poorer health.

Characteristics

Tested on 1,129 subjects with chronic disease. N=51 for test-retest.

No. of items	Observed Range	Mean	Standard Deviation	Internal Consistency Reliability	Test-Retest Reliability
1	1-5	3.29	.91	—	.92

Source of Psychometric Data

Stanford Chronic Disease Self-Management Study. Psychometrics reported in: Lorig K, Stewart A, Ritter P, González V, Laurent D, & Lynch J, *Outcome Measures for Health Education and other Health Care Interventions*. Thousand Oaks CA: Sage Publications, 1996, p.25.

Comments

This is an item used in the National Health Interview Survey. In a number of studies self-rated health has been found to be an excellent predictor of future health. This scale available in Spanish.

References

Lorig K, Stewart A, Ritter P, González V, Laurent D, & Lynch J, *Outcome Measures for Health Education and other Health Care Interventions*. Thousand Oaks CA: Sage Publications, 1996, pp.25,52-53.

Idler EL, & Angel RJ, Self-rated health and mortality in the NHANES-I epidemiologic follow-up study. *American Journal of Public Health*, 80, 1990, pp.446-452.

The Satisfaction with Life Scale

By Ed Diener, Ph.D.

DIRECTIONS: Below are five statements with which you may agree or disagree. Using the 1-7 scale below, indicate your agreement with each item by placing the appropriate number in the line preceding that item. Please be open and honest in your responding.

1 = Strongly Disagree
2 = Disagree
3 = Slightly Disagree
4 = Neither Agree or Disagree
5 = Slightly Agree
6 = Agree
7 = Strongly Agree

_____1. In most ways my life is close to my ideal.

_____2. The conditions of my life are excellent.

_____3. I am satisfied with life.

_____4. So far I have gotten the important things I want in life.

_____5. If I could live my life over, I would change almost nothing.

Appendix C-- Semi-Structured Interview

To get started off, you can tell me why you decided to sign up for the study?

Questions about Health Coaching program:

1) What did you think of the health-coaching program?

2) Did the health-coaching program turn out to be what you expected when you signed up for it?

3) In the best ways you can describe, what were your goals in participating in the program? How much was goal selection influenced by the health coach with whom you were communicating?

4) At the beginning of the program you were assigned a health coach and given a smartphone with special software programming. Were you influenced in ways you find important? Please indicate any positive experiences you have had and any negative experiences you have had, while you have been participating 'in' the program?

5) How could your health coach have helped you more? What did your health coach do well? Did you feel respected by your health coach? Was there any point at which you felt disrespected?

6) Would you have preferred a different kind of communication style?

7) Have you ever worked with anyone in a role similar to a health coach before?

8) Was the health coach effective in helping you work towards your goals if yeah how?

9) If you were to give any feedback to the health coaches, not necessarily to your health coach but to the health coaches in general, how would you train them differently?

Questions about the Health Coach Software:

1) Did you use the device at all? How was your experience with the health coaching application and smartphone?

2) What are your thoughts about the health coach software? Do you think the smartphone app made a difference for you, if so how?

3) Did you at all make use of the online portal to the software?

Questions about Program Changes and Program Effects

1) If you could plan this study so that it worked differently, what do you think should be different?

2) What did you value most about being in this study?

3) Do you feel you're healthier or not as healthy? About the same?

4) Would you recommend this program to someone for health behaviour change?