The ENCOURAGE App – Public Release Protocol

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Background

Healthy employees are a valuable asset for businesses and employers alike.[1] In fact, a recent meta-analysis determined that a lack of physical activity amongst employees is a contributing factor to low productivity in the workplace.[2] The average Canadian adult accumulates just 15 minutes of moderate-vigorous physical activity on a weekly basis, which is significantly less than the 150 minutes recommended by the Canadian Physical Activity Guidelines.[3,4] As such, it has become essential to develop evidence-informed strategies that will assist Canadians to adopt and sustain a more physically active lifestyle.

Sixty percent of Canadian adults are accessible through the workplace (Government of Canada; Employment and Social Development). Thus, workplace wellness programs that include physical activity components provide a viable option to encourage employees to become more physically active. Recent studies have demonstrated that workplace wellness programs significantly improve the health status of lean as well as obese individuals[5] with hypertension, dyslipidemia and psychological distress.[6] Despite this information, many workplaces do not want to intrude into employee's personal lives or incur significant costs as a result of implementing evidence-based programming. In a previous study conducted by our group entitled ENCOURAGEing Workplaces, we successfully supported 54 workers to increase their total physical activity levels by 160 minutes per week through an individualized approach to physical activity prescription. This outcome stimulated our team to identify strategies to upscale the ENCOURAGE approach to influence the health behaviour of a larger number of Manitobans. Moving forward with the ENCOURAGE health promotion model, we will use _mobile health technology_ to support employees to become more physically active, while offering employers a solution that can be easily implemented in a variety of contexts. We recognize the technical challenge of creating a physical activity promotion mobile application (herein referred to as the ENCOURAGE App) that is tailored for the workplace sector. Therefore, we have partnered with Tactica Interactive (http://tactica.ca/) to secure the programming expertise necessary to develop the app (**Appendix 1**). Tactica staff have helped us to refine the app concept and have developed a two-page description of the ENCOURAGE app that is included within this document (**Appendix 2**). Our research team previously conducted the ENCOURAGEing Workplaces project (E2014: 094) at this site and have the support of the St. Boniface Hospital executive (**Appendix 3**) and union leadership (**Appendix 4**) to conduct this new project. For the development phase of this App, we have conducted a market research survey (H2015:405) to inform the user development of a prototype version of the App, completed the testing of a proto. We are also testing the prototype version of the ENCOURAGE App in a user observation setting (H2016:097) to determine the user experience and what they liked and disliked with the App, and beta tested the App to further develop the final product. The present study will publicly release the final ENCOURAGE App product.

Trial objectives and purpose

The objectives of this study are to determine if the final product ENCOURAGE App can over a 6 month period:

1) Enhance physical activity levels; and,
2) Improve cardiovascular health risk;

Trial design

The public release of the ENCOURAGE App will involve two phases (Figure 1):

1) The recruitment of 300 individuals through the App. Any user will be able to download the ENCOURAGE App through the iTunes Store or Google Play. Note that when participants download the App, they are not automatically enrolled in the study. Participants will be prompted, after downloading the App, with a brief description of the study, as well as a pre-screening tool will be used to determine eligibility (see below for inclusion/exclusion criteria). Users will be asked via a textbox to determine if they wish to participate in a research project. Users will be asked to participate in a *time series quasi-experimental design* study to determine if the ENCOURAGE App can support participants to increase their physical activity levels over a 6 month period. The App uses a time management technique (i.e., Pomodoro technique) as a strategy to provide prompts for users to engage in an activity. The App can be customized by the users to set prompts at intervals that fits into their schedule. For example, these activities can range from a stretching activity (e.g., a neck stretch), a standing activity (e.g., stand and read), or a physical activity (e.g., fill up the printer with paper, do a squat). Additionally, the App will use Behavior Change Techniques as a way to support participants as they reduce their sedentary behavior and improve their physical activity levels.[7] The App uses a series of Behavior Change Techniques shown to be effective in promoting a more physically active lifestyle.[8,9] Users will also provide feedback regarding the App using an *experience sampling approach*, which uses a list of questions to guide user feedback (**Appendix 5**). Additionally, we will use *Flurry Analytics* (http://www.flurry.com/) to measure, track, and analyze the ENCOURAGE App performance, and aggregate-level user activity within the App. Specifically, we wish to determine the number of user sessions within the App, frequency of use, session length, user events, technical data and errors, and user geographic distribution. For a more detailed description of the experience sampling and Flurry Analytics approaches, see **Appendix 6**.
2) The recruitment of a sub-sample of 60 participants who live in Winnipeg, MB which will be drawn from the larger sample of 300 participants and by advertisement. In addition to completing all the components listed above from the recruitment of 300 participants, they will be also asked to wear a physical activity monitor, called an accelerometer.

Inclusion and exclusion criteria

Inclusion criteria:

- Male and female employees 18-70 years old
- Self-identify as being physically inactive in the last 3 months (less than 150 minutes of moderate-vigorous physical activity per week)
- Ready to adopt a more physically active lifestyle based on the Transtheoretical Model[10]
- *Specific to the sub-sample of 60 participants:* Live in Winnipeg, MB

Exclusion criteria:

- Individuals who do not have a personal mobile phone
- Any physical limitations that would not allow a person to engage in physical activity
- Any cognitive limitations that would not allow a person to consent for the study
- *Specific to the sub-sample of 60 participants:* Those who live outside of Winnipeg, MB.

To our knowledge, no characteristics of the participants make them especially vulnerable or require extra precautions to administer the user observation study. Participants will be healthy volunteers able to provide informed consent.

Participant recruitment

Recruitment of participants involves two phases (Figure 1):

1) Recruitment of 300 individuals who download the ENCOURAGE App the iTunes Store or Google play and choose to enroll in the study. Users will be asked via a textbox to determine if they wish to participate in a research project. A description of the project, as well as an electronic consent form will be provided prior to enrolment through Survey Monkey. In order to track participants in the study, we will be asking for their e-mail addresses, their date of birth, and first and last name initials.

2) Recruitment of 60 individuals who live in Winnipeg, MB to wear an accelerometer. We will employ a convenience sampling approach, where participants who are already using the App and participating in the study (i.e., the 300 participants described above) will be asked to participate if they live in Winnipeg. Additionally, we will employ a convenience sampling approach at the St. Boniface Hospital, University of Manitoba, and Tactica Interactive. Participants will be contacted via e-mail. First, we will use an e-mail approach to contact participants. The e-mail approach will provide contact information for potential participants to reach research staff to facilitate the recruitment and consent of participants at a mutually agreeable location. Secondly, we will use a poster advertisement approach (**Appendix** 7) to facilitate recruitment. Posters will be placed around the St. Boniface Hospital, University of Manitoba, and Tactica Interactive. In total for the sub-study, more than 12,000 staff members at the St. Boniface Hospital, 8,700 faculty/staff, at the University of Manitoba, and Tactica Interactive will be accessible, including:

   - Nurses and Nurse Practitioners;
   - Physicians;
   - Property Management (electrical, carpentry, mechanical);
   - Administrators and clerical support staff; and,
   - Researchers
   - Software developers

Study procedures

Large study procedures:

After participants choose to participate in the study, participants will be asked to complete a series of questionnaires at baseline, one week and every month for a total of six months (i.e., 8 different

occasions). The questionnaires (**Appendix 8**) will take approximately 30-45 minutes to complete and comprise of the following:

1) Demographics
2) Depressive symptoms with the Patient Health Questionnaire-9
3) Physical activity using the Godin Leisure Time Exercise Questionnaire
4) Cardiovascular health risk using the Cardiovascular Health in Ambulatory Care Research Team (CANHEART) questionnaire
5) Occupational Sitting with the Occupational Sitting and Physical Activity Questionnaire
6) Self-efficacy levels for physical activity and reducing sedentary time with the Exercise Self-Efficacy Questionnaires and Self-Regulatory Efficacy to Manage Sedentary Behavior questionnaire
7) Confidence levels for reducing sedentary behaviors with the Barrier Self-Efficacy to Reduce Sedentary Behavior and Self-efficacy to Reduce Total Daily Sedentary Time questionnaires.
8) Physical activity levels at the workplace with the Workplace Sitting Breaks Questionnaire

Research participants will be prompted within the App to a hyperlink to complete the research questionnaires on Survey Monkey. In order to track individual research participant responses The links are as follows:

1) Description of the study/eligibility form, consent to participate, and baseline questionnaire: https://www.surveymonkey.com/r/L3KDHRQ
2) 1 week survey: https://www.surveymonkey.com/r/L39CZB5
3) 1 month survey: https://www.surveymonkey.com/r/L3J2M67
4) 2 month survey: https://www.surveymonkey.com/r/L3SKXGH
5) 3 month survey: https://www.surveymonkey.com/r/L3MDLCF
6) 4 month survey: https://www.surveymonkey.com/r/L3FLMWG
7) 5 month survey: https://www.surveymonkey.com/r/L3B28KX
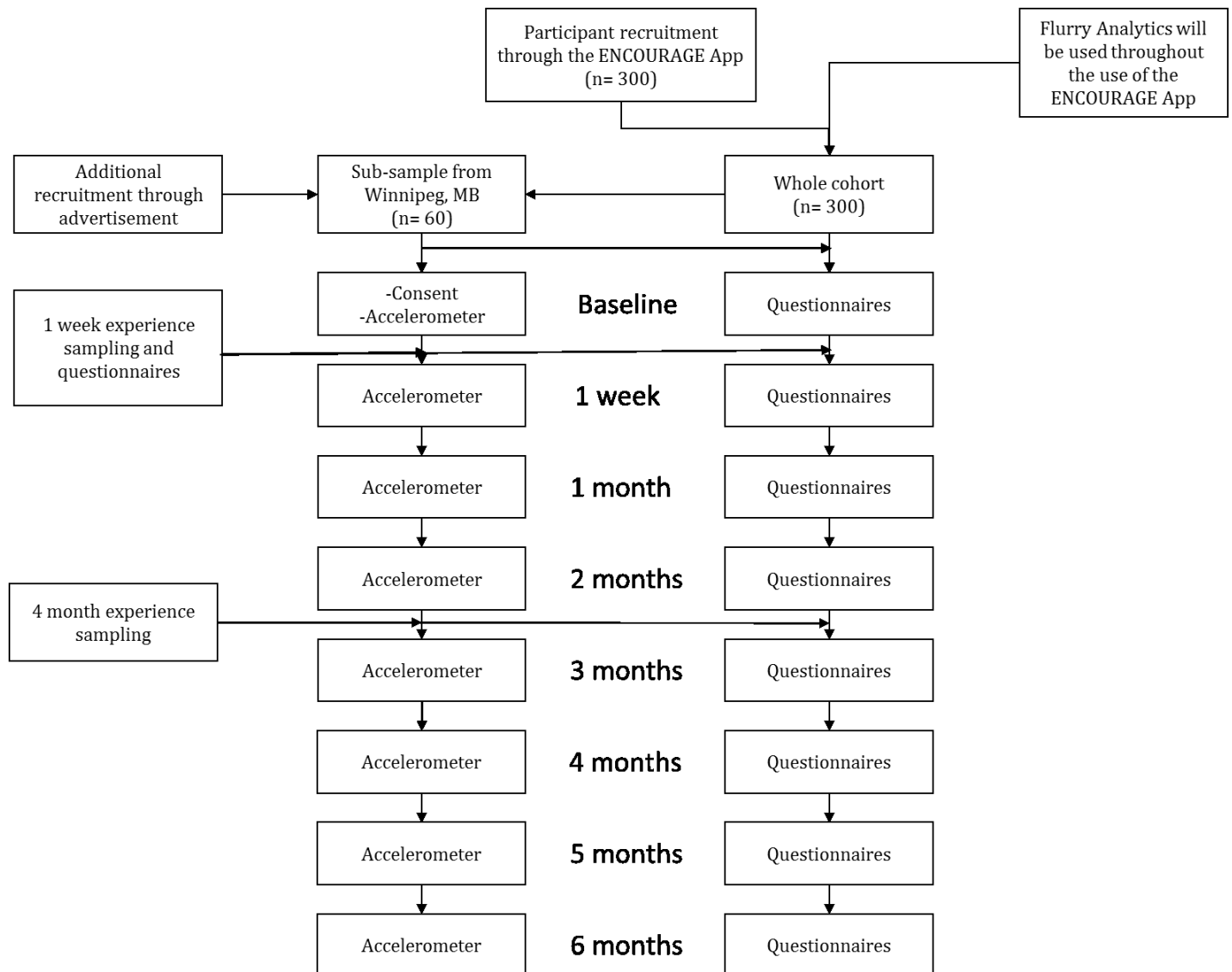8) 6 month survey: https://www.surveymonkey.com/r/L3P9FGC

Participants will also be asked on two separate occasions over the 6 month period to document their experiences using an experience sampling approach. A list of questions used are in **Appendix 5**.

Sub-study procedures:

Participants from Winnipeg, MB who choose to enroll in the sub-study will complete the study procedures for the large study and will also be asked to meet with research staff to obtain consent for the smaller study and will be asked to wear an accelerometer for 7-day periods at baseline and every month for 6 months (i.e., 7 different occasions). The research appointments will last approximately 30 minutes each.

See below for a figure overviewing the flow of the study.

Figure 1. Study flow chart

	Participant recruitment through the ENCOURAGE App (n= 300)	Flurry Analytics will be used throughout the use of the ENCOURAGE App

Additional recruitment through advertisement	→	Sub-sample from Winnipeg, MB (n= 60)	←	Whole cohort (n= 300)

	-Consent -Accelerometer	**Baseline**	Questionnaires
1 week experience sampling and questionnaires	Accelerometer	**1 week**	Questionnaires
	Accelerometer	**1 month**	Questionnaires
	Accelerometer	**2 months**	Questionnaires
4 month experience sampling	Accelerometer	**3 months**	Questionnaires
	Accelerometer	**4 months**	Questionnaires
	Accelerometer	**5 months**	Questionnaires
	Accelerometer	**6 months**	Questionnaires

Assessment of Safety

Since this is not a drug study, rescue medication is not warranted. Should any participant experience adverse effects as a consequence of participation in the study, they will be excluded from the study and receive routine clinical care. All serious adverse events as well as death due to any cause or cardiovascular death will be reviewed by the medical monitor within 24 hrs of becoming aware of events. Any Serious Adverse Events will be reported to the University of Manitoba Health Ethics Boards and St. Boniface Hospital.

Statistics

Sample Size

The primary outcome for this time series quasi-experimental study is a change in moderate-vigorous physical activity within the subset of 60 participants. When doing a pre/post power analysis, an estimate of correlation between the pre and post measurements is required. We assumed a high correlation of 0.8 between measurements. Under this assumption, the sample size needed to detect a 20 minute/week increase for moderate-vigorous physical activity (Mean ± SD; Pre: 72 ± 64 min/week; Post: 92 ± 86 min/week) is n=44 for with a two tailed α of 0.05 and power of 80%. Even so, we will recruit *60 participants* to account for the possibility of drop out. If we assume a moderate correlation of 0.5 between Pre-Post, the sample size of 60 will still be large enough to detect a change in total physical activity (Pre: 1240 ± 182 min/week; Post: 1402 ± 455 min/week).

Study Data

For the experience sampling and Flurry Analytics approach to this study, data from participants at the aggregate level using the mobile App will be analyzed to categorize responses, generate frequency charts, and define themes

For the quasi-experimental design, a one-way repeated measures ANOVA or Mann-Whitney Test will be used to examine changes in breaks in sedentary time and other continuous outcome measures from baseline to 1 week, 1-month, 2-month, 3-month, 4-month, 5-month, and 6-month depending if the data are normally distributed. Categorical variables will be compared using a Chi-Square test. Relationships between variables will be assessed using Pearson or Spearmen correlations, as well as multivariable linear or logistic regression.

Informed consent

The written consent form will be reviewed by the Health Research Ethics Board at the University of Manitoba prior to the initiation of the study. The consent form will describe the study procedures, risks and possible benefits, and will be reviewed by the participant prior to their enrollment in the study. Each participant will be asked to read the consent form and will be provided an opportunity to ask questions before they are enrolled. All participants will be required to provide written consent prior to initiation of study procedures. The consent form will be signed and dated by the participant and will be counter-signed by the researcher who conducted the informed consent process. The researcher will retain the original signed consent form and a copy of the form will be provided to the participant.

Study participants may decline to participate in the study or withdraw from participating at any time throughout the course of the study. Participants are free to withdraw from the study at any time upon

request by contacting any individual from the research team, or directly by contacting Dr. Todd Duhamel (email: tduhamel@sbrc.ca).

Ethics

A full submission will be made to the University of Manitoba Health Research Ethics Board and the St. Boniface Hospital Research Review Committee for written approval of the study prior to implementation. Any amendments where necessary, will be submitted for review and approval prior to implementation. Study status will be reported annually. A final study notification will be forwarded at completion of the study or in the event of early termination. The tenets of Good Clinical Practice will also be followed. Subjects are free to withdraw from the study at any time without affecting their right to ongoing medical care.

Deception

Deception will not be used in this study.

Feedback/Debriefing

At the conclusion of the user observation session, participants will be thanked and given an opportunity to provide their contact information if they would like to receive a summary of the overall study findings. Participants will also be provided an opportunity to indicate if they are willing to be contacted for future research studies.

Risk and Benefits

The risks with participating in this study are considered to be minimal. There is a very minor risk associated with participating in physical activity, but the benefits of participating in physical activity significantly outweigh the minimal risks.

Despite best efforts to keep personal information confidential, absolute confidentiality cannot be guaranteed for the participant. If a participant chooses not to allow contact for further research, their data will remain anonymous. If a participant chooses to allow contact for further research and indicates they would like to receive a report of the overall study findings, they must identify themselves so that they can be contacted. However, this contact information will be separated from all research data. A password protected spreadsheet located on a secure drive in the principal investigator's office containing the participant's name and contact information will be maintained separate from all other research data. Neither participants' name nor contact information will appear in any publications stemming from this research.

There may or may not be direct benefit resulting from participation in the study. Potential benefits of participation include the opportunity to influence the development of a workplace wellness initiative that more appropriately addresses the unique needs of an employee.

Anonymity or Confidentiality

With regards to use of the ENCOURAGE App, while there can never be absolute guarantees regarding unauthorized access to a system or data, there are several key security risk mitigations that can be put into place to greatly help in protecting private information. Any aggregate usage data will not be directly attributable to a device or individual. Data that is intended to be shared with researchers

will be coded or anonymized, and will be a select subset of data transferred over a secure encrypted connection. Any personal information will be stored only locally on the device, and no personally identifiable information will be shared with researchers or pushed to a cloud system. The App will be delivered through a website (http://www.encourageapp.com) as a signed binary, and any content remotely served to the application will restrict content and markup, as will be served as read only data to prevent any opportunities for HTML or SQL injection.

Information gathered in this research study may be presented at conferences or published in a peer-reviewed journal.

All data (i.e. notes, questionnaire data) will be labeled with a unique identification code. Briefly, a code (i.e. EABPR01, EABPR02, etc.) will be used to label the questionnaire package. Data linking the participant identification code with the participant's name and contact information (if provided during informed consent process) will be maintained in an independent, password protected spreadsheet. Information gathered in this research study may be presented at conferences or published in a peer-reviewed journal. Any publications resulting from the study will present themes that emerge from the experience sampling and quotes that support the themes. If a reference is made to a direct quote, pseudonyms will be used in place of the participant or organizational name in order to protect anonymity. Despite best efforts to keep personal information confidential, absolute confidentiality cannot be guaranteed for the participant. The results will also be used to generate a report to inform the development of the final version of the ENCOURAGE app.

If a participant chooses not to allow contact for further research, their data will remain anonymous. If a participant chooses to allow contact for further research, they must identify themselves so that they can be contacted (e.g. name, email, phone). However, this contact information will be separated from all other questionnaire data. Neither the participants' name nor contact information will appear in any publications stemming from this research.

When the project is completed, identifying data file (i.e. Excel spreadsheet) stored on a secure computer in the principal investigator's office will be destroyed after a period of 7-years. A password-protected USB storage device with research data will also be stored in a locked filing cabinet in Dr. Todd Duhamel's office location for 7-years, where only the principal researcher will have access to this data. After this seven-year period, all electronic data will be permanently deleted and the computer hard drive will be re-formatted. Anonymous hard copy data will also be destroyed after 7-years using similar confidential waste procedures.

Compensation

For the larger study, research participants will be entered into a draw to win one of ten (10) $20 gift cards to either Starbucks or Chapters-Indigo. As such, research participants will be asked to provide their e-mail addresses to indicate if they have won a gift card.

Dissemination

The qualitative information gathered from the experience sampling will be disseminated into a final study report. The information obtained from this study will be used to generate a report that will inform the utility of the ENCOURAGE App. Broad themes that emerge from the comments of multiple study participants will be summarized and any direct quotes that are extracted to support themes will not reveal names or other identifying information. All information that may reveal personal identifiers will be removed prior to data analysis in order to protect anonymity.

Financing

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Appendix 1: Letter of support for the ENCOURAGE App from Tactica Interactive

TACTICA INTERACTIVE

June 15, 2015

Dr. Todd Duhamel
Institute of Cardiovascular Science,
St. Boniface General Hospital Research Centre
R4012 - 351 Tache Ave,
Winnipeg, MB, Canada, R2H 2A6

Dear Dr. Duhamel:

On behalf of Tactica, I am pleased to provide this letter in support of the ENCOURAGE app. The app proposed by your group will assist Canadians to integrate healthy behaviours into their life and learn key skills to self-manage their health by using a system of evidence-informed behaviour change approaches. We have met with your research group on five occasions over the past 6 months to discuss and plan the development of the ENCOURAGE app.

To support the feasibility of the app development, we have submitted a budget and deliverables document as well as a production schedule document for you to include within your grant application. Tactica believes so strongly in the importance of this project that we will also support the app by:

1. providing a $6,250 cash investment (derived from the Manitoba Interactive Digital Media Tax Credit we will claim); and

2. donating in-kind support (valued at $15,000) in the form of our pre-existing code we have developed for a behaviour management platform.

Tactica is an interactive digital media studio that creates award-winning **mobile apps, games, websites,** and **online marketing strategies.** We collaborate with researchers and healthcare service providers to **conceptualize, test** and **deliver research-based digital health solutions** that support better patient outcomes.

Our health clients include Winnipeg Regional Health Authority, Children's Hospital Research Institute of Manitoba (CHRIM), TRanslating Emergency Knowledge for Kids (TREKK), University of Manitoba, Faculty of Nursing at the University of Alberta, Red River College, Klinic Community Health Centre, Canadian Association of Suicide Prevention, Canadian Broadcasting Corporation, The Massage Therapy Association of Manitoba, and Canadian Mental Health Association. Some successful health and fitness apps we've created include:

TACTICA INTERACTIVE

- **Fit First:** a fitness app targeting First Nation peoples
  http://tactica.ca/project/fit-first/

- **Calm in the storm:** A stress reduction and suicide prevention app
  http://tactica.ca/project/calm-in-the-storm-app/

- **Be Well Winnipeg:** a mental health promotion app that helps individuals and communities improve their mental health
  http://tactica.ca/project/be-well-winnipeg/

- **Tiga Talk:** a speech therapy game for young kids
  http://tactica.ca/project/tiga-talk-campfire-adventure-ipad-game/

We enthusiastically support your Heart and Stroke Foundation Primary Prevention Challenge Grant proposal and look forward to serving as a partner for this research program. Should anything further be required to support your grant application, please do not hesitate to contact me.

Sincerely,

Kevin Glasier
CEO, Tactica Interactive

Appendix 2: ENCOURAGE App 2 page description

ENCOURAGE APP

This app will assist Canadians to integrate healthy behaviours into their daily life and learn key skills to self-manage their health by using a system of evidence-backed pledges.

* 6 categories of health pledges: **physical activity, sedentary time, nutrition, mental health, healthy behaviour self-management, and workplace health.**

* Each pledge is unique to help the user develop skills and sustainably **integrate healthy behaviours** into their lives.

* **Focus on one pledge each week -** the app will ask users if they have been successful in maintaining their pledges.

* More than 52 pledges will engage users for a 1 year period so the users can advance to a maintenance stage of health behaviour change.

* Users **choose their own path** to health as they unlock new pledges in an order of their choosing and test their skills through increasingly complex pledges.

* **Share pledges** on social media to receive encouragement and support.

Market Demand

✳ National surveys find 60% of Canadians wanting to "**exercise more regularly**" and 87% of Canadians "**trying to eat healthfully but still want to do better**".

✳ The estimated economic impact of physical inactivity ($6.8 billion annually), poor nutrition ($6.3 billion annually) and mental illness ($51 billion annually) in Canada is more than $64 billion annually.

Successfully helping just 0.01% of Canadians may result in annual savings of over $6.4 million.

✳ Health-related pledges with a social component are effective for increasing motivation to change unhealthy behaviour.

✳ No publically available app exists that incorporates a pledge system, education and self-monitoring to build health management skills, **though evidence shows these components are effective and necessary.**

✳ Leading health and wellness apps such as MyFitnessPal neither significantly improve health behaviour nor integrate elements of behaviour change[1].

✳ The approach used in this app was developed by university researchers with expertise in health promotion, kinesiology and recreation.

✳ The health promotion model is consistent with American Heart Association's statement on Worksite Wellness Programs for Cardiovascular

[1] Laing, B.Y. et al (2014). Effectiveness of a Smartphone Application for Weight Loss Compared With Usual Care in Overweight Primary Care Patients: A Randomized, Controlled Trial. Ann Intern Med; 161, S5–S12

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Appendix 3: Letter of support from the executive of the St. Boniface Hospital

Hôpital St-Boniface Hospital

409 Taché Ave, Winnipeg MB Canada R2H 2A6
T. (204) 233-8563

June 1, 2015

Heart and Stroke Foundation of Manitoba
Primary Prevention Challenge Grant Program
6 Donald Street
Winnipeg, MB   R3L 0K6

Dear Grant Manager,

Re: "Developing the ENCOURAGE app to support physical activity promotion in diverse workplaces"

St. Boniface Hospital supports the ENCOURAGE app submission to the Primary Prevention Challenge Grant Program.

St. Boniface Hospital believes that supporting the health of workers through this project will result in positive outcomes for our employees as well as the worksite at large. We strongly support this opportunity to increase linkages between our employees and community resources, contributing to the goal of improving health for all Canadians.

Sincerely,

Dr. Michel Tétreault
President & Chief Executive Officer
St. Boniface Hospital

Appendix 4: Letter of support from union leadership

June 11, 2015

Heart and Stroke Foundation of Manitoba
Primary Prevention Challenge Grant Program
6 Donald Street
Winnipeg, MB   R3L 0K6

Dear Grant Manager,

Re: "Developing the ENCOURAGE app to support physical activity promotion in diverse workplaces"

The Manitoba Nurses Union Local 5 is excited to support the "ENCOURAGE app" submission to the Heart & Stroke Primary Prevention Challenge Grant Program.

MNU Local 5 recognizes that assisting our members to maintain or improve their physical and mental health through physical activity promotion, linkages to local organizations and resources, and other health interventions results in positive outcomes for the individual and the workplace.

MNU Local 5 welcomes and strongly supports this excellent opportunity to strengthen the connection between our members and the community, and to contribute to the national goal of improving health and reducing chronic disease.

Sincerely,

Karen Sadler, RN
President, St. Boniface Nurses Local 5

Appendix 5: Experience sampling questions

Screening Questions
To ensure that the user research group is comprised of individuals who fit the target audience definition for the app, it could be valuable to consider using screening questions like the following examples to deselect candidates who may not provide value to the research goals:

- Do you own or regularly use a smartphone or tablet?

- Have you used an app within the last six months?

Demographic Questions

How old are you?

What gender are you?
❏ Male

❏ Female

How active are you at work?
❏ Very active

❏ Somewhat active

❏ Somewhat inactive

❏ Very inactive

How much time do you spend seated during your work day?
❏ 0-2 hours

❏ 2-4 hours

❏ 4-6 hours

❏ 6-8 hours

❏ 8+ hours

How concerned are you about your sedentary behaviour at work?
❏ Not concerned

❏ Somewhat concerned

    ❏ please specify

❏ Very concerned

    ❏ please specify

Experience Sampling Questions

What apps, websites or personal habits/routines do you currently use to keep you active?

What do you find the most difficult in dealing with your daily activity level?

Can you think of a time/moment when an activity reminder app would have been useful to you?

Does your workplace encourage physical activity?

User Experience & Design Questions

What was main thing that you remember or liked most about the app?

What did you like least about the app?

Was there anything that confused you at first?

Was there anything important to you that was missing?

Do you feel the characters would appeal to you and other people your age?
- ❏ Very much agree
- ❏ Agree
- ❏ Not sure
- ❏ Disagree
- ❏ Very much disagree

Do you feel the colours and style of the app would appeal to you and other people your age?
- ❏ Very much agree
- ❏ Agree
- ❏ Not sure
- ❏ Disagree
- ❏ Very much disagree

Do you feel that the available exercises are challenging enough?
- ❑ Very much agree
- ❑ Agree
- ❑ Not sure
- ❑ Disagree
- ❑ Very much disagree

Do you feel that the available exercises provide enough variety?
- ❑ Very much agree
- ❑ Agree
- ❑ Not sure
- ❑ Disagree
- ❑ Very much disagree

Did you like the ability to earn "streak points" for completing activities in the app?
- ❑ Yes
- ❑ No
- ❑ Didn't care either way

How likely would you be to consider sharing your progress to friends and family via social media?
- ❑ Very likely
- ❑ Likely
- ❑ Not sure
- ❑ Not likely
- ❑ Wouldn't at all

How likely would you be to use the app to help support a friend or family member that wanted to be more active during the work day?
- ❑ Very likely
- ❑ Likely
- ❑ Not sure
- ❑ Not likely
- ❑ Wouldn't at all

Do you feel at least one exercise per hour is achievable?
- ❏ Very much agree
- ❏ Agree
- ❏ Not sure
- ❏ Disagree
- ❏ Very much disagree

How helpful was it to be reminded via notifications to complete your activity?
- ❏ Very helpful
- ❏ Helpful
- ❏ Not sure
- ❏ Not helpful
- ❏ Annoying

If you failed to complete an activity, how helpful was it to receive feedback on how to achieve success next time?
- ❏ Very helpful
- ❏ Helpful
- ❏ Not sure
- ❏ Not helpful
- ❏ Annoying

Did you learn something during the use of this app? If yes, what did you learn?

Appendix 6: Description of experience sampling and Flurry Analytics

Experience sampling:

Experience sampling and marketing validation is a strategic research technique for uncovering user needs and wants. Users are interrupted at defined intervals to note their experience in real-time. The following steps will be taken to gather experience sampling data:

1. Define experience sampling questions based on criteria that focusses on repeated behaviour and avoids yes/no questions, quantity-based answers or opinions.
2. Categorize responses, clean data, adjust categories
3. Generate frequency charts and define themes

Flurry Analytics description

Flurry Analytics is an industry standard that allows researchers and organizations to understand what components of the App the users are most engaged with. It is important to note that individual-level data will not be linked to the user's personal information. Flurry Analytics collects data at the aggregate level. User's IDs are anonymized and are created to pair with the user's device and the server. It is important to note that the user's ID is only known by the server.

Flurry analytics can measure user sessions, frequency of use, session length. Analytics can also determine if the users are progressing through the app as intended, data describing the number of times a specific module of the app was started and how long the user stayed engaged with each module. Flurry is an industry standard analytics tool that measures, tracks and analyzes app performance, user acquisition and activity. Flurry provides a deep understanding of app performance metrics and user behaviour. The following information will be gathered:

- **User sessions**
    - The number of unique users and total number of user sessions - ie 10,000 unique users and 25,000 sessions.

- **Frequency of use**
    - Session frequency distribution for daily, weekly and monthly time periods - ie in a weekly period 2,000 users had 1 session, 4,000 users had 2-3 sessions, 1,500 users had 4-6 sessions

- **Session length**
    - Session length distribution and mean session length - ie median session length is 1.6 minutes, 1,000 users used the app 0-1 min, 2,000 users for 1-3 min, 1,000 users 3-5 min

- **User events**
    - Custom events defined within the app - ie 10,000 users clicked "Save" - or users clicked "Save" and average of 2.6 times per session

- **Technical data and errors**
    - Devices have been used to access the app, number of users who may have experienced a crash (note: false positives for crashes can occur when users close the app and interrupt a process) - ie 5,000 sessions were conducted on Apple iPad Mini WiFi Only

- **Geographic distribution**
    - Reported at a country level

Appendix 7: Poster advertisement

ENCOURAGE Researchers need your help!!!

Sedentary behaviour is becoming increasingly common in the modern working environment. This is concerning, as researchers are beginning to recognize that sitting for extended periods of time increases your risk of diabetes, cardiovascular disease and other adverse health outcomes. Unfortunately, sitting at work is often unavoidable, but we want you to help us change that!

We are seeking volunteers for a research study to test the public release of a mobile app that is designed to decrease sedentary time in the workplace

Are you?
- Between the ages of 18 and 70
- An employee of the University of Manitoba or St. Boniface Hospital with a fairly inactive job?
- Consider yourself physically inactive but ready to make a change towards a more active lifestyle?

If you are eligible, seven study visits will be scheduled over 6 months that will include:
- Installing the ENCOURAGE App on your mobile phone (first visit only)
- Wearing a device called an accelerometer to measure your physical activity behavior
- Complete a series of questions regarding your lifestyle behaviors and cardiovascular health risk

  You will also be asked to complete weekly questions regarding your experience with the App

If you are interested, please contact us at stbonifaceresearch@gmail.com.

ENCOURAGEing Workplaces

Hôpital St-Boniface Hospital

TACTICA INTERACTIVE

UNIVERSITY OF MANITOBA

RAGE Mobile App Study — ENCOURAGE Mobile App Study — ENCOURAGE Mobile App Study — ENCOURAGE Mobile App Study — ENCOURAGE Mobile App Study — ENCOURAGE Mobile App Study
ceresearch@gmail.com — stbonifaceresearch@gmail.com — stbonifaceresearch@gmail.com — stbonifaceresearch@gmail.com — stbonifaceresearch@gmail.com — stbonifaceresearch@gmail.com

Appendix 8: Study questionnaire package

<u>Appendix List of questionnaires</u>

1. Demographics Questionnaire
2. Patient Health Questionnaire-9
3. Occupational Sitting and Physical Activity Questionnaire

4. Godin leisure time exercise questionnaire

5. The Cardiovascular Health in Ambulatory Care Research Team (CANHEART) health questionnaires

      -CANHEART Questionnaire – Tobacco use

      -CANHEART Questionnaire – Fruit and vegetable consumption

      -CANHEART Questionnaire – High blood pressure

      -CANHEART Questionnaire – Diabetes

6. Exercise Self-Efficacy Questionnaires:

      -Physical Activity Task Self-Efficacy Questionnaire

      -Physical Activity Self-Regulatory Efficacy Questionnaire

7. Self-Regulatory Efficacy to Manage Sedentary Behavior

8. Barrier Self-Efficacy to Reduce Sedentary Behavior

9. Self-efficacy to Reduce Total Daily Sedentary Time

10. Workplace Sitting Breaks Questionnaire

<u>DEMOGRAPHICS QUESTIONNAIRE</u>

1. <u>Demographics</u>

Age (years) : _____

Height (cm): ___ ___ ___ . ____

Weight (kg): ___ ___ ___ . ____

Job Title/description _____

Occupation (type): □ sedentary □ semi-active □ active

Perception of work stress: □ high □ moderate □ low

Highest level of education: □ elementary/junior high □ high school □ college
□ graduate school/PhD

Living arrangement: □ alone □ with spouse/partner □ with relative

Height (cm): _____

Weight (kg): _____

PHQ-9 QUESTIONNAIRE

Over the past 2 weeks, how often have you been bothered by any of the following problems? Please circle the best response, according to the following scale:

0	1	2	3
Not at all	**Several days**	**More than half the days**	**Nearly every day**

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. thoughts that you would be better off dead, or of hurting yourself in some way	0	1	2	3
10. If you checked off any problems, how difficult _____ have these problems made it for your to do your _____ work, take care of things at home, or get along _____	Not difficult at all Somewhat difficult Very difficult		

with other people?   Extremely difficult
_____

please check (√) your response

<u>OCCUPATIONAL SITTING AND PHYSICAL ACTIVITY QUESTIONNAIRE (OSPAQ)</u>

1. How many hours did you work in the last 7 days? _____ hours

2. During the last 7 days, how many days were you at work? _____ days

3. How would you describe your typical work day in the last 7 days? (This involves only your work day, and does not include travel to and from work, or what you did in your leisure time)

a. Sitting (including driving)	_____	%
b. Standing	_____	%
c. Walking	_____	%
d. Heavy labour or physically demanding tasks	_____	%
Total	_____	%

Example:
Jane is an administrative officer. Her work day involves working on the computer at her desk, answering the phone, filing documents, photocopying, and some walking around the office.
Jane would describe a typical work day in the last 7 days like this:

Sitting (including driving)	90 %
Standing	5 %
Walking	5 %
Heavy labour or physically demanding tasks	0 %
Total	100 %

GODIN LEISURE TIME EXERCISE QUESTIONNAIRE

INSTRUCTIONS

In this excerpt from the Godin Leisure-Time Exercise Questionnaire, the individual is asked to complete a self-explanatory, brief four-item query of usual leisure-time exercise habits.

CALCULATIONS

For the first question, weekly frequencies of strenuous, moderate, and light activities are multiplied by nine, five, and three, respectively. Total weekly leisure activity is calculated in arbitrary units by summing the products of the separate components, as shown in the following formula:

Weekly leisure activity score = (9 × Strenuous) + (5 × Moderate) + (3 × Light)

The second question is used to calculate the frequency of weekly leisure-time activities pursued "long enough to work up a sweat" (see questionnaire).

EXAMPLE

Strenuous = 3 times/wk

Moderate = 6 times/wk

Light = 14 times/wk

Total leisure activity score = (9 × 3) + (5 × 6) + (3 × 14) = 27 + 30 + 42 = 99

Godin, G., Shephard, R. J.. (1997) <u>Godin Leisure-Time Exercise Questionnaire</u>. Medicine and Science in Sports and Exercise. 29 June Supplement: S36-S38.

1. During a typical 7-Day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write on each line the appropriate number).

a) STRENUOUS EXERCISE (HEART BEATS RAPIDLY)
(e.g., running, **jogging**, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

TIMES PER WEEK _____

b) MODERATE EXERCISE (NOT EXHAUSTING)
(e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

TIMES PER WEEK _____

c) MILD EXERCISE (MINIMAL EFFORT) (e.g., yoga, archery, fishing from river bank, bowling, horshoes, golf, snow-mobiling, easy walking)

TIMES PER WEEK _____

2. During a typical 7-Day period (a week), in your leisure time, how often do you engage in any regular activity long enough to work up a sweat (heart beats rapidly)?

OFTEN	SOMETIMES	NEVER/RARE
1.	2.	3.

CANHEART QUESTIONNAIRE – TOBACCO USE

1. Never used tobacco: ☐   2. Ex-tobacco user: Quit date _____   3.

Currently use: ☐

      If tobacco user, average number per day _____   and number of years ____

CANHEART QUESTIONNAIRE – FRUIT AND VEGETABLE CONSUMPTION

The next questions are about the foods you usually eat or drink. Think about all the foods you eat, both meals and snacks, at home and away from home.

1. How often do you usually drink fruit juices such as orange, grapefruit or tomato? (for example, once a day, three times a week, twice a month)

         Times/day _____   OR   Times/week ____

2. Not counting juice, how often do you usually eat fruit?

         Times/day _____   OR   Times/week ____

3. How often do you (usually) eat green salad?

         Times/day _____   OR   Times/week ____

4. How often do you usually eat potatoes, not including French fries, fried potatoes, or potato chips?

         Times/day _____   OR   Times/week ____

5. How often do you (usually) eat carrots?

         Times/day _____   OR   Times/week ____

6. Not counting carrots, potatoes, or salad, how many <u>servings</u> of other vegetables do you usually eat?

         Times/day _____   OR   Times/week ____

CANHEART QUESTIONNAIRE – HIGH BLOOD PRESSURE

1. We're interested in conditions diagnosed by a healthcare professional. Do you have high blood pressure? (please circle one)

    Yes   No

2. If yes, how old were you when you were first diagnosed?

    Age in years _____

CANHEART QUESTIONNAIRE - DIABETES

1. We're interested in conditions diagnosed by a healthcare professional. Do you have diabetes? (please circle one)

    Yes   No

2. If yes, how old were you when you were first diagnosed?
    Age in years _____

<u>EXERCISE SELF-EFFICACY QUESTIONNAIRES</u>

PHYSICAL ACTIVITY TASK SELF-EFFICACY QUESTIONNAIRE

How certain are you that you can engage in moderate- to strenuous-intensity physical activity for the following durations? Please rate your degree of confidence for each duration using the scales.

<u>10 minutes</u>
0	1	2	3	4	5	6	7	8	9	10
Cannot at all certain					Moderately can do					Highly can do

<u>20 minutes</u>
0	1	2	3	4	5	6	7	8	9	10
Cannot at all certain					Moderately can do					Highly can do

<u>30 minutes</u>
0	1	2	3	4	5	6	7	8	9	10
Cannot at all certain					Moderately can do					Highly can do

<u>40 minutes</u>
0	1	2	3	4	5	6	7	8	9	10
Cannot at all certain					Moderately can do					Highly can do

<u>50 minutes</u>
0	1	2	3	4	5	6	7	8	9	10
Cannot at all certain					Moderately can do					Highly can do

<u>60 minutes</u>
0	1	2	3	4	5	6	7	8	9	10
Cannot at all certain					Moderately can do					Highly can do

PHYSICAL ACTIVITY SELF-REGULATORY EFFICACY QUESTIONNAIRE

Please rate your confidence in your ability to engage in the following behaviours over the next 8 weeks.

1. Over the next 8 weeks, how confident are you that you can identify key factors that trigger lapses in your physical activity?

0	1	2	3	4	5	6	7	8	9	10

Not at all   Moderately
Completely
   confident   confident   confident

2. Over the next 8 weeks, how confident are you that you can arrange your schedule in order to do your physical activity no matter what?

0	1	2	3	4	5	6	7	8	9	10

Not at all   Moderately
Completely
   confident   confident   confident

3. Over the next 8 weeks, how confident are you that you will set realistic physical activity goals?

0	1	2	3	4	5	6	7	8	9	10

Not at all   Moderately
Completely
   confident   confident   confident

4. Over the next 8 weeks, how confident are you that you will develop solutions to cope with potential barriers that can interfere with your physical activity?

0	1	2	3	4	5	6	7	8	9	10

Not at all   Moderately
Completely
   confident   confident   confident

5. Over the next 8 weeks, how confident are you that you can make up times when you miss your physical activity sessions?

          0   1   2   3   4   5   6   7   8   9   10

   Not at all   Moderately
Completely
    confident   confident   confident

6. Over the next 8 weeks, how confident are you that you will follow through with your physical activity for the week, even though it may be difficult at times?

          0   1   2   3   4   5   6   7   8   9   10

   Not at all   Moderately
Completely
    confident   confident   confident

7. Over the 8 weeks, how confident are you that you will organize your time and responsibilities around each physical activity session no matter what?

          0   1   2   3   4   5   6   7   8   9   10

   Not at all   Moderately
Completely
    confident   confident   confident

8. Over the next 8 weeks, how confident are you that you will resume your physical activity when it is interrupted and you miss physical activity for a few days or weeks?

          0   1   2   3   4   5   6   7   8   9   10

   Not at all   Moderately
Completely
    confident   confident   confident

9. Over the 8 weeks, how confident are you that you can schedule your physical activity around your daily activities?

          0   1   2   3   4   5   6   7   8   9   10

   Not at all   Moderately
Completely
    confident   confident   confident

10. Over the next 8 weeks, how confident are you that you will develop plans to reach your level of physical activity?

0   1   2   3   4   5   6   7   8   9   10

Not at all   Moderately
Completely
  confident   confident   confident

11. Over the next 8 weeks, how confident are you that you will view any missed physical activity as challenges to overcome rather than failures?

0   1   2   3   4   5   6   7   8   9   10

Not at all   Moderately
Completely
  confident   confident   confident

12. Over the next 8 weeks, how confident are you that you can set realistic goals for maintaining your level of physical activity?

0   1   2   3   4   5   6   7   8   9   10

Not at all   Moderately
Completely
  confident   confident   confident

13. Over the next 8 weeks, how confident are you that if you do not do your exercise for a few days, you can readjust your goals to resume physical activity?

0   1   2   3   4   5   6   7   8   9   10

Not at all   Moderately
Completely
  confident   confident   confident

Self-Regulatory Efficacy to Manage Sedentary Behaviour

You may have heard that being sedentary, or sitting too much is bad for our health. We would like to know about your confidence to be able to do certain things that would promote reductions in sedentary behaviour (sitting time) at work.

Using the scale below, choose a number that best represents how **confident** you are that you could do the things listed in the table below during your work day.

0	10	20	30	40	50	60	70	80	90	100
Not at all confident					Moderately confident					Completely confident

How confident are you that you can…

Make sitting less a priority?	
Schedule in regular standing/movement breaks, especially during long bouts of sitting (i.e., sitting bouts that last for more than one hour)?	
Stick to a schedule that has been designed to help you spend less time sitting?	
Keep track of the time you spend sitting every day?	
Identify factors (people, places, things) that influence the amount of time you spend sitting on a daily basis?	
Identify situations and settings in which you could stand up or move instead of sitting still?	
Set realistic goals for sitting less (e.g., sit less by 30 minutes a day)?	
Identify barriers and challenges that might prevent you from being able to spend less time sitting?	
Develop strategies and solutions to overcome barriers and challenges that prevent you from sitting less?	
Restart your efforts to sit less even if you fail to meet your goals for sitting less for a few days?	

Barrier Self-Efficacy to Reduce Sedentary Behaviour

We are interested in your confidence to reduce your sedentary behaviour (sitting time) when facing certain barriers and challenges that might interfere with your ability to sit less at work.

Using the scale below, choose a number that best represents how confident you are that you could reduce your sitting time at work when faced with each of the barriers listed in the table below.

0	10	20	30	40	50	60	70	80	90	100
Not at all confident					Moderately confident					Completely confident

How confident are you that you can reduce the amount of time you spend sitting (i.e., by taking regular standing/movement breaks), even if you…

Are feeling tired (physically and/or mentally)	
Are feeling comfortable and relaxed in your seated position	
Have important tasks to do that require you to be seated (e.g., study, using a computer)	
Feel like you deserve to sit down	
Feel stressed out	
Feel down or depressed	

Self-Efficacy to Reduce Total Daily Sedentary Time

We are interested to know how confident you are to reduce your total daily sitting time.

Using the scale provided, choose the number that best represents how confident you are to reduce your total daily sitting time by the time durations listed in the table below. Remember to consider all of time you spend sitting on a typical day (e.g., at home, school, work, and in transportation).

0	10	20	30	40	50	60	70	80	90	100

Not at all confident   Moderately confident   Completely confident

Over the next 7 days, how confident are you that you can reduce the total time you spend sitting per day by the following durations…

10 minutes	
30 minutes	
1 hour	
1.5 hours	
2 hours	
More than 2 hours	

WORKPLACE SITTING BREAKS QUESTIONNAIRE (SITBRQ)

Short Physcial Activity Breaks = any interruption to sitting time at work

One area we wish to explore is whether you take breaks from your working tasks during work hours. During a typical working day there may be opportunities to take short physical activity breaks from your working tasks. This is any interruption to your sitting time at work. For example, taking time away from your desk/workstation to move around perhaps to get a drink, have a bathroom break or even continuing a work task while standing.

How many breaks from sitting (such as standing up, or stretching or taking a short walk) during <u>one hour</u> of sitting would you <u>typically take at work</u>?
(*please circle the correct answer to the following questions*)

a. During a typical work day how many **breaks from sitting** (such as standing up, or stretching or taking a short walk) during **one hour** of sitting would you take **at work**?	6 or more	5	4	3	2	1	0
b. What is the **total time** you spend in **short physical activity breaks** during a **typical day** at work?	60 minutes or more	30-59 min	20-29 min	10-19 min	5-9 min	Less than 5 min	N/A