

Electronic Thesis and Dissertation Repository

4-11-2017 12:00 AM

Promoting Benefits of Physical Activity through Persuasive Communication

Priynka Patil, *The University of Western Ontario*

Supervisor: Dr. Alan Salmoni, *The University of Western Ontario*

A thesis submitted in partial fulfillment of the requirements for the Master of Arts degree in Kinesiology

© Priynka Patil 2017

Follow this and additional works at: <https://ir.lib.uwo.ca/etd>



Part of the [Health Communication Commons](#), [Health Psychology Commons](#), [Psychology of Movement Commons](#), and the [Public Health Education and Promotion Commons](#)

Recommended Citation

Patil, Priynka, "Promoting Benefits of Physical Activity through Persuasive Communication" (2017). *Electronic Thesis and Dissertation Repository*. 4484.
<https://ir.lib.uwo.ca/etd/4484>

This Dissertation/Thesis is brought to you for free and open access by Scholarship@Western. It has been accepted for inclusion in Electronic Thesis and Dissertation Repository by an authorized administrator of Scholarship@Western. For more information, please contact wlsadmin@uwo.ca.

Abstract

Inactivity early in life can lead to inactivity later in life, which can result in negative outcomes. The primary purpose was to determine if gain- or loss-framed messages about physical activity would change the attitudes, intentions, and behaviours of students in the contemplation or preparation stage of the Transtheoretical model. The secondary purpose was to determine if framing the message in terms of the physical health benefits, appearance/social benefits, or mental health benefits (benefit condition) would change attitude, intention and behaviour. Undergraduate female students (N=60) between the ages of 18 and 36 were recruited from the university. The results found no significant framing effect for intention and behaviour; however, gain-framed messages produced a greater improvement in attitude compared to loss-framed messages. Results showed no significant differences among benefit conditions. In conclusion, gain-framed messages are more effective than loss-frame messages at increasing attitudes towards physical activity for female undergraduate students.

Keywords

Physical Activity, Persuasive Communication, Diffusion of Innovation Theory, Gain-framed, Loss-framed, Physical Health, Mental Health, Appearance, Social, Undergraduate

Acknowledgment

Special thanks to Dr. Alan Salmoni for his guidance, time, patience, understanding and encouragement, it was an honour to work with you. Thank you so much for giving me the opportunity to create research that was of interest to me. Thank you for all the valuable discussions and advice that gave me the determination to complete this work. This project would not have been possible without your support. I would like to express my appreciation to my advisory committee: Dr. Karen Danylchuk and Dr. Harry Prapavessis. Thank you for taking the time to review my thesis proposal and providing me with valuable feedback. I would also like to take the time to acknowledge Taniya Nagpal and Cassandra Ellis for always being there to answer any questions I had related to my thesis. Thank you both for your advice and acting as mentors to me. I would also like to thank the University of Western Ontario and the Faculty of Kinesiology for giving me this opportunity. Finally, I would like to thank my family and friends for their support and for always being there when I was struggling and needed help.

Table of Contents

Abstract.....	i
Acknowledgment.....	ii
Table of Contents.....	iii
List of Tables.....	v
List of Figures.....	vi
List of Appendices.....	vii
Chapter 1.....	1
1 Introduction.....	1
1.1 Diffusion of Innovation Theory.....	3
1.2 Persuasive Communication Theory.....	6
1.3 Transtheoretical Model.....	10
1.4 Purpose.....	11
Chapter 2.....	12
2 Methods.....	12
2.1 Participants.....	12
2.2 Content of Framed Messages.....	12
2.3 Manipulation Check.....	13
2.4 Instruments.....	14
2.4.1 Attitude.....	14
2.4.2 Intention.....	15
2.4.3 Physical Activity Behaviour.....	15
2.4.4 Qualitative Data.....	16

2.5	Recruitment Method.....	16
2.6	Procedure.....	17
2.7	Analysis.....	18
Chapter 3.....		20
3	Results.....	20
3.1	Participants.....	20
3.2	Correlation.....	20
3.3	Attitude.....	21
3.4	Intention.....	23
3.5	Physical Activity Behaviour.....	25
3.6	Qualitative Data.....	25
Chapter 4.....		27
4	Discussion.....	27
4.1	Limitations.....	33
4.2	Future Considerations.....	35
4.3	Conclusion.....	36
References.....		38
Appendices.....		46
Curriculum Vitae.....		70

List of Tables

Table 1: Procedure.....	18
Table 2: Demographic Profile of Participants.....	21
Table 3: Theme that Emerged from Follow-up Questionnaire.....	26

List of Figures

Figure 1: Change in attitude measured by question one over time between gain- and loss-framed messages.....	23
Figure 2: Mean change in intention over time.....	24
Figure 3: Change in intention over time between self-reported responses to change.....	26

List of Appendices

Appendix A: Eligibility Questionnaire.....	46
Appendix B: Western University Non-Medical Research Ethics Board.....	47
Appendix C: Six Framed Messages.....	48
Appendix D: Manipulation Check.....	54
Appendix E: Pre-intervention Questionnaire.....	55
Appendix F: Post-intervention Questionnaire.....	57
Appendix G: Follow-up Questionnaire.....	59
Appendix H: Physical Activity Log.....	62
Appendix I: Letter of Information and Consent Form.....	63
Appendix J: Fidelity Check.....	67

Chapter 1

1 Introduction

To profit from multiple benefits, every Canadian should be participating in a range of physical activities that are both enjoyable and safe. These benefits include physical health benefits, mental health benefits, and appearance/social benefits. To achieve the benefits of physical activity, it is recommended that adults (aged 18 to 64) participate in at least 150 minutes of moderate to vigorous physical activity a week. This should include aerobic activities, and muscle and bone strengthening activities (“Physical Activity and Adults,” 2016). Many Canadians do not meet this guideline; therefore, they do not profit from the multiple benefits (Ogilvie & Eggleton, 2016). As youth move from secondary school to post-secondary school, there is a drop in participation in physical activity (Sallis, 2000). In Canada, between 2007 and 2011 only 18.9% of young adults aged 18 to 39 met the recommended guidelines for physical activity (“Directly measured physical activity of Canadian adults, 2007 to 2011,” 2013). Leisure time physical activity is less common among females compared to men throughout all age groups, but there is a significant gap in physical activity level between females and males after the age of 19 (“Physical Activity,” 2013; Turcotte, 2015). In 2012 and 2013 only 29% of females between the age of 18 to 39 met the recommended guidelines for physical activity (“Directly measured physical activity of adults, 2012 and 2013,” 2015). Studies have shown that if mothers participate in sports their children are 22% more likely to participate in sports (“Facts and Stats,” 2013). In 2010, only 19% of Canadian females participated in sports activities compared to 35% of Canadian males (“Facts and Stats,” 2013). Sallis (2000) states that inactivity early in life can lead to inactivity later in life,

which can result in many negative outcomes to one's physical health, mental health, and appearance/social status.

Physical inactivity can result in poor physical health outcomes such as increased risk of cardiovascular disease and cancer, the leading causes of death in Canada ("The 10 leading causes of death, 2011," 2015). Also, physical inactivity increases your risk of type 2 diabetes, stroke, hypertension, metabolic syndrome, and osteoarthritis ("The Benefits of Physical Activity," 2015). For the past two decades, these diseases have cost the Canadian government \$4.6 to \$7.1 billion (Twells, Gregory, Reddigan, & Midodzi, 2014). Being physically active significantly decreases the risk and prevalence of these diseases and can potentially reduce health care costs ("The Benefits of Physical Activity," 2015).

In 2012, approximately 2.8 million Canadians, 15 years of age and older, reported having symptoms associated with common mental disorders ("Canadian Community Health Survey: Mental Health, 2012," 2013). Many (17%) adults experience their first symptoms by the age of 18 and suicide is the leading cause of death among youth (Wilson & Goldbloom, 2012). Physical activity has an effect on chemicals in the brain that can affect mood and thinking, such as dopamine and serotonin. It can also stimulate other chemicals in the brain called brain derived neurotrophic factors, which help new brain cells to grow and develop. If you are physically active you are less likely to be depressed, anxious, stressed and have problems with memory and dementia. Additionally, you are more likely to feel better about yourself, sleep better, focus better and cope with cravings and withdrawal symptoms from habits like smoking or alcohol abuse ("Physical Activity and Mental Health," 2012).

Lastly, being physically active can also have social and appearance based benefits that can help motivate behaviour change. Women are more motivated to participate in an activity when it involves developing social relationships (Johnstone & Millar, 2012). Going to the gym is often a great place to hangout with friends and to improve on those social relationships. Being physically active can benefit an individual's social status by providing them with the opportunity to meet new friends and gain social acceptance in a fun and exciting environment. An individual's confidence and self-esteem can also be improved by managing body weight through physical activity. Being physically active can help reduce body fat, lose weight, strengthen bones, and prevent individuals from becoming overweight or obese, increase muscle tone, and improve body function and its ability to burn calories (Li, Cheng, & Fung, 2014). Since being regularly physically active can contribute to improving social life, appearance, physical health, and mental health it is vital that individuals are informed of these benefits through effective social marketing practices to motivate individuals to adopt physical activity in their daily lives.

1.1 The Diffusion of Innovation theory

The Diffusion of Innovation Theory has been shown to be an effective social marketing theory that can be used to persuade individuals to adopt new innovations or, in this case, a new behaviour (Rogers, 2002). Physical activity is a preventative innovation that can be marketed to university students to increase participation in physical activity. The Diffusion of Innovation Theory has been used to reduce the spread of sexually transmitted disease and HIV (Dearing et al., 1996; Valente & Fosados, 2006), promote smoking cessation (Valente, Dyal, Chu, Wipfli, & Fujimoto, 2015), increase breast cancer screening (Leeman et al., 2013) and other preventative behaviours.

The Diffusion of Innovation Theory has four elements: social system, time, communication channel, and innovation. These four elements determine whether or not an individual will make the decision to adopt the innovation (Rogers, 2002). Individuals within any social system will adopt the innovation at different stages. The first to adopt an innovation are called innovators (2.5% of the social system). Next are the early adopters who make up 13.5% of the social system. Followed by the early majority (34% of the social system), then the late majority (34% of the social system) and lastly the laggards (16% of the social system). The sooner the innovators adopt the innovation, the faster the whole social system will respond. If the innovators are opinion leaders in the community such as medical practitioners or prominent members of the public, it will speed up the diffusion process (Rogers, 2002). In addition to the social system and the timing of diffusion, the communication channel plays an equally important role in the diffusion process.

Innovation can be communicated through many different channels such as face-to-face, radio, print, television, and social media. The channel that is used to deliver the innovation is important to ensure adoption of the innovation. According to Rogers (2002), interpersonal communication channels (face-to-face communication) are more effective in forming and changing attitudes compared to mass media communication channels, which are more effective at disseminating knowledge. Additionally, communication between individuals or groups of people with similar attributes (homophily) such as beliefs, attitudes, social status, education and values lead to greater knowledge gain and increases the chance that attitudes and behaviour will change

compared to communication between individuals or groups of people with opposite or different attributes (heterophily) (Rogers, 2002).

Adopting an innovation is a mental process that an individual must proceed through. The process includes five steps: gaining *knowledge* about the innovation, forming an *attitude* about the innovation, making a *decision* to adopt the innovation or not, *implementing* the innovation, and *confirming* the decision (Rogers, 2002). Of these five steps, the most critical step is forming an *attitude*. If an individual's attitude can be changed in favour of the innovation it can increase the rate of diffusion. To enhance the rate of diffusion, the innovation must be relatively advantageous, compatible, triable, observable, and must lack complexity. The innovation is relatively advantageous when it is better than a product already available or is beneficial in one way or another. For the innovation to be compatible, it must align with the values, past experiences, and needs of the potential adopter. If the innovation can be tested out on a limited time basis, it is triable. For the innovation to be observable, the result of the innovation must be visible. Lastly, if the innovation is hard to understand or complicated to use, the chance of being adopted decreases. If all of these factors are present, then it will increase the rate of diffusion (Rogers, 2002).

In this study, the innovation being adopted is physical activity. Physical activity is considered a preventative innovation because physical activity is adopted to avoid poor outcomes in the future. This type of diffusion is referred to as Diffusion of Preventive Innovation. Compared to Diffusion of Innovation, Diffusion of Preventive Innovations are low in relative advantage, and are not observable since the benefits of the innovation are delayed, intangible, and the health outcome may or may not occur. Research has

shown that relative advantage is the most important at predicting the rate of adoption. If the relative advantage is enhanced, then the Diffusion of Preventive Innovations can be effective in changing behaviours such as physical activity (Rogers, 2002). A way to enhance relative advantage is by presenting the innovation in a way that is relevant to the adopter. In most cases, physical activity is promoted through its physical health benefits. These types of benefits are not observable, or compatible with the values and needs of younger adults who are not interested in their long-term health. Young adults are more interested in what they can do to improve their health now. Relative advantages or benefits of physical activity that are immediate are mental health benefits and appearance/social benefits. These benefits can also be easily observed and are compatible with young adults potential needs and values. Studies have shown that people can be motivated to adopt healthy behaviours for other purposes than physical health. A study conducted by Cornelis, Cauberghe, and De Pelsmacker (2014) found that appearance-focused arguments were more effective in lowering individuals behavioural intentions towards sun tanning compared to health-focused arguments. According to the Diffusion of Preventive Innovations Theory, by stating the immediate benefits rather than the long-term benefits young adults are more likely to adopt the healthy behaviour. To ensure adoption occurs different types of messaging can be used to persuade an individual or group into changing their behaviour.

1.2 Persuasive Communication Theory

Persuasive communication is any message presented in a written, oral or visual form, that is intended to influence the attitudes and behaviours of an individual or group of people (Ajzen, 1992; Stiff & Mongeau, 2003). Persuasive communication is

commonly used to motivate individuals to adopt a healthy behaviour such as sunscreen use, safe sex, smoking cessation, hygiene, vaccines, healthy eating and physical activity. The message is the core of persuasive communication because it is designed to sway an individual in favour of the argument. The message contains three fundamental aspects: the innovation (i.e., physical activity), general arguments in favour of the innovation (i.e., all adults should at least participate in 150 minutes of moderate to vigorous physical activity a week) and the facts that back up the argument (i.e., research has shown that being physically active can reduce your risk of having cancer and other chronic diseases) (Ajzen, 1992; Warburton, Nicol, & Bredin, 2006). As well as content, the context in which the message is delivered also needs to be considered. There are four factors that affect context known as the source, receiver, channel, and message factors. The purpose of Persuasive Communication Theory is to determine how these factors will change the attitude, intention, and behaviour of an individual (Ajzen, 1992).

The present research specifically focused on message factors or message framing. When designing effective health communication strategies, it is important to keep in mind how the message is framed because one way of framing that message may be more effective than the other in motivating an individual to change their unhealthy behaviour (Siu, 2010). Messages can be framed in terms of gain or loss. Gain-framed messages focus on what an individual will gain by adopting the recommended innovation or healthy behaviour (i.e., being physically active will decrease your risk of having chronic diseases). Loss-framed messages focus on what an individual will lose from not adopting the recommended healthy behaviour (i.e., not being physically active will increase your risk of having chronic diseases) (Siu, 2010). These framing types have different

persuasive effects when applied to the same information. However, it was shown in a systematic review that many studies show inconsistency between which of the two framing types are more persuasive at changing attitude, intention, and behaviours towards physical activity (Gallagher & Updegraff, 2012).

There are two ways to classify health behaviours, behaviours that prevent illness (i.e., sunscreen use), and behaviours that detect illness (i.e., skin cancer examinations). Making a distinction between these behaviours can make it easier to determine which type of framing is more effective at persuading healthy behaviours. Disease prevention behaviours are seen as safe because they minimises the chance of becoming sick. On the other hand, disease-detecting behaviours are seen as risky because there is a possibility one may find out that they are ill. According to Rothman and Salovey (1997), gain-framed messages make people more risk-averse while loss-framed messages make people more willing to take risks. From this it can be assumed that gain-framed messages would be more effective at changing physical activity behaviour; however, some studies have shown inconsistencies with this assumption (as cited in Gallagher & Updegraff, 2011).

A Meta-analysis conducted by O'Keefe and Jensen (2007) found that gain-framed messages had a significant but weak advantage over loss-framed messages, but only for dental hygiene behaviour ($r=0.154$) and not for any of the other preventative health behaviours such as physical activity. However, a systematic review (Janssen, Leblanc, & Bassett, 2010) found that gain-framed messages were more effective than loss-framed messages at changing intention and behaviour towards physical activity. Additionally, a meta-analysis review (Gallagher & Updegraff, 2012) found no significant difference in intention ($r=0.028$) and attitude ($r=0.039$), but there was an apparent difference in

behaviour between gain- and loss-framed messages for preventative behaviours such as smoking ($r=0.198$), skin cancer prevention ($r=0.237$) and physical activity ($r=0.160$). Six of the eleven studies about physical activity found that gain-framed messages were more effective at increasing participant behaviour compared to loss-framed messages (Gallagher & Updegraff, 2011; Jones, Sinclair, & Courneya, 2003; Jones, Sinclair, Rhodes, & Courneya, 2004; Latimer et al., 2008; McCall & Ginis, 2004; van't Riet, Ruiter, Verrij, & de Vries, 2010). Based on these findings Gallagher and Updegraff (2012) suggested that time may have a framing effect on behaviour compared to more immediate outcomes like intention and attitude.

A study conducted with undergraduate students found that gain-framed messages were more effective than loss-framed at changing intention (Gray & Harrington, 2011). Additionally, a study conducted by Li et al. (2014) focused on measuring physical activity behaviour using both self-report and accelerometer data, found that gain-framed messages were more effective than loss-framed messages in promoting physical activity in older adults, but no difference was found in younger adults. This may be because the messages only contained physical health related information, which may be of less interest to younger adults. In previous studies, the framed messages have primarily focused on physical health benefits only (Gallagher & Updegraff, 2011). Furthermore, a study by van 't Rieta et al. (2014) also found no framing effect on intention for participants aged 15 to 82. On the contrary, a study conducted by Bassett-Gunter, Ginis, and Latimer-Cheung (2013) found that loss-framed messages targeting mental health were more effective than gain-framed messages at changing intentions towards leisure-time physical activity for older adults. Furthermore, a study conducted by Robberson &

Rogers (1988) found that loss-framed messages about health (physical and mental health) were more persuasive than gain-framed messages about health and gain-framed messages about self-esteem were more persuasive than loss-framed messages about self-esteem in changing female undergraduate students intention towards physical activity. As stated by the Protection Motivation Theory, individuals are motivated to protect themselves from physical, physiological and social threats; therefore, we can assume that individuals may be persuaded to adopt healthy lifestyles for reasons other than health alone (Robberson & Rogers, 1988). Despite all of the research, it is still unclear how health messages should be framed to persuade healthy behaviour, and therefore further research is warranted.

1.3 Transtheoretical Model

For any message to effectively change the attitudes, intentions, or behaviours of an individual, the person must be ready to change. According to the Transtheoretical model, behaviour change unfolds through a series of stages called the stages of change (Prochaska & Velicer, 1997). The first stage is the pre-contemplation stage. Individuals in this stage have no intention to take action in the foreseeable future (in the next six months). They also are uninformed about the negative consequences of their current behaviour. The next stage is the contemplation stage. In this stage, individuals intend to change in the next six months. They are more aware of the pros and cons of changing, causing uncertainty, which is why individuals may be at this stage for a long period. The third stage is called the preparation stage in which individuals intend to take action in the next month. These individuals have an action plan (i.e., I am going to join a gym in the next month). They also are the individuals that should be recruited for interventions that are focused towards behaviour change. The preparation stage is followed by the action

stage. Individuals in this stage have made specific changes to their lifestyle within the past six months. For the purpose of the present study, participants in the action stage would be those that are moderately to vigorously physically active at least 150 minutes a week. The fifth stage is the maintenance stage, which lasts from 6 months to 5 years. In this stage, individuals are working to prevent relapse. The final stage is called the termination stage in which individuals are not tempted to relapse, have high self-efficacy, and are sure they will not return to their old unhealthy behaviour (Prochaska & Velicer, 1997). For the purposes of this study, individuals must have been in either the contemplation or the preparation stage to participate.

1.4 Purpose

The primary purpose of this study was to determine if gain- or loss-framed messages about physical activity would change the attitude, intention, and behaviour of female undergraduate students who were in the contemplation or preparation stage. The secondary purpose was to determine if framing the message in terms of the physical health benefits, the appearance/social benefits, or the mental health benefits would change attitude, intention, and behaviour.

Two hypotheses were tested. Firstly, gain-framed messages about physical activity would be more effective in changing attitude, intention, and behaviour towards physical activity. Secondly, messages framed in terms of appearance/social and mental health benefits would be more effective at changing attitude, intention, and behaviour towards physical activity than messages framed in terms of physical health benefits.

Chapter 2

2 Methods

2.1 Participants

For the purpose of this study, data were only collected from individuals who identified themselves as a female between the ages of 18 and 35 (young adults) and who were normally inactive (did not meet the recommended guideline for physical activity - 150 minutes of moderate to vigorous physical activity/week). The latter inclusion criterion was used because physical activity messages are more effective for individuals who are inactive compared to those who are regularly active (Latimer et al., 2008). Participants must also have been in either the contemplation or preparation stage with regards to physical activity. This was determined using the Eligibility Questionnaire (see Appendix A) consisting of one multiple-choice question. If the potential participants circled 'No, but I intend to be physically active in the next 30 days' (preparation stage) or 'No, but I intend to be physically active in the next 6 months' (contemplation stage) they were eligible to participate in the intervention (Marcus, Selby, Niaura, & Rossi, 1992). If participants were eligible, they were then randomly assigned to one of 6 groups (gain- or loss-framed message about mental health benefits, physical health benefits, or appearance/social benefits) each containing a minimum of 10 participants. The Western University Non-Medical Research Ethics Board (NMREB) reviewed and approved this study (see Appendix B).

2.2 Content of Framed Messages

As stated above each of the participants were randomly assigned to one of six messages (see Appendix C). These six messages were created using a combination of Bassett-Gunter, Latimer-Cheung, Martin Ginis, and Castelhana (2014), Conner, Rhodes, Morris, McEachan, and Lawton (2011), Li et al. (2014), Pfeffer (2013) and van't Riet, Ruiters, Verrij, & de Vries (2010) gain-framed and loss-framed messages. Half of these six messages were gain-framed messages, and the others were loss-framed messages. These messages were further categorised based on content. These categories were mental health benefits, physical health benefits, and appearance/social benefits. Each message contained a definition of physical activity, the recommended guidelines for physical activity, the benefits of physical activity, and many facts to support the benefits of physical activity in general. Each framed message consisted of 352 to 373 words. These messages were presented to the participants in a printed format.

2.3 Manipulation Check

Prior to conducting the intervention, each message was analysed to determine to what extent the message was positive or negative to ensure the message was a gain-framed message or a loss-framed message respectively. Thirty students were recruited at random from the University of Western Ontario campus. All participants had to be female, not active, an undergraduate student, and 18 to 35 years of age. Each participant was given a letter of information and consent form. If they gave consent, they were asked to read two messages, a gain-framed message and a loss-framed message either about mental health benefits, physical health benefits, or appearance/social benefits. After reading these messages, each participant was given a manipulation check questionnaire containing four questions (see Appendix D). To measure whether the gain-framed

message is a gain-framed message two questions were used to assess the positive reaction to the information. Participants were asked on a scale from 1 to 7 (i.e. 1 = not happy at all; 7 = very happy) ‘to what extent do they think the information made you feel happy?’. Question two was similar but replaced ‘happy’ with ‘relieved’. For the loss-framed message, two items were used to assess the negative reaction to the information. Participants were asked ‘to what extent do they think the information made you feel sad?’. For the second question sad was replaced with afraid (van’t Riet, Ruiter, Werrij, Candel, & de Vries, 2010). To determine if there was a framing effect, the confidence interval for each message was determined and compared. If the confidence interval did not include a score less than four, there was a framing effect. Results showed that gain-framed messages about physical health (n=10, 95% CIs [4.42, 5.58] and [4.35, 5.65]), mental health (n=10, 95% CIs [4.41, 5.58] and [4.35, 5.65]), and appearance/social benefits (n=10, 95% CIs [4.36, 5.84] and [4.64, 5.96,]) produced a more positive (happy and relieved) effect than the loss-framed messages about physical health (n=10, 95% CIs [4.20, 5.21] and [4.59, 5.41]), mental health (n=10, 95% CIs [4.10, 5.50] and [4.55, 5.25]), and appearance/social benefits (n=10, 95% CIs [5.06, 5.94] and [4.23, 5.77]) which had a more negative effect (sad and afraid). Based on these results it was concluded that there was a framing effect between the gain- and loss-framed messages.

2.4 Instruments

Three questionnaires, pre-intervention, post-intervention and the follow-up questionnaire, were used to measure attitude, intention, and behaviour towards physical activity (see Appendix E, Appendix F, & Appendix G).

2.4.1 Attitude

Attitude was measured using two questions at three different time points. One week before the intervention, immediately after reading the intervention, and one week later. Each question used 5 to 8 semantic differentiation scales to determine attitude towards physical activity. Question one asked participants to rate on a scale from 1 to 7 ‘For me, engaging in at least 30 minutes of physical activity for at least 5 days of the week would be’: very good–very bad; very important–very unimportant; very sensible–not sensible at all; very nice–not at all nice; and a lot of fun–no fun at all. Question two asked participants to rate on a scale from 1 to 7 ‘For me, exercising, at least, five times per week for the next 2 weeks would be’: useless–useful; unimportant–important; worthless–valuable; harmful–beneficial, unsatisfying–satisfying; unpleasant–pleasant; unenjoyably–enjoyable; and boring–exciting (Conner et al., 2011; van’t Riet, Ruiter, Werrij, & de Vries, 2010). For each of the two questions that measure attitude, the scores were averaged producing two separate scores between 1 and 7, one for each question.

2.4.2 Intention

Intention to be physically active was measured using two questions. The questions asked participants to rate on a scale from 1 to 7 (1 = strongly disagree; 7 = strongly agree) to what extent they agreed with the following statement, ‘I intend to be physically active, at least, five times per week for the next 2 weeks’ and ‘I intend to be physically active for at least thirty minutes on at least five days of the week’ (Conner et al., 2011; van ’t Rieta et al., 2014). The scores from both items were averaged to produce a score between 1 and 7.

2.4.3 Physical Activity Behaviour

Physical activity behaviour was measured using the Godin Leisure-Time Exercise Questionnaire (recall) (GLTEQ; Godin & Shephard, 1985). This questionnaire assesses how many times in a one-week period a participant engages in light, moderate, or vigorous physical activity. Weekly leisure activity of light, moderate, and vigorous physical activity was calculated by multiplying each by three, five and nine, respectively, and summing all three values together. A physical activity log (self-report) was also used to track the number of times participants engaged in light, moderate, or vigorous physical activity, how long they did that activity, and what activity they specifically did (see Appendix H).

2.4.4 Qualitative Data

To further understand participants' attitude, intention, and behaviour towards physical activity two qualitative questions were asked at the follow-up session. The first question asked participants to answer yes or no to the following questions, 'Did your attitudes, intentions, or behaviours towards physical activity change after reading the message?'. Depending on their response participants were then asked to answer one of two questions, 'If yes, what part of the message influenced you the most in changing your attitudes, intentions, or behaviours toward physical activity?' or 'If no, what part of the message influenced you the most to not change your attitudes, intentions, or behaviours toward physical activity?'.

2.5 Recruitment Method

Participants were recruited through University Student Council Clubs. Club presidents were contacted by email before September 2016 to gain permission to contact potential participants face-to-face at their annual general meetings in September. At the

annual general meeting, club members were informed about the study. Each club member was given a Letter of Information (see Appendix I) to further inform them of the research study as well as an Eligibility Questionnaire (see Appendix A). On their own time, club members filled out the Eligibility Questionnaire to determine if they were eligible to participate in the study. If a club member was eligible, they were asked to contact the researcher via email to set up a time when they could come into the lab to sign the Consent Form and complete session #1 of the study (see Appendix I).

2.6 Procedure

This study consisted of three sessions between 10 to 15 minutes in length (see Table 1). In session one, participants read the letter of information and signed the consent form, and were given the pre-intervention questionnaire used to collect participants' demographic data (age, gender, field of study, etc.), assess baseline intention and attitude towards physical activity, and determine baseline physical activity behaviour prior to reading the framed message. Participants were given a physical activity log to fill out for the next week. Participants then returned one week later to complete session two. Participants were asked to read the randomly assigned message and complete the post-intervention questionnaire to assess their attitudes, intentions, and behaviours towards physical activity. After, each participant was given a fidelity check to ensure they did read the message completely (see Appendix J). The fidelity check consisted of two questions, 'What is the recommended guideline for physical activity for someone 18 years and older?' and 'Which of the following will occur as a result of (not) being physically active?'. To pass the fidelity check, each participant had to get a score of 75%. If the score was below 75% it was assumed that the participant did not read the message;

therefore, this data were removed from the data set to ensure the validity of the results. Two participants were removed from the sample because they got a score below 75% on the fidelity check. Following the questionnaire, participants were given a new physical activity log to fill out for an additional week. After one week, participants returned again for session three to complete the follow-up questionnaire to assess their attitudes, intentions, and behaviours towards physical activity.

Table 1

Procedure

Sessions	Duration of Session	Activity
Session 1	10 to 15 minutes	Sign Letter of Information and Consent Form Complete Pre-Intervention Questionnaire
	5 minutes/day for a week	Fill out Physical Activity Log for a week
Session 2	10 to 15 minutes	Read Framed Message Complete Post-Intervention Questionnaire Complete Fidelity Check
	5 minutes/day for a week	Fill out Physical Activity Log for a week
Session 3	10 to 15 minutes	Complete Follow-up Questionnaire

2.7 Analysis

The analysis of the data focused on examining the difference between gain-framed messages and loss-framed messages on change in attitudes, intentions, and behaviours from pre-intervention to post-intervention to follow-up. Additionally, messages focusing on physical health benefits, mental health benefits, or appearance/social benefits were compared to determine which message was more effective at changing attitudes, intentions, and behaviours. To investigate the relation among the three dependent variables a Pearson Correlation analysis was conducted. For the purpose of these analyses, gain-framed messages and loss-framed messages were

referred to as the framing condition, whereas physical health benefits, mental health benefits, and appearance/social benefits were referred to as the benefit condition. The scores from the pre-intervention questionnaire were compared to the scores from the post-intervention questionnaire and follow-up questionnaire to measure the change in attitude, intention, and behaviour over time. To examine the effects of each condition on attitude, intention, and behaviour, a 2 x 3 x 3, framing condition x benefit condition x time, between-subjects ANOVA, with repeated measures on the last factor, was conducted using SPSS. The main effects within the benefit condition or time condition were compared to the Bonferroni Correction ($p < 0.017$) since more than two groups were being compared. To analyse the effect size for ANOVA, eta squared was calculated for each effect and compared against Cohen's guidelines (small effect=0.01, medium effect=0.059, and large effect=0.138). Post hoc analyses were conducted for interactions that were calculated to be statistically significant. Additionally, paired-sample t-tests were conducted to determine effect sizes between two levels of independent variables using Cohen's d (small effect=0.2, medium effect=0.5, and large effect=0.8). To analyse the qualitative data common themes were identified and organised into codes. The codes were then further analysed to create over-arching themes.

Chapter 3

3 Results

3.1 Participants

A total of 120 undergraduate female students were recruited from the University of Western Ontario campus who participated voluntarily and anonymously. Only 92 participants completed session one of the study and only 60 participants completed session two and three of the study. Looking at the pre-intervention data of the participants that completed all three session (n=60) compared to those who completed only the first session (n=32) there was no significant difference in intention, $F(1,80)=0.013$, $p=0.909$, $\eta^2=0.000$, attitude (question 1), $F(1,80)=2.278$, $p=0.103$, $\eta^2=0.033$, attitude (question 2), $F(1,80)=1.664$, $p=0.201$, $\eta^2=0.020$, and behaviour, $F(1,80)=102$, $p=0.750$, $\eta^2=0.001$ at session one.

All of the 60 participants identified as female and identified as not being regularly active according to the recommended guidelines for physical activity. According to the stages of change guidelines, 34 (57%) of the participants were in the preparation phase, and 26 (43%) participants were in the contemplation phase. The participants came from different fields of study such as science (n= 27), social science (n=18), health science (n=5), arts and humanities (n=3), information and media studies (FIMS) (n=5), and engineering (n=2) (see Table 2). Participants were between the ages of 18 and 25 years with an average age of 19.78 (SD=1.65).

3.2 Correlational Analysis

The results from this study verify the assumption that attitude, intention and behaviour are correlated. At pre-intervention, $r(60)=0.479$, $p=0.000$, post-intervention, $r(60)=0.419$, $p=0.001$, and follow-up, $r(60)=0.653$, $p=0.000$, there was a strong correlation between intention and attitude. Between intention and behaviour there was a strong correlation at post-intervention, $r(60)=0.290$, $p=0.025$, and follow-up, $r(60)=0.310$, $p=0.016$, however there was no correlation at pre-intervention, $r(60)=0.011$, $p=0.936$. Between attitude and behaviour there was a strong correlation at post-intervention, $r(60)=0.285$, $p=0.027$, and follow-up, $r(60)=0.302$, $p=0.019$, however there was no correlation at pre-intervention, $r(60)=-0.027$, $p=0.839$.

Table 2

Demographic profile of participants

	Mental Health Gain	Mental Health Loss	Physical Health Gain	Physical Health Loss	Appearance/Social Gain	Appearance/Social Loss
Average Age of Participants	19.75	19.25	20.25	19.75	19.88	19.75
Field of Study						
Science	6	4	5	3	4	5
Social Science	2	5	2	5	2	2
Health Science	1		2		1	1
Arts and Humanities	1				1	1
FIMS		1		2	1	1
Engineering			1		1	
Stage of Change						
Preparation	6	4	7	6	5	7
Contemplation	4	6	3	4	5	3

3.3 Attitude

Attitude was measured using two questions. Question one was ‘for me, engaging in at least 30 minutes of physical activity for at least 5 days of the week would be’: very

good–very bad; very important–very unimportant; very sensible–not sensible at all; very nice–not at all nice; and a lot of fun–no fun at all. For question one, the change in attitude over the three time points was not statistically significant, $F(2,53)=1.820$, $p=0.172$, $\eta^2=0.064$. There was no significant interaction for benefit condition x time, $F(4,106)=1.086$, $p=0.367$, $\eta^2=0.039$, and framing condition x benefit condition x time, $F(4,106)=1.607$, $p=0.178$, $\eta^2=0.057$. However, the framing condition x time interaction was found to be statistically significant ($p<0.05$) with a medium effect size, $F(2,53)=3.920$, $p=0.026$, $\eta^2=0.129$. Time on gain-frame messages was observed to be statistically significant, $F(2,53)=3.473$, $p=0.038$, $\eta^2=0.116$, but time on loss-framed messages was not statistically significant, $F(2,53)=2.267$, $p=0.114$, $\eta^2=0.079$. The contrast analysis found a significant improvement in attitude for gain-framed messages from pre-intervention ($M=4.773$, $SD=1.211$) to post-intervention ($M=5.187$, $SD=1.168$), $t(29)=2.663$, $p=0.012$, $d=0.486$, and pre-intervention ($M=4.773$, $SD=1.211$) to follow-up ($M=5.127$, $SD=1.288$), $t(29)=2.042$, $p=0.050$, $d=0.373$, but no difference was found between post-intervention ($M=5.187$, $SD=1.168$) and follow-up ($M=5.127$, $SD=1.288$), $t(29)=0.453$, $p=0.654$, $d=0.083$ (see Figure 1). However no statistically significant simple effect was observed between gain- and loss-framed message at pre-intervention, $F(1,59)=0.543$, $p=0.465$, $\eta^2=0.010$, post-intervention, $F(1,59)=1.003$, $p=0.321$, $\eta^2=0.018$, and follow-up, $F(1,59)=2.198$, $p=0.144$, $\eta^2=0.039$. The between-subjects ANOVA showed no main effect for framing condition, $F(1,54)=0.512$, $p=0.477$, $\eta^2=0.009$, benefit condition, $F(2,54)=0.494$, $p=0.613$, $\eta^2=0.018$, or the framing condition x benefit condition, $F(2,54)=2.198$, $p=0.121$, $\eta^2=0.075$.

The second question ('for me, exercising, at least, five times per week for the next 2 weeks would be': useless–useful; unimportant–important; worthless–valuable; harmful–beneficial, unsatisfying–satisfying; unpleasant–pleasant; unenjoyable–enjoyable; and boring–exciting) that was used to measure attitude indicated no statistically significant change in attitude over the three time points, $F(2,53)=2.198$, $p=0.121$, $\eta^2=0.077$. In regards to change in attitude for question two there was no significant framing condition x time interaction, $F(2,53)=0.739$, $p=0.482$, $\eta^2=0.027$, benefit condition x time interaction, $F(4,106)=1.592$, $p=0.182$, $\eta^2=0.057$, and framing condition x benefit condition x time interaction, $F(4,106)=0.690$, $p=0.600$, $\eta^2=0.025$. The between-subjects ANOVA showed no main effect for framing condition, $F(1,54)=0.129$, $p=0.721$, $\eta^2=0.002$, benefit condition, $F(2,54)=0.129$, $p=0.879$, $\eta^2=0.005$, or framing condition x benefit condition, $F(2,54)=0.227$, $p=0.797$, $\eta^2=0.008$.

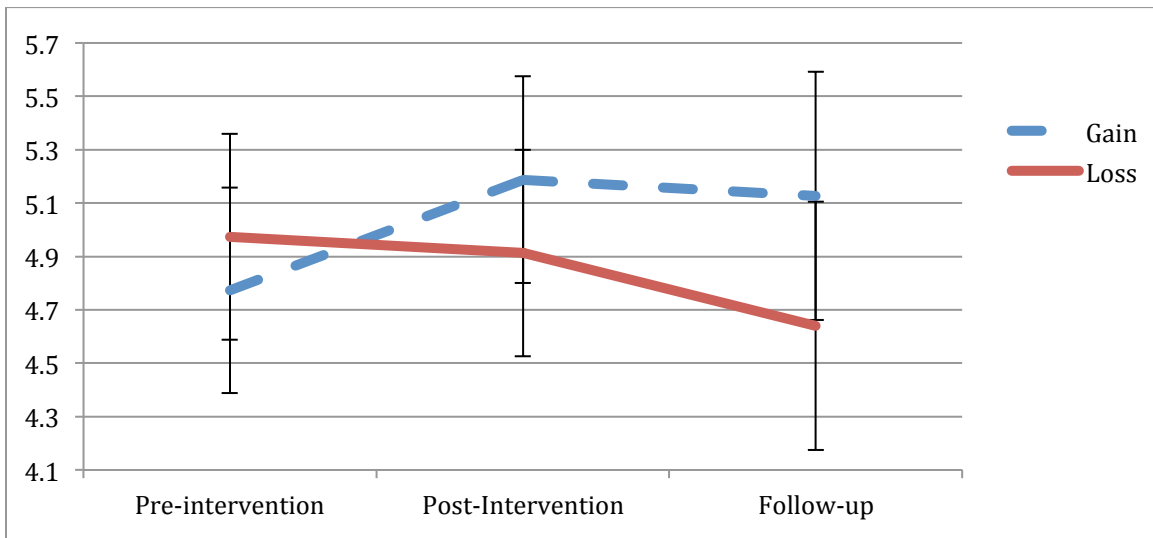


Figure 1 Change in attitude measured by question one over time between gain- and loss-framed messages

3.4 Intention

The repeated measures ANOVA test showed that there was a statistically significant ($p < 0.017$) change in intention over the three-time points with a very large effect size, $F(2,53) = 24.66$, $p = 0.000$, $\eta^2 = 0.482$ (see Figure 2). The contrast analysis for the independent variable time found a significant increase in intention from pre-intervention ($M = 3.025$, $SD = 1.439$) to post-intervention ($M = 4.258$, $SD = 1.598$), $t(59) = 6.896$, $p = 0.000$, $d = 0.890$, and from pre-intervention ($M = 3.025$, $SD = 1.439$) to follow-up ($M = 4.075$, $SD = 1.669$), $t(59) = 6.058$, $p = 0.000$, $d = 0.782$. There was no statistically significant difference between post-intervention ($M = 4.258$, $SD = 1.598$) and follow-up ($M = 4.075$, $SD = 1.669$), $t(59) = 1.328$, $p = 0.189$, $d = 0.171$. There was no statistically significant interaction for framing condition \times time, $F(2,53) = 1.116$, $p = 0.335$, $\eta^2 = 0.040$, benefit condition \times time, $F(4,106) = 0.321$, $p = 0.864$, $\eta^2 = 0.012$, and framing condition \times benefit condition \times time, $F(4,106) = 1.394$, $p = 0.241$, $\eta^2 = 0.050$. The between-subjects ANOVA showed no main effect for framing condition, $F(1,54) = 1.415$, $p = 0.239$, $\eta^2 = 0.026$, benefit condition, $F(2,54) = 0.749$, $p = 0.478$, $\eta^2 = 0.027$, or framing condition \times benefit condition, $F(2,54) = 0.899$, $p = 0.413$, $\eta^2 = 0.032$.

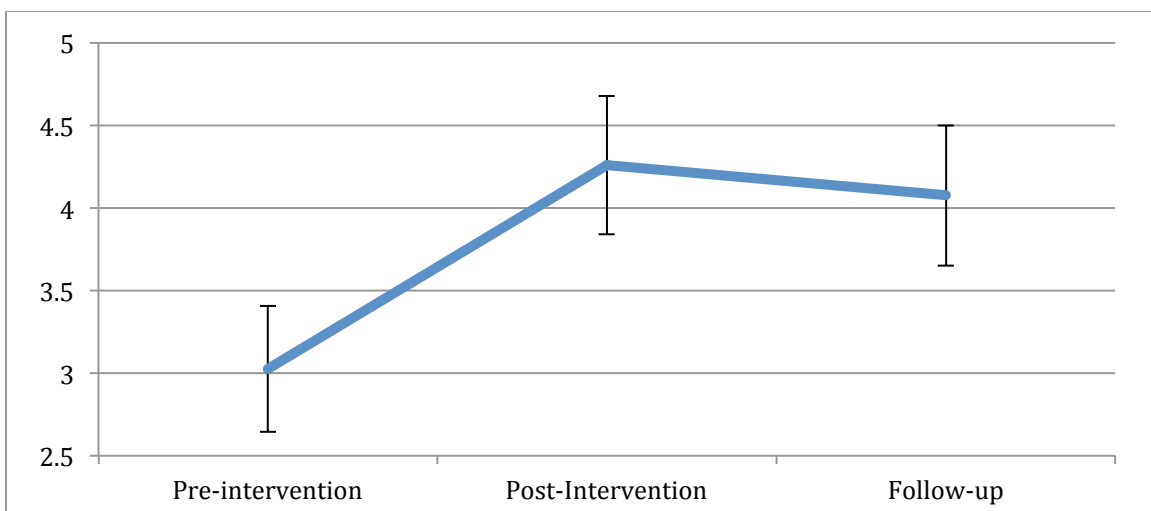


Figure 2 Mean change in intention over time

3.5 Behaviour

The repeated measure ANOVA test found no statistically significant changes in behaviour over the three time points, $F(2,53)=1.054$, $p=0.356$, $\eta^2=0.038$. Additionally there were no statistically significant interactions were observed for framing condition x time, $F(2,53)=0.605$, $p=0.550$, $\eta^2=0.022$, benefit condition x time, $F(4,106)=0.383$, $p=0.820$, $\eta^2=0.014$, and framing condition x benefit condition x time, $F(4,106)=1.159$, $p=0.333$, $\eta^2=0.042$. The between-subjects ANOVA showed no main effect for framing condition, $F(1,54)=1.434$, $p=0.236$, $\eta^2=0.026$, benefit condition, $F(2,54)=0.606$, $p=0.549$, $\eta^2=0.022$, or framing condition x benefit condition, $F(2,54)=0.311$, $p=0.734$, $\eta^2=0.011$.

Only 19 participants (32%) completed the physical activity log. Since less than half of the participants completed the physical activity log, this data was not analysed.

3.6 Qualitative Data

The qualitative data from the follow-up questionnaire was coded, and five main themes emerged: lack of time; information was not new; lack of motivation; not relevant; and content of the message (see Table 3). Four of these themes (lack of time; information was not new; lack of motivation; and not relevant) represent participants' reasons for why the message did not influence the participants to change their attitudes, intentions, or behaviours toward physical activity. The theme 'content of the message' represents participants' reasons for why the message did influence the participants to change their attitudes, intentions, or behaviours toward physical activity. Although 36 participants reported not having had any change in attitude, intention and/or behaviour, there was still a statistically significant change in intention regardless of whether the participants reported 'yes' or 'no' to having changed, $F(2,57)=22.755$, $p=0.000$, $\eta^2=0.444$, (see Figure

3). Although 24 participants reported a change in attitude, intention, or behaviour, no statistically significant change over time was observed for attitude (question 1), $F(2,57)=1.602$, $p=0.210$, $\eta^2=0.053$, attitude (question 2), $F(2,57)=1.895$, $p=0.160$, $\eta^2=0.062$, or behaviour, $F(2,57)=0.899$, $p=0.413$, $\eta^2=0.031$.

Table 3

Themes that Emerged from Follow-up Questionnaire

	Mental Health Gain	Mental Health Loss	Physical Health Gain	Physical Health Loss	Appearance/Social Gain	Appearance/Social Loss
Lack of Time	2		1	3	3	1
Information was Not New	3	1	2	3	3	4
Lack of Motivation	2		1	1	1	
Not Relevant			1	2		2
Content of the Message	5	7	6	2	2	2

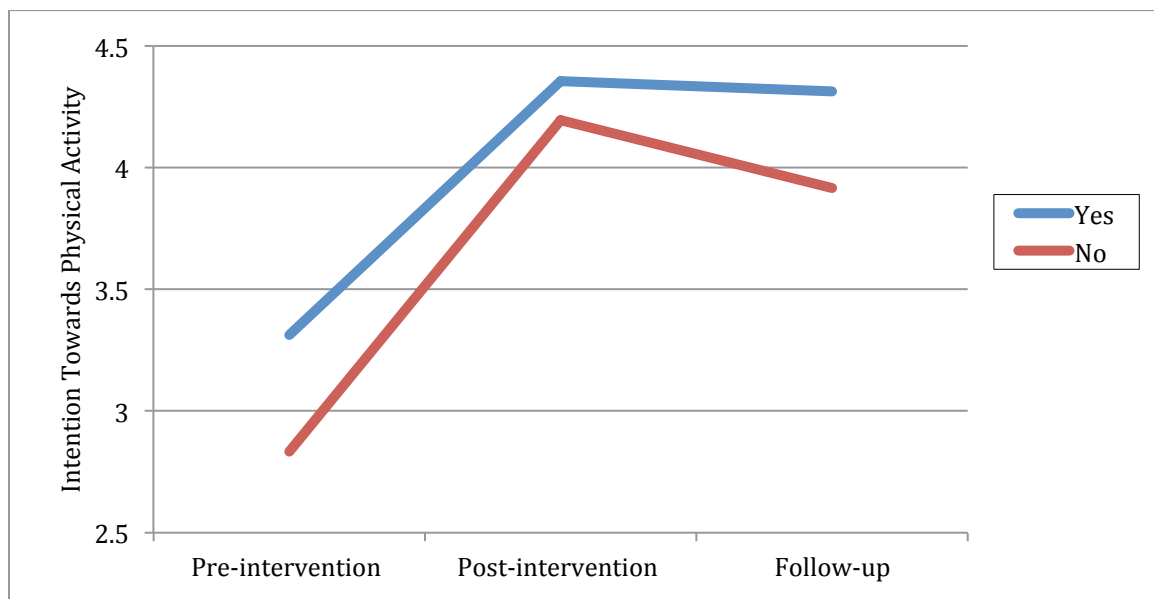


Figure 3 Change in intention over time between self-reported responses to change

Chapter 4

4 Discussion

It has been proposed that one way to motivate individuals or groups to adopt positive health behaviours is by using the Diffusion of Innovation Theory (Rogers, 2002). This theory states that forming an attitude is the most important step towards adopting a new behaviour. If an individual's attitude towards a new behaviour can be changed in favour of that new behaviour it can increase the rate of adoption. To ensure attitude was changed in favour of the new behaviour, three benefits of physical activity were used to determine which benefit was more relevant to the individuals. Also, to ensure the messages were effective at increasing attitude, intention, and behaviour, persuasive communication was used in the form of gain- and loss-framed messages. Two hypotheses were tested to determine if gain- or loss-framed messages or messages framed in terms of the physical health benefits, the appearance/social benefits, or mental health benefits would change the attitudes, intentions, and behaviours of female undergraduate students who were in the contemplation or preparation stage. The first hypothesis, gain-framed messages about physical activity would be more effective at changing attitude, intention, and behaviour towards physical activity, was found to be true with regards to attitude but not for intention or behaviour. The second hypothesis, messages framed in terms of mental health benefits and appearance/social benefits would be more effective at changing attitude, intention and behaviour towards physical activity than messages framed in terms of physical health benefits, was not supported for all three dependent variables.

According to the Diffusion of Innovation Theory, attitude plays a significant role in adopting a new behaviour (Rogers, 2002). The results from attitude question one indicated that gain-framed messages increased attitude level from pre-intervention to post-intervention but no change from post-intervention to follow-up. This suggests that gain-framed messages may be more advantageous compared to loss-framed messages in changing undergraduate females attitude to engaging in at least 30 minutes of physical activity for at least five days of the week. This result is consistent with Rothman's and Salovey's (1997) assumption that gain-framed messages should be more effective at changing attitude because physical activity is a preventive behaviour, which is seen as a safe behaviour that will minimize the chance of becoming sick. For attitude question two there was no indication that the framing condition had any effect on undergraduate female students' attitude to exercise at least, five times per week for the next two weeks.

The results of this study suggest that the messages about physical activity were effective at changing undergraduate female students' intention to be physically active at least five times per week for the next two weeks and/or at least thirty minutes on at least five days of the week. Specifically, all messages significantly increased undergraduates' intention to be physically active from pre-intervention to post-intervention, but there was no further increase from post-intervention to follow-up. This suggests that the messages had an immediate effect on intention levels and had the ability to maintain this effect one week after reading the message. Although intention levels increased from pre-intervention to post-intervention, there is no indication that this increase was as a result of any particular framing condition or the benefit condition. Based on these results, neither gain- nor loss-framed messages had a differential effect on undergraduate female

students' intention levels towards physical activity. These results are consistent with other studies that have looked at the effects of framing on intention. A study by van 't Rieta et al. (2014) also found no framing effect on intention, however, the participant's age ranged from 15 to 82 (n=3672) which is a much larger age range compared to the present study. A study by Gray & Harrington (2011) found that gain-framed messages were more effective than loss-framed messages at changing intention for young adults aged 18 to 29 (n=345). A potential explanation as to why no framing effect was observed in the present study may be due to the small sample size (n=60). When looking at the mean scores, there was a slightly greater increase in intention for gain-framed messages from pre-intervention (M=3.117) to post-intervention (M=4.467) compared to loss-framed messages from pre-intervention (M=2.933) to post-intervention (M=4.050). If the sample size was larger a framing effect may have been observed. There is also some treatment difference between the present study and that of Gray & Harrington (2011). The study by Gray & Harrington (2011) consisted of approximately 125 less words and was written in a paragraph rather than point form. As well, information about physical activity was presented as either a narrative or statistical evidence, although there was no statistical difference between narrative or statistical evidence (Gray & Harrington, 2011). These treatment differences may also explain why no framing effects were observed in the present study for intention.

Although framing condition only had an effect on attitude for question one, no effect on attitude (question one and two) and intention was observed between messages about physical health benefits, mental health benefits, or appearance/social benefits. Although the Diffusion of Innovation Theory states that relative advantage is the most

important at predicting the rate of adoption of a new behaviour (Rogers, 2002), the advantages in the present study were not motivating enough to have an effect on intention or attitude. Past studies have taken additional baseline measures to understand each participant's individual motivations to be physical activity. A study conducted by Cornelis et al. (2014) found that participants motivated by appearance had a more favourable attitude towards the appearance-focused argument compared to the health-focused argument. These results were reversed for the health-focused argument. The qualitative data found that 5 participants stated they were not motivated enough to be active, suggesting that the messages were not motivating enough to change behaviour for some. Participants also indicated that the information was either not new to the participant (n=16) or not relevant to them (n=5). Based on this it can be assumed that the relevance of the message to the participant plays a significant role in the behaviour change process. The purpose of the present study was to find an advantage that was more effective at changing attitude, intention, or behaviour; however, the advantage that motivates physical activity may be individual and cannot be generalised for this population of young adults. On the other hand, many participants (n=24) did state that their attitude, intention, and/or behaviour were changed by the content of the messages. The majority of these participants were in the mental health group (n=12), with only 8 participants in the physical health group and 4 participants in the appearance/social group. This suggests that the mental health advantage of physical activity may be more relevant to female undergraduate students compared to the physical health and appearance/social advantages.

Although there was an increased level of intention from pre-intervention to post-intervention and an increased level of attitude for gain-framed messages, there was no significant change in behaviour as a result of the framing condition or the benefit condition. This suggests that change in intention and attitude did not translate into a change in behaviour towards physical activity. Although there was a significant increase in attitude for gain-framed messages, the effect size was small, $d=0.486$. The small effect size suggests that the small change may not have been powerful enough to evoke a change in behaviour. Additionally, the post-intervention mean score for gain-framed messages was 5.127 out of 7 on the semantic differentiation scales; therefore, the mean attitude may not have been high enough to affect behaviour. However, a meta-analysis conducted in 2012 by Gallagher and Updegraff, which found no significant difference in intention ($r=0.028$) and attitude ($r=0.039$) between gain- and loss-framed messages but found an apparent difference in behaviour between gain- and loss-framed messages for physical activity ($r=0.160$), stated the framing effect on behaviour may not be completely mediated by attitude and intention. However, the correlation analysis from the present study found that there were significant correlations between attitude, intention and behaviour. Although these correlations were present, there was no significant change in behaviour as a result of change in attitude and intention.

The absence of significant change in behaviour can be clarified by the qualitative data that was collected at follow-up (see Table 3). Overall, 10 participants stated that the reason their behaviour did not change over the course of the study was because they did not have time to be active, which is a common barrier to physical activity. Although the messages may have changed their intention or attitude towards physical activity, the lack

of time participants had may have made it difficult to engage in any physical activity during the week. Given that this study was conducted during the school term many of the participants would perhaps allocate their leisure-time to studying.

The desirability of the end-state also plays a role in the behaviour change process. A study by Nan (2007) found that when the end-state of physical activity was undesirable (risk of disease) vs. desirable (toned muscles) gain-framed message (decrease the risk of disease) had an effect on attitude and intention compared to loss-framed messages (increase the risk of disease). The messages in this study had a combination of both desirable and undesirable end-states with the mental health message consisting of five desirable and four undesirable, the physical health message consisting of two desirable and seven undesirable, and the appearance/social message consisting of seven desirable and two undesirable. If all the statements in the messages had an undesirable end-state, this might have increased behaviour levels.

The Diffusion of Innovation Theory states that the source that delivers the message influences diffusion of an idea or behaviour. If the messages were delivered by a highly credible source like a healthcare professional, this may have more effectively encouraged physical activity. A study by Jones, Sinclair, & Courneya (2003) and Arora, Stoner, & Arora (2006) found that a credible source compared to a non-credible source influenced both attitude and intention towards physical activity. Additionally, a gain-framed message containing a credible source had an effect on intention and physical activity over a two week period (Jones et al., 2003). In the present study, all the facts that were provided were referenced by credible online resources, but none were provided by a healthcare professional. According to Rogers (2002) healthcare professionals are opinion

leaders or innovators in the community that can facilitate the speed of adoption. The sooner the innovator adopts the behaviour the sooner the whole social system will adopt the behaviour. Potential adopters (early adopters, early majority, late majority and laggards) look to the innovators for information or advice about the innovation. If the message was delivered or contained information by a healthcare professional it may have been more effective at changing behaviour.

In the present study, the message was only administered to the participant on one occasion. A study conducted by Latimer et al. (2008) showed that gain-framed messages increased physical activity levels after repeated exposure (three times over nine weeks) to the message. Behaviour may not have changed because participants were only exposed to the message once rather than on multiple occasions.

Lastly, the lack of behaviour change may be clarified by the large proportion of participants that were in the contemplation phase (57%) of the stages of change. Only 43% of the participants were in the preparation phase, which is the stage most recommended for interventions that are focused towards behaviour change (Prochaska & Velicer, 1997). Participants in the contemplation phase were added to increase the sample size, but this may have minimized the effect the messages had on behaviour.

4.1 Limitations

The first limitation was the small sample size. The small sample size was the result of a large number of dropouts. The majority of the participants only completed the first session. Only 60 participants completed all three parts of the study. This small sample size resulted in the study being underpowered. Given that there are six different treatment groups, having a larger sample size would have resulted in greater power. The

second limitation was that all the participants were female. Although having all female participants minimized heterogeneity and allowed for generalisations to be made to the female population, it is unknown how the messages affect male attitude, intention, and behaviours towards physical activity.

The third limitation was the lack of a long-term measure for behaviour. Due to the short timeframe of this study, behaviour over a longer time frame was unable to be measured. Gallagher and Updegraff (2012) suggest that time may have a framing effect on behaviour compared to more immediate outcomes like intention and attitude. In the present study outcome measures were measured one week before the intervention, immediately after the intervention and one week after the intervention. Other studies have measured attitude, intention, and behaviour months after administering the intervention. A study by van't Riet, Ruiter, Werrij, & De Vries (2010) measured attitude, intention, and behaviour 3-months after participants read the message and found that gain-framed messages had a more positive attitude, stronger intention, and increased level of physical activity, however, only the effect on intention was significant.

Lastly, only a small percentage of the participants completed the physical activity log. Only 19 participants (32%) completed the physical activity log. Due to the missing data, the physical activity logs were removed from the analysis. The only measure of behaviour was a self-reported one-week recall of physical activity, which is not 100% accurate or reliable. A study that compared the effect of framing on behaviour over a two-week period between younger and older adults using both self-report and accelerometer data found that self-reported levels of physical activity were lower than when measured by accelerometer. Additionally, younger adults were more likely to

under-report their physical activity compared to older adults (Li et al., 2014). The physical activity log would have allowed for a more day-to-day recall of physical activity, which would have been more accurate and reliable compared to the one-week recall.

4.2 Future Research

Research is needed to further understand the effects of framed messages on attitude, intention, and behaviour and how/if attitude and intention mediate behaviour. Reducing the barrier to physical activity to see if change in attitude can be translated into behaviour change may be one way to see if attitude mediates behaviour. Since all the participants in this study were in school during the time of the study, perhaps conducting the study earlier in the school year when students have more leisure time would have minimized the barrier to physical activity. Also, providing students with examples of how to fit physical activity into their busy schedules (i.e. walking to school rather than taking the bus) may have increased physical activity.

Also, future research should be conducted with a larger sample size that is both male and female and includes only those participants who are in the preparation stage. Providing an incentive may encourage participation. In the present study, it was also very challenging to maintain participants throughout all three parts of the study. Creating a simpler procedure with fewer steps may assist in maintaining participants. A grand prize draw that participants can be entered into after completing the study may be an effective way to prevent drop out. As well, allowing participants to conduct the survey online rather than having to come into the lab would help ensure participants complete all parts of the study.

To ensure the effectiveness of the messages, some changes should be made for future research. According to the participants, the messages used in this study were not motivating and not relevant, therefore, these messages should be altered to ensure they are more motivating and relevant. Future research should look at combining the three benefits into one message and compare the effectiveness to messages with only one benefit. Since the motivation to be physically active is individual, combining the three benefits into one message may allow for a more effective motivator for more of the participants. This would also ensure the message is relevant to all readers. Using a healthcare professional to deliver the message face-to-face may also be more motivating than having the participants read the messages.

Nan (2007) found that gain-framed messages with undesirable end-states (risk of disease) were more effective at changing attitude and intention than gain-framed messages containing desirable end-states (toned muscles). In the present study, a mixture of undesirable and desirable end-states was used in the messages. Future research should create messages that have only undesirable end-states because they are more effective at causing a change in attitude and intention. Lastly, including a more accurate (i.e. accelerometers) and a longer-term measure of behaviour would help us better understand the effects of the message on behaviour and its effect over time.

4.3 Conclusion

Despite the majority of the results from this study not being statistically significant, there was still some added value of this study to the field of persuasive communication. One implication of this study is that gain-framed messages are more effective than loss-framed messages in increasing attitude towards physical activity in

women. Hence, when using persuasive communication to change attitudes towards physical activity of female undergraduate students gain-framed messages would likely be more effective. Although intention increased for each message, it is unclear which message may have been more persuasive than the other. This study also addressed that time is a barrier to physical activity, which cannot be overcome by any one of these messages. This is the first study that has looked at messages focusing on physical health benefits, mental health benefits, or appearance/social benefits and its effect on attitude, intention, and behaviour, even though no significant change was observed. Using persuasive communication to frame physical activity has the potential to increase physical activity levels of female undergraduate students.

References

- Ajzen, I. (1992). Persuasive Communication Theory in Social Psychology: A Historical Perspective. In M.J.Manfredo (Ed.), *Influencing human behavior: Theory and applications in recreation, tourism, and natural resource management* (pp. 1–27). Champaign, IL: Sagamore Publishing.
- Arora, R., Stoner, C., & Arora, A. (2006). Using framing and credibility to incorporate exercise and fitness in individuals' lifestyle. *Journal of Consumer Marketing*, 23(4), 199–207. <http://doi.org/10.1108/07363760610674329>
- Bassett-Gunter, R. L., Ginis, K. A. M., & Latimer-Cheung, A. E. (2013). Do you want the good news or the bad news? Gain-versus loss-framed messages following health risk information: The effects on leisure time physical activity beliefs. *Health Psychology*, 32(12), 1188–98. <http://doi.org/10.1037/a0030126>
- Bassett-Gunter, R. L., Latimer-Cheung, A. E., Ginis, K. A. M., & Castelhana, M. (2014). I Spy With My Little Eye: Cognitive Processing of Framed Physical Activity Messages. *Journal of Health Communication*, 19(6), 676–691. <http://doi.org/10.1080/10810730.2013.837553>
- Canadian Community Health Survey: Mental Health, 2012. (2013). Retrieved March 6, 2016, from <http://www.statcan.gc.ca/daily-quotidien/130918/dq130918a-eng.htm>
- Conner, M., Rhodes, R. E., Morris, B., McEachan, R., & Lawton, R. (2011). Changing exercise through targeting affective or cognitive attitudes. *Psychology & Health*, 26(2), 133–149. <http://doi.org/10.1080/08870446.2011.531570>
- Cornelis, E., Cauberghe, V., & De Pelsmacker, P. (2014). Being healthy or looking good? The effectiveness of health versus appearance-focused arguments in two-sided

messages. *Journal of Health Psychology*, 19(9), 1132–1142.

<http://doi.org/10.1177/1359105313485310>

Dearing, J. W., Rogers, E. M., Meyer, G., Casey, M. K., Rao, N., Campo, S., & Henderson, G. M. (1996). Social Marketing and Diffusion-Based Strategies for Communicating with Unique Populations: HIV Prevention in San Francisco. *Journal of Health Communication*, 1, 343–364.

<http://doi.org/10.1080/108107396127997>

Directly measured physical activity of adults, 2012 and 2013. (2015). Retrieved January 2, 2017, from <http://www.statcan.gc.ca/pub/82-625-x/2015001/article/14135-eng.htm>

Directly measured physical activity of Canadian adults, 2007 to 2011. (2013). Retrieved March 5, 2016, from <http://www.statcan.gc.ca/pub/82-625-x/2013001/article/11807-eng.htm>

Facts and Stats. (2013). Retrieved December 10, 2016, from <http://www.caaws.ca/facts-and-stats/>

Gallagher, K. M., & Updegraff, J. A. (2011). When “fit” leads to fit, and when “fit” leads to fat: How message framing and intrinsic vs. extrinsic exercise outcomes interact in promoting physical activity. *Psychology & Health*, 26(7), 819–834.

<http://doi.org/10.1080/08870446.2010.505983>

Gallagher, K. M., & Updegraff, J. A. (2012). Health message framing effects on attitudes, intentions, and behavior: A meta-analytic review. *Annals of Behavioral Medicine*, 43(1), 101–116. <http://doi.org/10.1007/s12160-011-9308-7>

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the

community. *Canadian Journal of Applied Sport Sciences*, 10(3), 141–146. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/4053261>

Gray, J. B., & Harrington, N. G. (2011). Narrative and Framing: A Test of an Integrated Message Strategy in the Exercise Context. *Journal of Health Communication*, 16(3), 264–281. <http://doi.org/10.1080/10810730.2010.529490>

Janssen, I., Leblanc, A. G., & Bassett, R. L. (2010). Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. *The International Journal of Behavioral Nutrition and Physical Activity*, 7(36). <http://doi.org/10.1186/1479-5868-7-40>

Johnstone, L., & Millar, S. (2012). *Actively Engaging Women and Girls*. Retrieved from www.caaws.ca

Jones, L. W., Sinclair, R. C., & Courneya, K. S. (2003). The Effects of Source Credibility and Message Framing on Exercise Intentions, Behaviors, and Attitudes: An Integration of the Elaboration Likelihood Model and Prospect Theory. *Journal of Applied Social Psychology*, 33(1), 179–196. <http://doi.org/10.1111/j.1559-1816.2003.tb02078.x>

Jones, L. W., Sinclair, R. C., Rhodes, R. E., & Courneya, K. S. (2004). Promoting exercise behaviour: An integration of persuasion theories and the theory of planned behaviour. *British Journal of Health Psychology*, 9(4), 505–521. <http://doi.org/10.1348/1359107042304605>

Latimer, A. E., Rench, T. A., Rivers, S. E., Katulak, N. A., Materese, S. A., Cadmus, L., ... Salovey, P. (2008). Promoting participation in physical activity using framed messages: an application of prospect theory. *British Journal of Health Psychology*,

13(4), 659–681. <http://doi.org/10.1348/135910707X246186>

Leeman, J., Moore, A., Teal, R., Barrett, N., Leighton, A., & Steckler, A. (2013).

Promoting community practitioners' use of evidence-based approaches to increase breast cancer screening. *Public Health Nursing, 30*(4), 323–331.

<http://doi.org/10.1111/phn.12021>

Li, K., Cheng, S., & Fung, H. H. (2014). Effects of Message Framing on Self-Report and

Accelerometer-Assessed Physical Activity across Age and Gender Groups. *Journal of Sport & Exercise Psychology, 36*(1), 40–51. <http://doi.org/10.1123/jsep.2012-0278>

Marcus, B. H., Selby, V. C., Niaura, R. S., & Rossi, J. S. (1992). Self-efficacy and the

stages of exercise behavior change. *Research Quarterly for Exercise and Sport, 63*(1), 60–66. <http://doi.org/10.1080/02701367.1992.10607557>

McCall, L. A., & Ginis, K. A. M. (2004). The effects of message framing on exercise adherence and health beliefs among patients in a cardiac rehabilitation program.

Journal of Applied Biobehavioral Research, 9(2), 122–135.

<http://doi.org/10.1111/j.1751-9861.2004.tb00096.x>

Nan, X. (2007). The relative persuasive effect of gain- versus loss-framed messages:

Exploring the moderating role of the desirability of end-states. *Journalism & Mass Communication Quarterly, 84*(3), 509–524.

<http://doi.org/10.1177/107769900708400307>

O'Keefe, D. J., & Jensen, J. D. (2007). The Relative Persuasiveness of Gain-Framed

Loss-Framed Messages for Encouraging Disease Prevention Behaviors: A Meta-Analytic Review. *Journal of Health Communication, 12*(7), 623–644.

<http://doi.org/10.1080/10810730701615198>

Ogilvie, K. K., & Eggleton, A. (2016). *Obesity in Canada*. Retrieved from

http://www.parl.gc.ca/content/sen/committee/421/SOCI/Reports/2016-02-25_Revised_report_Obesity_in_Canada_e.pdf

Overweight and obese adults (self-reported), 2010. (2015). Retrieved April 2, 2016, from

<http://www.statcan.gc.ca/pub/82-625-x/2011001/article/11464-eng.htm>

Pfeffer, I. (2013). Regulatory fit messages and physical activity motivation. *Journal of*

Sport & Exercise Psychology, 35(2), 119–31. Retrieved from

<http://www.ncbi.nlm.nih.gov/pubmed/23535971>

Physical Activity. (2013). Retrieved December 10, 2016, from

<http://www.womenshealthdata.ca/category.aspx?catid=121&rt=2>

Physical Activity & Diabetes. (2016). Retrieved May 9, 2016, from

<http://www.diabetes.ca/diabetes-and-you/healthy-living-resources/exercise/physical-activity-diabetes>

Physical Activity and Adults. (2016). Retrieved January 31, 2016, from

http://www.who.int/dietphysicalactivity/factsheet_adults/en/

Physical Activity and Cancer. (2009). Retrieved May 9, 2016, from

<http://www.cancer.gov/about-cancer/causes-prevention/risk/obesity/physical-activity-fact-sheet>

Physical Activity and Mental Health. (2012). Retrieved March 6, 2016, from

<http://www.rcpsych.ac.uk/healthadvice/treatmentwellbeing/physicalactivity.aspx>

Physical activity improves quality of life. (2016). Retrieved May 9, 2016, from

<http://www.heart.org/HEARTORG/HealthyLiving/PhysicalActivity/StartWalking/P>

physical-activity-improves-quality-of-
life_UCM_307977_Article.jsp#.VzDhGmQrI00

- Prochaska, J. O., & Velicer, W. F. (1997). The Transtheoretical Change Model of Health Behavior. *American Journal of Health Promotion, 12*(1), 38–48. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/10170434>
- Robberson, M. R., & Rogers, R. W. (1988). Beyond Fear Appeals: Negative and Positive Persuasive Appeals to Health and Self-Esteem. *Journal of Applied Social Psychology, 18*(3), 277–287. <http://doi.org/10.1111/j.1559-1816.1988.tb00017.x>
- Rogers, E. M. (2002). Diffusion of preventive innovations. *Addictive Behaviors, 27*(6), 989–993. [http://doi.org/10.1016/S0306-4603\(02\)00300-3](http://doi.org/10.1016/S0306-4603(02)00300-3)
- Rothman, A. J., & Salovey, P. (1997). Shaping perceptions to motivate healthy behavior: the role of message framing. *Psychological Bulletin, 121*(1), 3–19. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/9000890>
- Sallis, J. F. (2000). Age-related decline in physical activity: a synthesis of human and animal studies. *Medicine and Science in Sports and Exercise, 32*(9), 1598–600. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/10994911>
- Siu, W. (2010). Interactive Source and Message Effects in Persuasion. *School of Journalism and Communication, 110*(2), 493–500. Retrieved from <http://www.amsciepub.com/doi/abs/10.2466/pms.110.2.493-500?journalCode=pms>
- Stiff, J. B., & Mongeau, P. A. (2003). *Persuasive Communication*. New York: Guilford Press. Retrieved from <https://books.google.com/books?id=YnXk9Txuov0C&pgis=1>
- The 10 leading causes of death, 2011. (2015). Retrieved January 31, 2016, from <http://www.statcan.gc.ca/pub/82-625-x/2014001/article/11896-eng.htm>

- The Benefits of Physical Activity. (2015). Retrieved October 16, 2015, from <http://www.cdc.gov/physicalactivity/basics/pa-health/>
- Turcotte, M. (2015). Women and Health. Retrieved January 2, 2017, from <http://www.statcan.gc.ca/pub/89-503-x/2010001/article/11543-eng.htm#a5>
- Twells, L. K., Gregory, D. M., Reddigan, J., & Midodzi, W. K. (2014). Current and predicted prevalence of obesity in Canada: a trend analysis. *Canadian Medical Association Journal Open*, 2(1), E18–E26. <http://doi.org/10.9778/cmajo.20130016>
- Valente, T. W., Dyal, S. R., Chu, K. H., Wipfli, H., & Fujimoto, K. (2015). Diffusion of innovations theory applied to global tobacco control treaty ratification. *Social Science and Medicine*, 145, 89–97. <http://doi.org/10.1016/j.socscimed.2015.10.001>
- Valente, T. W., & Fosados, R. (2006). Diffusion of innovations and network segmentation: the part played by people in promoting health. *Sexually Transmitted Diseases*, 33(7), S23–S31. <http://doi.org/10.1097/01.olq.0000221018.32533.6d>
- van't Riet, J., Ruiter, R. A. C., Werrij, M. Q., Candel, M. J. J. M., & de Vries, H. (2010). Distinct pathways to persuasion : The role of affect in message-framing effects. *European Journal of Social Psychology*, 40, 1261–1276. <http://doi.org/10.1002/ejsp>
- van't Riet, J., Ruiter, R. A. C., Werrij, M. Q., & de Vries, H. (2010). Investigating message-framing effects in the context of a tailored intervention promoting physical activity. *Health Education Research*, 25(2), 343–354. <http://doi.org/10.1093/her/cyp061>
- van 't Rieta, J., Coxb, A. D., Coxb, D., Zimetc, G. D., de Bruijnd, G., Putted, B. Van den, ... Ruiter, R. A. C. (2014). Does perceived risk influence the effects of message framing? A new investigation of a widely held notion. *Psychology & Health*, 29(8),

933–949. <http://doi.org/doi:10.1080/08870446.2014.896916>

Warburton, D. E. R., Nicol, C. W., & Bredin, S. S. D. (2006). Health benefits of physical activity: the evidence. *Canadian Medical Association Journal*, *174*(6), 801–809.

<http://doi.org/10.1503/cmaj.051351>

Wilson, M., & Goldbloom, D. (2012). *Focus on Mental Health*. Retrieved from

<http://www.collegesontario.org/policy->

[positions/health/CO_MentalHealth_Report_2012_WEB.pdf](http://www.collegesontario.org/policy-positions/health/CO_MentalHealth_Report_2012_WEB.pdf)

Appendices

Appendix A: Eligibility Questionnaire

Eligibility Questionnaire

First Name: _____

Email: _____

Age: _____

Gender: _____

Faculty: _____

Instructions: Circle your answer

Physical Activity Definition

Experts say that adults your age should be engaging in at least 150 minutes of moderate to vigorous physical activity a week. Some examples of moderate to vigorous physical activity include a very brisk walk, cleaning, mowing the lawn, shovelling the snow, bicycling, playing sports, running, jogging, hiking, dancing, etc.

Are you regularly physically active according to that definition above?

- Yes, I have been physically active for MORE than 6 months.
- Yes, I have been physically active for LESS than 6 months.
- No, but I intend to be physically active in the next 30 days.
- No, but I intend to be physically active in the next 6 months.
- No, and I do NOT intend to be physically active in the next 6 months.

Scoring Method

- Answered with choice #1: stage = Maintenance
- Answered with choice #2: stage = Action
- Answered with choice #3: stage = Preparation
- Answered with choice #4: stage = Contemplation
- Answered with choice #5: stage = Precontemplation

Appendix B: Western University Non-Medical Research Ethics Board



Research Ethics

Western University Non-Medical Research Ethics Board NMREB Delegated Initial Approval Notice

Principal Investigator: Dr. Alan Salmoni
Department & Institution: Health Sciences\Kinesiology, Western University

NMREB File Number: 108123
Study Title: Promoting Benefits of Physical Activity through Persuasive Communication

NMREB Initial Approval Date: July 04, 2016
NMREB Expiry Date: July 04, 2017

Documents Approved and/or Received for Information:

Document Name	Comments	Version Date
Recruitment Items	Recruitment Script - Received June 27, 2016	
Western University Protocol	Received June 27, 2016	
Sub-Study Letter of Information & Consent	Manipulation Check	2016/06/29
Letter of Information & Consent		2016/06/29
Instruments	Pre-Intervention Questionnaire - Received June 16, 2016	
Instruments	Post-Intervention Questionnaire - Received June 16, 2016	
Other	Eligibility Questionnaire - Received June 16, 2016	
Instruments	Manipulation Check - Received June 16, 2016	
Instruments	Follow-up Questionnaire - Received June 16, 2016	
Recruitment Items	Email to Club Presidents - Received June 16, 2016	
Instruments	Physical Health Benefits Loss-Framed Message - Received June 16, 2016	
Instruments	Physical Health Benefits Gain-Framed Message - Received June 16, 2016	
Instruments	Physical Health Benefits Loss-Framed Message - Fidelity Check - Received June 16, 2016	
Instruments	Physical Health Benefits Gain-Framed Message - Fidelity Check - Received June 16, 2016	
Instruments	Appearance Benefits Gain-Framed Message - Received June 16, 2016	
Instruments	Appearance Benefits Loss-Framed Message - Received June 16, 2016	
Instruments	Appearance/Social Benefits Gain-Framed Message - Fidelity Check - Received June 16, 2016	
Instruments	Appearance/Social Benefits Loss-Framed Message - Fidelity Check - Received June 16, 2016	
Instruments	Mental Health Benefits Gain-Framed Message - Received June 16, 2016	
Instruments	Mental Health Benefits Loss-Framed Message - Received June 16, 2016	
Instruments	Mental Health Benefits Gain-Framed Message - Fidelity Check - Received June 16, 2016	
Instruments	Mental Health Benefits Loss-Framed Message - Fidelity Check - Received June 16, 2016	
Instruments	Physical Activity Log - Received June 16, 2016	

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the above named study, as of the NMREB Initial Approval Date noted above.

NMREB approval for this study remains valid until the NMREB Expiry Date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario.

Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

Appendix C: Six Framed Messages

Mental Health Benefit Gain-framed Message

It has been well researched that physical activity can benefit your mental health. Experts say that adults your age should be engaging in at least 150 minutes of moderate to vigorous physical activity a week. Some examples of moderate to vigorous physical activity include a very brisk walk, cleaning, mowing the lawn, shovelling the snow, bicycling, playing sports, running, jogging, hiking, dancing, etc. Research has shown that physical activity is associated with the following health benefits:

- Reduce risk of depression and other mental illnesses.
- Physical activity makes you feel good about yourself and more relaxed.
- Improve your quality of life.
- Help cope with mental health and mood disorders such as depression.
- Help improve your study habits, memory, and ability to concentrate and focus in class.
- Improve the quality of sleep resulting in fewer sleep disturbances, which can improve your study habits and academic performance.
- Reduce the likelihood of feeling overwhelmed by stress and may help manage school-related stress.
- Reduce the feeling of stress-related emotions such as tension and anxiety.
- Physical activity makes it easier for university students to cope with stress, especially during academically demanding times.

Facts about mental health

- In Canada, only 18.9% of young adults aged 18 to 39 met the recommended guidelines for physical activity (“Directly measured physical activity of Canadian adults, 2007 to 2011,” 2013).
- In 2012, it was estimated that approximately 2.8 million Canadians 15 years of age and older, reported having symptoms associated with common mental disorders (“Canadian Community Health Survey: Mental Health, 2012,” 2013).
- Research has shown that aerobic exercise leads to a decrease in tension, depression, fatigue, and confusion; a small decrease in anger; and a positive effect on psychological well-being (Biddle, in Biddle, Fox, & Boutcher, 2000).
- Physical activity has been found to be beneficial for people suffering from mental disorders such as anxiety, depression and general well-being (Schmitz et al., 2004)
- Research has shown that physical activity decreases your risk of sleep disruption and may improve the sleep of persons with disturbed sleep patterns (Youngstedt & Frelove-Charton, in Faulkner & Taylor, 2005).
- Results of intervention have shown significant improvement in cognitive functioning among adults who increase their aerobic fitness (Boutcher, 2000).

Mental Health Benefit Loss-framed Message

It has been well researched that physical inactivity cannot benefit your mental health. Experts say that adults your age should be engaging in at least 150 minutes of moderate to vigorous physical activity a week. Some examples of moderate to vigorous physical activity include a very brisk walk, cleaning, mowing the lawn, shovelling the snow, bicycling, playing sports, running, jogging, hiking, dancing, etc. Research has shown that physical inactivity is associated with the following health outcomes:

- Increased risk of depression and other mental illnesses.
- Physical inactivity will not make you feel good about yourself and not more relaxed.
- Decrease your quality of life.
- Will not help cope with mental health and mood disorders such as depression.
- Will not help improve your study habits, memory, and ability to concentrate and focus in class.
- Decrease quality of sleep resulting in more sleep disturbances, which can worsen your study habits and academic performance.
- Increase the likelihood of feeling overwhelmed by stress and may not help manage school-related stress.
- Increase the feeling of stress-related emotions such as tension and anxiety.
- Physical inactivity makes it difficult for university students to cope with stress, especially during academically demanding times.

Facts about mental health

- In Canada, only 18.9% of young adults aged 18 to 39 met the recommended guidelines for physical activity (“Directly measured physical activity of Canadian adults, 2007 to 2011,” 2013).
- In 2012, was been estimated that approximately 2.8 million Canadians 15 years of age and older, reported having symptoms associated with common mental disorders (“Canadian Community Health Survey: Mental Health, 2012,” 2013).
- Research has shown that aerobic exercise leads to a decrease in tension, depression, fatigue, and confusion; a small decrease in anger; and a positive effect on psychological well-being (Biddle, in Biddle, Fox, & Boutcher, 2000).
- Physical activity has been found to be beneficial for people suffering from mental disorders such as anxiety, depression and general well-being (Schmitz et al., 2004)
- Research has shown that physical activity decreases your risk of sleep disruption and may improve the sleep of persons with disturbed sleep patterns (Youngstedt & Frelove-Charton, in Faulkner & Taylor, 2005).
- Results of intervention have shown significant improvement in cognitive functioning among adults who increase their aerobic fitness (Boutcher, 2000).

Physical Health Benefit Gain-framed Message

It has been well researched that physical activity can benefit your physical health. Experts say that adults your age should be engaging in at least 150 minutes of moderate to vigorous physical activity a week. Some examples of moderate to vigorous physical activity include a very brisk walk, cleaning, mowing the lawn, shovelling the snow, bicycling, playing sports, running, jogging, hiking, dancing, etc. Research has shown that physical activity is associated with the following health benefits:

- Reduced risk of catching a common cold when you are faced with high stress periods like exams.
- Higher levels of physical activity are associated with lower incidence of the common cold among undergraduate students.
- Reduce the risk of developing high blood pressure.
- Reduce your risk of heart attack and stroke.
- Reduce your risk of developing colon cancer, breast cancer and many other types of cancers
- Reduce your risk of developing type 2 diabetes.
- Improve your body's ability to use insulin and carbohydrates to help keep your blood sugar in check.
- Help build and maintain healthy bones, muscles, and joints.
- Reduce risk of dying prematurely.

Facts about physical health

- In Canada, only 18.9% of young adults aged 18 to 39 met the recommended guidelines for physical activity ("Directly measured physical activity of Canadian adults, 2007 to 2011," 2013).
- Regular physical activity, in conjunction with healthy eating and weight control, can reduce type 2 diabetes incidences by 60% ("Physical Activity & Diabetes," 2016).
- A study in the *American Journal of Medicine* found that women who walked for a half-hour every day had half the number of colds as those not physically active.
- Research has shown that being sedentary (sitting down) for more the 4 hours a day increases your risk of death by 46% and increase your risk of death from cardiovascular disease by 80% ("Physical activity improves quality of life," 2016).
- Being moderate to vigorously physically active reduces your risk of stroke by 20% to 27% ("Physical activity improves quality of life," 2016).
- Individuals who are physically active reduce their risk of developing colon cancer by 30% to 40% and woman reduce their risk of breast cancer by 20% to 80% ("Physical Activity and Cancer," 2009).

Physical Health Benefit Loss-framed Message

It has been well researched that physical inactivity cannot benefit your physical health. Experts say that adults your age should be engaging in at least 150 minutes of moderate to vigorous physical activity a week. Some examples of moderate to vigorous physical activity include a very brisk walk, cleaning, mowing the lawn, shovelling the snow, bicycling, playing sports, running, jogging, hiking, dancing, etc. Research has shown that physical inactivity is associated with the following health outcomes:

- Increase risk of catching a common cold when you are faced with high stress periods like exams.
- Lower levels of physical activity are associated with higher incidence of the common cold among undergraduate students.
- Increase the risk of developing high blood pressure.
- Increase your risk of heart attack and stroke.
- Increase your risk of developing colon cancer, breast cancer and many other types of cancers
- Increase your risk of developing type 2 diabetes.
- Decreases your body's ability to use insulin and carbohydrates to help keep your blood sugar in check.
- Does not help build and maintain healthy bones, muscles, and joints.
- Increase risk of dying prematurely.

Facts about physical health

- In Canada, only 18.9% of young adults aged 18 to 39 met the recommended guidelines for physical activity ("Directly measured physical activity of Canadian adults, 2007 to 2011," 2013).
- Regular physical activity, in conjunction with healthy eating and weight control, can reduce type 2 diabetes incidences by 60% ("Physical Activity & Diabetes," 2016).
- A study in the *American Journal of Medicine* found that women who walked for a half-hour every day had half the number of colds as those not physically active.
- Research has shown that being sedentary (sitting down) for more the 4 hours a day increases your risk of death by 46% and increase your risk of death by cardiovascular disease from 80% ("Physical activity improves quality of life," 2016).
- Being moderate to vigorously physically active reduces your risk of stroke by 20% to 27% ("Physical activity improves quality of life," 2016).
- Individuals who are physically active reduce their risk of developing colon cancer by 30% to 40% and woman reduce their risk of breast cancer by 20% to 80% ("Physical Activity and Cancer," 2009).

Appearance/Social Benefits Gain-framed Message

It has been well researched that physical activity can benefit your appearance and social life. Experts say that adults your age should be engaging in at least 150 minutes of moderate to vigorous physical activity a week. Some examples of moderate to vigorous physical activity include a very brisk walk, cleaning, mowing the lawn, shovelling the snow, bicycling, playing sports, running, jogging, hiking, dancing, etc. Research has shown that physical activity is associated with the following appearance and social benefits:

- Reduce body fat, help maintain muscle mass and help strengthen bones.
- Improve your overall body definition, muscle tone, and body function.
- Improve your chances of losing weight or maintaining a healthy body weight.
- Reduce your risk of gaining weight during university, and can help avoid the ‘freshman 15’.
- Improve digestion by improving your body’s ability to use calories.
- Reduce risk of becoming overweight or obese if you engage in physical activity.
- Help you gain social acceptance, improve your social relationships and help establish new friendships.
- Improve confidence, self-esteem and self-image.
- Physical activity can be fun, enjoyable and exciting.

Facts about obesity

- In Canada, only 18.9% of young adults aged 18 to 39 met the recommended guidelines for physical activity (“Directly measured physical activity of Canadian adults, 2007 to 2011,” 2013).
- In 2010 roughly 4.2 million adults (aged 18 and older) reported height and weight that classified them as obese (“Overweight and obese adults (self-reported), 2010,” 2015).
- In Canada, 60.9% of men and 43.7% of women who are either obese or overweight have increased health risks because of their excess weight. (“Overweight and obese adults (self-reported), 2010,” 2015)
- The research shows that aerobic exercise and resistance training is the most effective physical activity in changing self-perceptions, with greater effectiveness in the short term with resistance training (Fox, in Biddle, Fox, & Boutcher, 2000).
- Physical activity programs provide feelings of mastery through completion of a physically demanding program, improved body image and a variety of group dynamic effects (Norris et al., 1992).
- Research has shown that physical activity programs provide social support aspects to the program (Babyak et al., 2000).

Appearance/Social Benefit Loss-framed Message

It has been well researched that physical inactivity cannot benefit your appearance and social life. Experts say that adults your age should be engaging in at least 150 minutes of moderate to vigorous physical activity a week. Some examples of moderate to vigorous physical activity include a very brisk walk, cleaning, mowing the lawn, shovelling the snow, bicycling, playing sports, running, jogging, hiking, dancing, etc. Research has shown that physical inactivity is associated with the following appearance and social outcomes:

- Increase body fat, not help maintain muscle mass and not help strengthen bones.
- Decrease your overall body definition, muscle tone and body function.
- Decrease your chances of losing weight or maintaining a healthy body weight.
- Increase your risk of gaining weight during university and won't help avoid the 'freshman 15'.
- Decrease digestion by decreasing your body's ability to use calories.
- Increase risk of becoming overweight or obese if you are not engaging in physical activity.
- Will not help you gain social acceptance, not improve your social relationships and not help establish new friendships.
- Decrease confidence, self-esteem and self-image.
- Physical inactivity cannot be fun, enjoyable and exciting.

Facts about obesity

- In Canada, only 18.9% of young adults aged 18 to 39 met the recommended guidelines for physical activity ("Directly measured physical activity of Canadian adults, 2007 to 2011," 2013).
- In 2010 roughly 4.2 million adults (aged 18 and older) reported height and weight that classified them as obese ("Overweight and obese adults (self-reported), 2010," 2015).
- In Canada, 60.9% of men and 43.7% of women who are either obese or overweight have increased health risks because of their excess weight. ("Overweight and obese adults (self-reported), 2010," 2015)
- The research shows that aerobic exercise and resistance training is the most effective physical activity in changing self-perceptions, with greater effectiveness in the short term with resistance training (Fox, in Biddle, Fox, & Boutcher, 2000).
- Physical activity programs provide feelings of mastery through completion of a physically demanding program, improved body image and a variety of group dynamic effects (Norris et al., 1992).
- Research has shown that physical activity programs provide social support aspects to the program (Babyak et al., 2000).

Appendix D: Manipulation Check

Manipulation Check

Instructions: Read the message and circle your answer

To what extent do you think the information made you feel happy?

1	2	3	4	5	6	7
Not happy at all	Not happy	Somewhat not happy	Neutral	Somewhat Happy	Happy	Very happy

To what extent do you think the information made you feel relieved?

1	2	3	4	5	6	7
Not relieved at all	Not relieved	Somewhat not relieved	Neutral	Somewhat relieved	Relieved	Very relieved

To what extent do you think the information made you feel sad?

1	2	3	4	5	6	7
Not sad at all	Not sad	Somewhat not sad	Neutral	Somewhat sad	Sad	Very sad

To what extent do you think the information made you feel afraid?

1	2	3	4	5	6	7
Not afraid at all	Not afraid	Somewhat not afraid	Neutral	Somewhat afraid	Afraid	Very afraid

Appendix E: Pre-intervention Questionnaire

Part A: Demographics

ID Number: _____

Age: _____

Gender: _____

Faculty: _____

Part B: Circle your answer

On a scale from 1 to 7 (1 = strongly disagree; 7 = strongly agree) to what extent do you agree or disagree with the following statements?

I intend to be physically active at least 5 times for the next week.

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

I intend to be physically active for at least 30 minutes on at least 5 days of the week.

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

Part C: Circle your answer

For me, engaging in at least 30 minutes of physical activity for at least 5 days of the week would be:

Very bad	1	2	3	4	5	6	7	Very good
Very unimportant	1	2	3	4	5	6	7	Very important
Not sensible at all	1	2	3	4	5	6	7	Very sensible
Not at all nice	1	2	3	4	5	6	7	Very nice
No fun at all	1	2	3	4	5	6	7	A lot of fun

For me, exercising at least 5 times per week for the next week would be:

Useless	1	2	3	4	5	6	7	Useful
Unimportant	1	2	3	4	5	6	7	Important
Worthless	1	2	3	4	5	6	7	Valuable
Harmful	1	2	3	4	5	6	7	Beneficial
Unsatisfying	1	2	3	4	5	6	7	Satisfying
Unpleasant	1	2	3	4	5	6	7	Pleasant
Unenjoyable	1	2	3	4	5	6	7	Enjoyable
Boring	1	2	3	4	5	6	7	Exciting

Part D: Write your response on the line provided below

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

- a) **VIGOROUS 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) _____
- b) **MODERATE EXERCISE (NOT EXHAUSTING)** (e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing) _____
- c) **LIGHT EXERCISE (MINIMAL EFFORT)** (e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snowmobiling, easy walking) _____

Experts say that adults your age should be engaging in at least 150 minutes of moderate to vigorous physical activity a week.

Are you regularly physically active according to that definition above?

- Yes, I have been physically active for MORE than 6 months.
- Yes, I have been physically active for LESS than 6 months.
- No, but I intend to be physically active in the next 30 days.
- No, but I intend to be physically active in the next 6 months.
- No, and I do NOT intend to be physically active in the next 6 months.

Appendix F: Post-intervention Questionnaire

Part A: Demographics

ID Number: _____

Age: _____

Gender: _____

Faculty: _____

Part B: Circle your answer

On a scale from 1 to 7 (1 = strongly disagree; 7 = strongly agree) to what extent do you agree or disagree with the following statements?

I intend to be physically active at least 5 times for the next week.

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

I intend to be physically active for at least 30 minutes on at least 5 days of the week.

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

Part C: Circle your answer

For me, engaging in at least 30 minutes of physical activity for at least 5 days of the week would be:

Very bad	1	2	3	4	5	6	7	Very good
Very unimportant	1	2	3	4	5	6	7	Very important
Not sensible at all	1	2	3	4	5	6	7	Very sensible
Not at all nice	1	2	3	4	5	6	7	Very nice
No fun at all	1	2	3	4	5	6	7	A lot of fun

For me, exercising at least 5 times per week for the next week would be:

Useless	1	2	3	4	5	6	7	Useful
Unimportant	1	2	3	4	5	6	7	Important
Worthless	1	2	3	4	5	6	7	Valuable
Harmful	1	2	3	4	5	6	7	Beneficial
Unsatisfying	1	2	3	4	5	6	7	Satisfying
Unpleasant	1	2	3	4	5	6	7	Pleasant
Unenjoyable	1	2	3	4	5	6	7	Enjoyable
Boring	1	2	3	4	5	6	7	Exciting

Part D: Write your response on the line provided below

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

- a) **VIGOROUS 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)

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

- c) **LIGHT EXERCISE (MINIMAL EFFORT)** (e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snowmobiling, easy walking)

Appendix G: Follow-up Questionnaire

Part A: Demographics

ID Number: _____

Age: _____

Gender: _____

Faculty: _____

Part B: Circle your answer

On a scale from 1 to 7 (1 = strongly disagree; 7 = strongly agree) to what extent do you agree or disagree with the following statements?

I intend to be physical active at least 5 times for the next week.

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

I intend to be physically active for at least 30 minutes on at least 5 days of the week.

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

Part C: Circle your answer

For me, engaging in at least 30 minutes of physical activity for at least 5 days of the week would be:

Very bad	1	2	3	4	5	6	7	Very good
Very unimportant	1	2	3	4	5	6	7	Very important
Not sensible at all	1	2	3	4	5	6	7	Very sensible
Not at all nice	1	2	3	4	5	6	7	Very nice
No fun at all	1	2	3	4	5	6	7	A lot of fun

For me, exercising at least 5 times per week for the next week would be:

Useless	1	2	3	4	5	6	7	Useful
Unimportant	1	2	3	4	5	6	7	Important
Worthless	1	2	3	4	5	6	7	Valuable
Harmful	1	2	3	4	5	6	7	Beneficial
Unsatisfying	1	2	3	4	5	6	7	Satisfying
Unpleasant	1	2	3	4	5	6	7	Pleasant
Unenjoyable	1	2	3	4	5	6	7	Enjoyable
Boring	1	2	3	4	5	6	7	Exciting

Part D: Write your response on the line provided below

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

a) **VIGOROUS 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)

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

c) **LIGHT EXERCISE (MINIMAL EFFORT)** (e.g., yoga, archery, fishing from river bank, bowling, horseshoes, golf, snowmobiling, easy walking)

Follow-Up Questionnaire

Did your attitudes, intentions or behaviours towards physical activity change after reading the message? (circle your answer)

- No
- Yes

If yes, what part of the message influenced you the most in changing your attitudes, intentions or behaviours toward physical activity?

If no, what part of the message did not influence you the most in changing your attitudes, intention or behaviours toward physical activity?

Appendix H: Physical Activity Log

Physical Activity Log

Date	Description of Activity	Duration of Activity

Appendix I: Letter of Information and Consent Form



**Aging and Ergonomics Research Laboratory
School of Kinesiology
Faculty of Health Science
UNIVERSITY OF WESTERN ONTARIO**

LETTER OF INFORMATION

Promoting Benefits of Physical Activity through Persuasive Communication.

Principle Investigator

Dr. Alan Salmoni, PhD

Co-collaborators:

Priynka Patil, BHSc

Introduction

You are being invited to participate in this study because you are between the ages of 18 to 35, are inactive and are either in the contemplation or preparation stage in relation to physical activity. The purpose of this letter is to provide you with the information required for you to make an informed decision regarding your participation in this research study.

Background and Purpose

It is recommended that every Canadian is participating in a range of physical activities that are both enjoyable and safe to profit from the multiple benefits. As youth move from secondary school to post-secondary school, there is a drop in participation in physical activity (Sallis, 2000). Since being regularly active can help improve our social life, appearance, physical health and mental health it may be beneficial that individuals are informed of these benefits to motivate individuals to start adopting physical activity in their daily lives.

The primary purpose of this study is to determine if gain- or loss-framed messages about physical activity will change the intentions, attitudes and behaviours of university students who are in the contemplation or preparation stage. The secondary purpose is to determine if framing the message in terms of the physical health benefits, the appearance/social benefits or mental health benefits will change the intentions, attitude, and behaviour of undergraduate students.

Study Design

This study will involve 300 undergraduate students from the University of Western Ontario. This study will be conducted at the University of Western Ontario in the Thames Hall Building, and you will be required to come to campus to participate in this study. If you agree to participate in this study, you will be randomly assigned to 1 of 6 groups. Each group will be given a different message to read. Before reading the message, you will be asked to fill out a questionnaire and a physical activity log for a week. Following this you will be asked to read the message. After reading the message, you will be given another questionnaire to fill out. Following this, you will be asked to fill out another physical activity log for another week. Then you will return for a follow-up to fill out the last questionnaire. You will be given an email reminder one day before each session. Below is a table outlining the time commitment needed to participant in this study

Sessions	Duration of Session	Activity
Session 1	10 to 15 minutes	Questionnaire
	5 minutes/day	Physical Activity Log
Session 2	10 to 15 minutes	Read Message Questionnaire
	5 minutes/day	Physical Activity Log
Session 3	10 to 15 minutes	Questionnaire

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate or refuse to answer any questions. You may withdraw from the study at any time. Attached to this letter is a Consent Form that all participants must sign to consent to participate in this study.

Risk/Benefits

Participating in this study is not intended to make you feel bad about your current physical activity level. There is a possibility that reading messages about physical activity may cause negative feelings regarding that individual's inactivity. If any negative feelings arise during the course of the study, please feel free to contact the Health and Wellness Center (http://www.uwo.ca/health/mental_wellbeing/) located on campus (University Community Centre Room 78). Please feel free to access these recourses on campus at any time throughout the study.

Other potential risks of physical activity include injury to body and other exercise-related events. If you are an individual with a structural cardiac disease you may be at risk of experiencing exercise-associated acute cardiac event. It is recommended that individuals with structural cardiac disease increase physical activity level gradually over time. If at any time you feel out of breath or faint while being physically active get help immediately by either calling 911, contact the campus first response team or by getting the attention of a bystander in the area to assist you in getting the medical attention you may need.

Although there are risks associated with physical activity, physical activity can improve your appearance and social life but more importantly it can help improve your physical health and mental health, which can help improve your quality of life.

Confidentiality

If you participate in this study you will be asked to identify yourself and provide contact information (email) for communication purposes. All personal information will be kept confidential and in paper form in a locked and secure area for a 5 year period. All electronic documents will be encrypted and password protected on a computer and USB. If the results of this study are published, your name will not be used. Representatives of The University of Western Ontario's Non-Medical Research Ethics Board may require access to your study-related records to monitor the conduct of the research. You do not waive any legal rights by consenting to this study.

Cost and Compensation

There are no costs involved with participating in this study. You will not be compensated for participating in this study.

Questions about the Evaluation

If you require any further information regarding this research project or your participation in the study you may contact Priynka Patil (see contact information above). If you have any questions regarding the conduct of this study or your rights as a research participant you can contact The Office of Research Ethics.



**Aging and Ergonomics Research Laboratory
School of Kinesiology
Faculty of Health Science
UNIVERSITY OF WESTERN ONTARIO**

CONSENT FORM

Promoting Benefits of Physical Activity through Persuasive Communication.

Principle Investigator

Dr. Alan Salmoni, PhD

Co-collaborators:

Priynka Patil, BHSc

I have read the Information Letter, have had the nature of the study explained to me and all questions have been answered to my satisfaction.

By signing this consent form I agree to participate in this study.

Participants Informed Consent (please print):

Print name: _____

Sign: _____

Date: _____

Person Obtaining Informed Consent (please print):

Print name: _____

Sign: _____

Date: _____

Appendix J: Fidelity Check

Fidelity Check – Mental Health Gain-Framed Message

Please answer the following multiple-choice questions.

What is the recommended guideline for physical activity for someone 18 years and older?

- a) 500 minutes/ week
- b) 5 hours/week
- c) 150 minutes/week
- d) 3 hours/week

Which of the following will occur as a result of being physically active? (circle all that apply)

- a) Reduce risk of depression and other mental illnesses.
- b) Improve the quality of sleep resulting in fewer sleep disturbances, which can improve your study habits and academic performance.
- c) Reduce your study habits, memory, and ability to concentrate and focus in class.
- d) Improve your quality of life.
- e) Physically active makes it harder for university students to cope with stress, especially during academically demanding times.

Fidelity Check – Mental Health Loss-Framed Message

Please answer the following multiple-choice questions.

What is the recommended guideline for physical activity for someone 18 years and older?

- a) 500 minutes/ week
- b) 5 hours/week
- c) 150 minutes/week
- d) 3 hours/week

Which of the following will occur as a result of not being physically active? (circle all that apply)

- a) Increased risk of depression and other mental illnesses.
- b) Decreases the quality of sleep resulting in fewer sleep disturbances, which can worsen your study habits and academic performance.
- c) Improve your study habits, memory, and ability to concentrate and focus in class.
- d) Decreases your quality of life.
- e) Physically inactive makes it easier for university students to cope with stress, especially during academically demanding times.

Fidelity Check - Physical Activity Gain-Framed Message

Please answer the following multiple-choice questions.

What is the recommended guideline for physical activity for someone 18 years and older?

- a) 500 minutes/ week
- e) 5 hours/week
- f) 150 minutes/week
- g) 3 hours/week

Which of the following will occur as a result of being physically active? (circle all that apply)

- a) Reduces the risk of catching a common cold when you are faced with high stress periods like exams.
- b) Improve your body's ability to use insulin and carbohydrates to help keep your blood sugar in check.
- c) Help increase the risk of developing high blood pressure.
- d) Help build and maintain healthy bones, muscles, and joints.
- e) Increase risk of dying prematurely

Fidelity Check – Physical Activity Loss-Framed Message

Please answer the following multiple-choice questions.

What is the recommended guideline for physical activity for someone 18 years and older?

- a) 500 minutes/ week
- b) 5 hours/week
- c) 150 minutes/week
- d) 3 hours/week

Which of the following will occur as a result of not being physically active? (circle all that apply)

- a) Increase risk of catching a common cold when you are faced with high stress periods like exams.
- b) Decreases your body's ability to use insulin and carbohydrates to help keep your blood sugar in check.
- c) Help decrease the risk of developing high blood pressure.
- d) Not help build and maintain healthy bones, muscles, and joints.
- e) Decrease risk of dying prematurely

Fidelity Check – Appearance/Social Gain-Framed Message

Please answer the following multiple-choice questions.

What is the recommended guideline for physical activity for someone 18 years and older?

- a) 500 minutes/ week
- b) 5 hours/week
- c) 150 minutes/week
- d) 3 hours/week

Which of the following will occur as a result of being physically active? (circle all that apply)

- a) Reduce body fat, help maintain muscle mass and help strengthen bones.
- b) Improve your chances of losing weight or maintaining a healthy body weight.
- c) Will not improve digestion by improving your body's ability to use calories.
- d) Help you gain social acceptance, see your friends more often, improve your social relationships and help establish new friendships.
- e) Decrease confidence, self-esteem and self-image.

Fidelity Check – Appearance/Social Loss-framed Message

Please answer the following multiple-choice questions.

What is the recommended guideline for physical activity for someone 18 years and older?

- a) 500 minutes/ week
- b) 5 hours/week
- c) 150 minutes/week
- d) 3 hours/week

Which of the following will occur as a result of not being physically active? (circle all that apply)

- a) Increase body fat does not help maintain muscle mass and does not help strengthen bones.
- b) Decrease your chances of losing weight or maintaining a healthy body weight.
- c) Improve digestion by improving your body's ability to use calories.
- d) Will not help you gain social acceptance, see your friends more often, improve your social relationships and help establish new friendships.
- e) Improve confidence, self-esteem and self-image.

Curriculum Vitae

Name: Priynka Patil

Post-secondary Education and Degrees: University of Western Ontario
London, Ontario, Canada
2011-2015 B.H.Sc.

The University of Western Ontario
London, Ontario, Canada
2015-2017 M.A.

Related Work Experience Teaching Assistant
The University of Western Ontario
2015-2017