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INFLUENCE OF HEALTH MAGAZINE MESSAGING ON INTENTIONS TO EXERCISE

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Approval of Thesis

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Abstract

Individuals are inundated with media messaging, yet the impact of media messaging in a naturalistic context on exercise is largely unknown.

The relationship between perceived credibility of popular fitness magazine articles and exercise attitudes, perceived behavioural control (PBC), intentions, and behaviour was examined. A pretest posttest approach was used. Participants (N=151) were randomized to a fitness (Group A) or science (Group B) article.

An ANOVA showed Group A reported a higher perception of article credibility than Group B (F = 7.14, p = .00). RM MANOVA results showed there was no effect for group (condition), but there was an effect for time (F = 3.46, p = .01) and a group by time interaction (F = 2.42, p = .05), with Group B reporting higher control beliefs.

It is possible that perceived credibility does not influence thoughts about exercise after reading a fitness article, though further investigation is warranted.

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Chapter I. Introduction

Regular physical activity and exercise contribute to many well-known health benefits including the prevention of non-communicable diseases such as cardiovascular disease, some cancers and obesity-related illness (Canadian Society for Exercise Physiology, 2012; World Health Organization, 2010). Physical activity is defined as any bodily movement expending energy and involving skeletal muscles (Caspersen, Powell, & Christenson, 1985). While physical activity includes exercise, by definition exercise is planned and structured physical activity that is done for improvement of physical ability and fitness (Caspersen, 1985). For example, movement that is part of daily life such as cleaning, walking, and carrying items such as groceries involves physical activity. This bodily movement requires the use of skeletal muscles to accomplish activity but is unstructured and is not done for the improvement of fitness. Exercise however, involves more planning and structure as in playing a game of soccer, cross country skiing, or participating in a yoga class, and is intended to benefit physical fitness and ability. Recommendations for physical activity set out by the World Health Organization (WHO), are used by national health departments worldwide, including Canada (WHO, 2010). According to the WHO (2010) and the Canadian Society for Exercise Physiology, 2012, 150 minutes of moderate-to-vigorous physical activity is needed per week in adult populations in order to achieve health benefit. Slightly more than half of Canadians (53.9%) report meeting this minimum amount of physical activity each week (Statistics Canada, 2012). Yet when measured objectively, only 15% of Canadian adults are meeting the recommended amount of physical activity (Colley, Garriguet, Janssen, Craig, Clarke, & Tremblay, 2011; Public Health Agency of Canada, 2011). When examining influencing factors on physical activity and exercise, the media may play a role. Health

and fitness magazines frequently depict images and descriptions of exercises, recommendations and associated benefits both for appearance and health. These forms of media concentrate on exercise rather than physical activity. Therefore, understanding how various factors might influence exercise behaviour is an important goal of research.

The influence health media messaging may have on consumers is of importance given the current low levels of physical activity in Canada and other Western countries. To date, little is known about the effects of health messaging on consumers' physical activity intention and behaviour (Rhodes & Dickau, 2012; Berry & Shields, 2013; Berry, McLeod, Pankratow & Walker, 2013). The Theory of Planned Behaviour (TPB) is a popular model for explaining physical activity and exercise intention and behaviour across a variety of populations and contexts (e.g., Bellows-Riecken, Rhodes, & Hoffert, 2012; De Bruijn, Verkooijen, De Vries, & Van Den Putte, 2012; Symons Downs & Hausenblas, 2005; McAuley & Courneya, 1993; Courneya, 1994). According to the TPB, behavioral intentions are a key antecedent to participation in a given activity, including exercise (Ajzen, 1991). The TPB states that a person's intention is determined by their attitudes, normative beliefs and perceived behavioral control surrounding the behavior. Perceived behavioral control can influence behavior either indirectly through intentions, or directly. The TPB may be used as a general framework in examining how the media plays a role in exercise. By using the TPB, an understanding of these fundamental precursors contributing to participation in exercise may be gained.

The public is often bombarded by vast amounts of media information in a diverse number of platforms affecting all facets of our daily lives (Maibach, 2007). Media now occupies both our personal and professional communities (Maibach, 2007). Health

messaging is presented in various forms, including advertisements used to market products and services (Berry, McLeod, Pankratow, & Walker, 2013; Berry & Shields, 2013; Maibach, 2007). In the promotion of the benefits of health and exercise, health professionals, non-profit organizations (e.g., Canadian Cancer Society), and governments (e.g., Health Canada) are consistently vying for public attention (Jones, Sinclair & Courneya, 2003; Maibach, 2007). Commercial media is also competing for public attention promoting ideal physique, fitness services (e.g., personal trainers), and products (e.g., athletic apparel, supplements, fitness equipment) for profitable gains (Maibach, 2007; Jones, Sinclair & Courneya, 2003).

With so many messages permeating our daily lives, consumers may become influenced by constant media, acting upon messaging seen in magazines or other venues, without realizing the extent to which they have been influenced (Maibach, 2007). This messaging may lead to credibility conflicts in readers. Credibility refers to the perceived expertise of the media source (Berry & Shields, 2013), and various for-profit media advertisements or advertorials may be perceived as being quite credible, when in fact the information they present may have little or no evidence base. Individuals may presume health messaging is touting credible health benefits, and may not realize many for-profit health messages are merely sales promotions. It is possible that media messaging and perceived credibility of the message may influence an individuals' attitude towards physical activity, as well as their intentions. For example, a woman may see a magazine article in a popular health publication. In this article, the use of an appetite-suppressing beverage is touted by a self-professed fitness professional as safe, effective and medically proven to support rapid weight loss. Upon reading this, the woman may not only believe

the fitness professional to be qualified and educated to give this information (i.e., credible), but she may also believe the magazine article to be evidence based when in fact it is advertorial in nature. By examining the role of media and credibility within the context of the TPB and variables such as attitudes and intentions, we may better understand ways in which media and messaging influences exercise participation. When considering popular media such as health magazines, many consumers are inundated with what may be considered credible resources. For example, celebrity personal trainers, fitness promoters, and generalist medical professionals may be referenced or endorsed by popular magazines, health products and service providers. Since an individuals' determination of credibility in a source may influence his/her intention to engage in a healthy behavior, it is important to understand how popular sources of health information may be evaluated in terms of credibility by consumers (Berry et al., 2013; Maibach, 2007).

Source credibility may be an important variable for influencing thoughts and behaviours (Pornpitakpan, 2004). Source credibility refers to the source of the message: the communicator (Pornpitakpan, 2004). For example, when reading a newspaper article about exercise recommendations, a woman notices that the article is written by a well-known athlete and fitness instructor. The woman then credits the source of the article to the writer, and she associates her own perceptions of credibility about the article with the writer, who is the source of the information. Individuals perceiving a message source as credible are more likely to be influenced by messages from that source, than individuals perceiving low levels of source credibility (Kumkale, Albarracin, & Seignourel, 2010). However, source credibility may only be relevant to consumers when message processing

is limited that is, when there is no repetition of the message (Kumkale et al., 2010; Pornpitakpan, 2004). In these situations, individuals may then rely more heavily on a perception of credibility and expertise when evaluating a message (Kumkale et al., 2010; Pornpitakpan, 2004).

Individuals who actively seek health information from magazines tend to be health oriented and interested in health information (Dutta-Bergman, 2004). Therefore they may be more likely to seek out health information from a variety of presumed credible sources such as health and fitness magazines. This is because resources such as magazines are considered relevant, factual and reliable by consumers in supplying health information but tend to direct readers to further self-research (Dutta-Bergman, 2004). However, a blurring of distinctions between entertainment, marketing and news/informative content may affect consumers' ability to separate credible from non-credible sources (Maibach, 2007). This incomplete or misunderstood information may lead to insufficient or potentially harmful choices by the reader, as not all readers have the expertise or background to fully disseminate published information (Dutta-Bergman, 2004). For example, upon reading 'Muscle and Fitness' magazine, a man may feel the information contained therein is mostly factual. When reading an advertorial article on the weight loss effects of a new diet trend, he may decide that this option is effective as he considers the magazine and its content credible. He does not recognize that the advertorial is not in fact, based on published research or by magazine content experts, but rather a promotional advertisement for a diet plan. This type of published information may lead to a decrease in his intention to exercise, as he may then decide not to engage in exercise as a weight loss tool, opting instead, for the perceived easier option of modifying

his diet. This blurring of credibility may interfere with intention to physical activity as the reader is unaware of the distinction between subject matter expert content and product advertorials. It is possible then, that health and fitness media may actually contribute to lower levels of physical activity when consumers are influenced by perceived credible sources that may not in fact, be credible at all. Therefore it is important to understand perceived credible health and fitness media, and the influence of the perception of credibility of these resources may have on intentions to engage in physical activity.

Chapter II. Review of the Literature

In situations where message processing is done quickly or with limited time, source credibility may influence thoughts and behaviours (Kumkale et al., 2010; Pornpitakpan, 2004). Without repetition of the message, more reliance is placed on the perception of credibility of the source (author, spokesperson) than in situations where messages may be repeated or reexamined (Kumkale et al., 2010; Pornpitakpan, 2004). A source that is perceived to be highly credible may influence individuals than a source that is perceived to be of low credibility or that is not perceived to be credible (Pornpitakpan, 2004). Commercial health media is often conveyed in brief segments including magazine articles and advertorials, often making use of celebrity endorsements (Pornpitakpan, 2004). Celebrities are often perceived as highly credible sources, and celebrity use for product endorsement or message advocacy may influence intentions (Pornpitakpan, 2004). Sources perceived to be highly credible may influence attitudes and intentions towards a behaviour (Pornpitakpan, 2004).

Research examining the influence of commercial health media on exercise has found that it is negatively related to intentions to exercise, so that women who are exposed to thin ideals in media messages report lower intentions to exercise (Berry, Jones, McLeod, & Spence, 2011). For example, a recent study examined the influence of commercial media advertisements showing both thin ideal and health promoting messages, as well as examined believability of the message on exercise intentions (Berry et al., 2011). Researchers studied both implicit and explicit believability of the message in both conditions. Implicit believability of the message refers to already formed thoughts and opinions about the topic whereas explicit believability are those beliefs of

which we are conscious and may easily change. Researchers found that female university students who were exposed to print advertisements endorsing an ideal physical appearance showed subsequently lower intentions to exercise than those exposed to print advertisements promoting health benefits (Berry et al., 2011). The greater the implicit believability participants had that exercise would contribute to a more desirable appearance, the lower their intentions to exercise (Berry et al., 2011). This may be because the physique standards often shown in the media of tall, thin women with little body fat are often unattainable standards for many women (Berry et al., 2011). Women viewing this unattainable image may actually be turned off from exercise, perhaps believing that since commercial media models' appearance is not achievable, there is little point in trying or intending to exercise in future (Berry et al., 2011).

With competing, and at times conflicting information surrounding exercise in the media, the perceived credibility of resources and information related to exercise may have a role in exercise intention and behavior (Jones, Sinclair, & Courneya, 2003; Berry, Jones, McLeod & Spence, 2011). In general, resources created or published by subject matter experts are perceived by others to be credible (Berry & Shields, 2013; Jones, Sinclair & Courneya, 2003). Credibility of a given resource increases the influence the content may have on the consumer, which may in turn influence the consumers' intention to act (Berry & Shields, 2013; Jones, Sinclair & Courneya, 2003). For example, a woman reads a magazine article written by an exercise physiology professor about a new exercise plan, promoted for increasing bone density in women. The article also cites research evidence as support for the exercise program. Based on this information, the consumer may be more likely to view the article as credible as it was written by a

credible source and cites evidence from research to support its claims. We may see then, that popular and for-profit media make use of subject matter experts in the promotion and sales of messaging in order to increase consumer believability. Therefore we may see that high credibility sources (e.g., exercise physiologist, medical doctor), are seen to increase message believability and intention to exercise (Berry et al., 2013; Jones et al., 2003).

Berry and Shields (2013) have shown that source credibility in exercise information may influence intentions to exercise, so that people who believe sources are more credible report stronger intentions to exercise than people who think sources are less credible. The relationship between source of information (e.g. non-profit sources, Heart and Stroke Foundation or commercial sources, Fitness Depot) and credibility of spokesperson on exercise attitudes and intentions was examined (Berry & Shields, 2013). In this study, both explicit and implicit attitudes were assessed. Participant undergraduate students were subjected to a brief (e.g. 85 second) television exercise-related advertisement offering strategies for implementing exercise into daily activities (Berry & Shields, 2013). Advertisements were the same except for the spokesperson (male participants watched male spokesperson, females watched a female spokesperson), focus of message (health versus appearance) and clothing of spokesperson (health messages clothing was a tracksuit, appearance messages clothing was more revealing and tight fitting). The spokesperson from both messages self-identified as a fitness professional in the advertisements. In the health message, information was delivered focusing on the health benefits of exercise; in the appearance message information was delivered using wording commonly found in popular health and fitness magazines (ex.

killer abs, muscle tone, etc.). Participants were asked to respond to several post-intervention questionnaires including perceived source attribution (non-profit versus commercial organization), credibility of the spokesperson, and believability of the message (Berry & Shields, 2013). Results showed that participants attributed more credibility to resources produced by non-profit sources (Heart and Stroke Foundation) over commercial sources (Fitness Depot), *regardless* of the exercise message (Berry and Shields, 2013). That is, even if the content was appearance based (killer abs) but claimed to be created by a non-profit source, participants still attributed more credibility to the non-profit spokesperson than the commercial spokesperson immediately after seeing the advertisement (Berry and Shields, 2013). This finding suggests that perceived credibility may be related to source (i.e., publisher) rather than content itself, at least immediately after exposure to the message (Berry & Shields, 2013). Further, results showed that participants who believed sources are more credible reported stronger intentions to exercise than participants who thought sources were less credible (Berry & Sheilds, 2013). In terms of attitudes, there were no differences in implicit attitudes between health and appearance messages. That is, exposure to credible and non-credible sources had no effect on attitudes toward exercise itself (Berry & Shields, 2013). This may be due to already formed attitudes towards exercise, which were not assessed as a pretest in this study, but which may have contributed to evaluations of exercise (Berry & Shields, 2013).

While Berry and Shields' (2013) research found that credibility may be more influential than the message itself, there are several limitations to the study. First, the finding that participants found all non-profit sources to be more credible despite the

message is curious, as it seems odd that one would think a credible source like the Heart and Stroke Foundation were promoting "killer abs". As Berry and Sheilds (2013) note it seems unlikely that over the longer term, participants would continue to find it credible that a non-profit agency would promote exercise for appearance reasons such as "killer abs". However, this may also bring into question the finding that intentions to exercise were linked to more credible sources. For example, if participants reported that the non-profit sources were more credible even when the health message didn't really "fit" with the source immediately after exposure to said media, it seems questionable as to whether the intentions to exercise would be enacted upon over the longer terms as well. While the creation of media advertisements such as the Berry and Shields' research-created ads allows us to examine the influence of credibility and other factors on intentions to be active, these ads are not necessarily realistic portrayals of what individuals actually see in the media. Examining the influence of popular health and fitness media in a naturalistic context might allow researchers to better understand the actual role of media messaging and perceived credibility on exercise intentions and behavior. A further limitation of this study is that it did not examine exercise behavior as a result of the intervention. That is, participants completed a Godin Leisure Time Exercise Questionnaire (GLTEQ) only once, immediately following the advertisement viewing, in order to assess exercise participation over the week prior to study participation and did not repeat the GLTEQ at any other point during the study. While credibility may have an immediate influence on intentions, it is therefore not clear whether or not credibility would actually influence behavior.

Credibility may be influenced by a number of factors, including personal involvement in a given issue (Berry, Jones, McLeod & Spence, 2011), and an individual's confidence in the creator and/or distributor (Berry & Shields, 2013; Jones et al., 2003). In a study examining the effects of message credibility and exercise participation, Jones, Sinclair and Courneya created health promotion resources which were distributed to participants (2003). Canadian undergraduate university students were told that the resources were written either by a physician (credible condition) or by a high school student (non-credible condition). Participants were randomly assigned to credible source, or non-credible source groups. Results showed that only those resources which were written by a credible source had significant, positive intentions to exercise, which remained stable for a two week period (Jones et al., 2003). Resources written by a high school student were not deemed credible by participants and had no effect on intention to exercise (Jones et al., 2003). Participants' behaviour was evaluated via Godin Leisure Time Exercise Questionnaire over a two week period after exercise message exposure (Jones et al., 2003). The study found participants who were given credible resources reported the highest frequency of strenuous exercise participation over a two-week period after message exposure (Jones et al., 2003). This suggests that participants act upon what they believe to be credible sources, and are more likely to report engaging in the promoted behavior. Additionally, participants who reported the article to come from a credible source also reported more positive intentions to be active than those reporting the source as non-credible (Jones et al., 2003). A limitation of this work is the "artificial" nature of the experimental design. Participants in this study were given the opportunity to evaluate source creators and determine credibility by credential, with a significant

disparity (medical doctor or high school student). In popular media such as magazines, this is not always discernible information for readers, and often credibility of an article source within magazines is implied based on magazine focus (health, fitness, economics, etc.).

According to the literature examining the role of media on exercise, intentions to exercise appear to be related to perceived source credibility and attitudes (Rhodes & Dickau, 2012; Berry & Shields, 2013; Berry, McLeod, Pankratow & Walker, 2013; McAuley & Courneya, 1993; Courneya, 1994; Maibach, 2007; Berry et al., 2011). That is, lower perceived credibility of media resources seems to be related to lower intentions to exercise (Dutta-Bergman, 2004; Jones et al., 2003). However, results from previous research examining the influence of credibility on attitudes may be conflicting. In a meta-analysis examining the effects of source credibility on attitudes with persuasive communication campaigns, it was found that after a single exposure to a message, participants were more reliant on source credibility only when attitudes about the topic were not previously established, or when there was no previous knowledge about the message topic (Kumkale et al., 2010). In contrast, another study examining the persuasiveness of source credibility found that using highly credibly sources (rather than low-credibility sources) were only necessary when consumers had established prior negative attitudes towards the source (Pornpitakpan, 2004). Examination of credibility influence on exercise showed that lower perceived credibility of media sources also appears to lower exercise-related attitudes (Dutta-Bergman, 2004), although again, the research is conflicting. Previous research has found that credibility may be related to implicit instrumental attitudes towards health and fitness (Berry & Shields, 2013). That

is, exposure to media influenced unconscious attitudes regarding the benefits, values, importance, and healthiness of participating in exercise, but did not influence voluntarily formed explicit attitudes about exercise pleasantness, enjoyment, and pleasure immediately after exposure (Berry & Shields, 2013). Rather, attitudes may be "pre-formed" and therefore not subject to targeted media messaging and perception of credibility (Berry & Shields, 2013). Other research however, indicates that perception of credibility has had no effect at all on attitudes (Jones et al., 2003).

Furthermore, the impact of concurrent and conflicting messaging prevalent in popular media (e.g., commercial, appearance messaging alongside research-based health messaging) has not yet been explored in relation to consumer intentions to exercise. With consistent media proliferation in our daily lives, understanding how health messaging influences our intention to exercise may provide an opportunity for health promoters to engage individuals in healthful behaviors. Much of the current literature examines only researcher-created interventions, that is participants studied to date have been offered media representations created solely for the purpose of the research study and not what is widely available in public media (Berry & Shields, 2013; Jones, Sinclair & Courneya, 2003). It will be valuable then to understand the response of health media messaging when presented in a naturalistic context that is, by using current and publically available fitness magazines.

Much of the previous research examining media and exercise makes use of many of the constructs from the TPB as a general framework (attitudes, intentions). The Theory of Planned Behaviour (TPB) is a widely used and well-established model for predicting participation in exercise behaviour (Symons Downs & Hausenblas, 2003). It is a linear

model with the predictive constructs each relating to intention (Ajzen, 1991). According to the TPB, behavioural intentions most closely predicts participation in a given activity (Ajzen, 1991). Behavioural intentions however, are predicted by three direct determinants including attitudes, subjective norms, and control beliefs (Ajzen, 1991).

Attitudes towards a behaviour refers to the evaluation of favourable and unfavourable judgements about a given behaviour (Ajzen, 1991). Attitudes encompass beliefs about associated outcomes of performing the behaviour as well as characteristics associated with engaging in the behaviour (i.e., pleasantness, enjoyment; Ajzen, 1991). Attitudes are those thoughts evoking feelings as well as beliefs about engaging in a behaviour (Ajzen, 1991). For example, a person who participates in regular exercise may hold the attitude that engaging in exercise is pleasant and beneficial for health and therefore holds favourable attitudes towards exercise. A person who does not participate in regular exercise may hold the attitude that exercise is difficult and unenjoyable, and therefore does not hold favourable attitudes towards exercise. According to the TPB, these attitudes towards exercise may influence a person's intentions to engage in exercise so that the person with favourable attitudes will intend to exercise while the person with unfavourable attitudes will not intend to engage in exercise.

Subjective norms refers to the individual social pressures of engaging in a given behaviour (Ajzen, 1991). Subjective norms include social pressures from friends, family and coworkers and are unique to individuals and their social networks (Ajzen, 1991). For example, a woman may have friends and family that participate regularly in community soccer, triathlons and alpine skiing. Her social network is amenable to exercise, therefore it is likely that her own participation in exercise is encouraged and supported by her

friends and family. This acceptance of engaging in exercise may also act as a perceived pressure for her to engage in exercise as it is considered 'normal' behaviour within her social network. As subjective norms are direct antecedents of behavioural intention, it is likely that she will intend to exercise as her subjective norms are favourable towards exercise.

Perceived behavioural control refers to an individual's perception of ability (ease or difficulty) to engage in a given behaviour (Ajzen, 1991). Perceived control can include a person's ability, access, and resources (financial, physical) involved in performing a behaviour, and includes thoughts about the likelihood of accomplishment (Ajzen, 1991). Perceived behavioural control may also include past behaviour in a given activity (Ajzen, 1991; Armitage, 2005). For example, a man who has limited finances may wish to join a fitness centre in order to work out more regularly. With limited resources, he is not able to afford the monthly membership in order to gain access to the fitness centre. He perceives his ability to exercise is difficult as he lacks the monetary requisite in order to exercise in a fitness centre. He is then less likely to intend to exercise if he perceives the barriers to exercise (finances) are too difficult to overcome. These antecedents to behaviour may then assist in examining factors influencing behavioural intentions and future behaviour.

The use of the TPB as a model for behaviour prediction has been used across various behavioural research studies in a variety of contexts (Ajzen, 1991). An examination of the predictive ability of the TPB has shown that attitudes significantly predict intentions to exercise (Ajzen, 1991; Rhodes & Courneya, 2005; Symons Downs & Hausenblas, 2003). The addition of perceived behavioural control has also been found

to be of equal importance in predicting behaviour (Ajzen, 1991). Subjective norms however, has been found to be a weaker predictor of behaviour when compared to other TPB antecedents (Armitage & Conner, 2001; Hausenblas, Carron, & Mack, 1997; Symons Downs & Hausenblas, 2005). In relation to exercise, attitudes and control beliefs may predict future intention to engage in exercise (Ajzen, 1991; Hausenblas et al., 1997; Rhodes & Courneya, 2004; Rhodes & Courneya, 2005). In a meta-analysis, researchers reviewed 31 studies examining exercise and the TPB (Hausenblas et al., 1997). The strength of the TPB model was analyzed to assist in determining its use for predicting exercise behaviour (Hausenblas et al., 1997). Results showed strong support for use of the TPB in exercise research and its ability to predict exercise behaviour (Hausenblas, et al., 1997). In a more recent meta-analysis, researchers reviewed 192 studies involving exercise and the TPB (Symons Downs & Hausenblas, 2005). Results from the meta-analysis indicate that intention has shown to be a significant predictor of exercise behaviour (Symons Downs & Hausenblas, 2005). Attitudes and perceived behavioural control were shown to be contributors to contribute to behavioural intention, however subjective norms was not found to be a significant contributor to exercise intentions (Symons Downs & Hausenblas, 2005). As the TPB is a widely accepted model for use in exercise research examining predictive cognitions about engaging in exercise, it is of benefit to use this previously used and validated model in the current study. However, much of the past research looking at media influences on exercise has focused on attitudes and has not included perceived behavioral control. When examined with behavioural intentions, perceived behavioural control may significantly predict behaviour (Ajzen, 1991) It seems plausible then, that health magazine messaging may

also be related to people's beliefs around whether or not they think physical activity is feasible, and whether associated goals are achievable.

Chapter III. Study Design

Purpose of the study

The purpose of this study was to examine the influence of popular health/fitness magazine messaging on perceived credibility, intentions, attitudes, perceived behavioural control and exercise behaviour in a naturalistic context. There were two basic research questions. Firstly, does perception of credibility of a fitness magazine influence intentions to engage in exercise? That is, will believing a fitness magazine article to be credible have any effect on the reader's intentions to exercise, and are there differences in the perceived credibility of the article between groups who are reading a popular health magazine article, versus those who are reading an article on science? Secondly, does reading a fitness magazine article influence attitudes, perceived behavioural control, and exercise behavior, when compared to those who are reading a non-fitness related article? Given the positive relationship between credibility and exercise intentions in past studies (Jones et al., 2003), it was hypothesized that participants who perceived the articles to be more credible would have higher intentions to participate in exercise, and form more favorable attitudes towards exercise. Subsequently, given the positive association between attitudes and credibility (Berry & Shields, 2013), it was hypothesized that participants reporting the fitness magazine to be credible, would also report more favourable attitudes towards exercise, and would engage in more exercise than those deeming the magazine article to be non-credible.

Methods & Procedures

This was an experimental pretest/posttest design in order to examine the influence of health magazine messaging on attitudes, perceived behavioural control, behavioural intentions, behaviour, and perception of credibility. The active independent variable was magazine articles. The dependent variables were instrumental and affective attitude towards exercise, perceived behavioral control regarding exercise, intention to engage in exercise, physical activity type/intensity, steps taken (pedometer), self-reported physical activity participation, and credibility of the magazine article. This design allowed for a comparison between the groups in order to assess whether the intervention itself had an effect or not. Additionally, this design allowed an examination of variance within groups from baseline (pre-test) to post-test, as a result of reading the magazine article. Finally, the pre-test measure ensures equivalencies between control and fitness article groups. Prior to conducting the study, approval from research ethics boards at Athabasca University and Mount Royal University was obtained (see Appendix A and Appendix B).

Rigor

Some strengths and weakness may be noted for the study design. Strengths to internal validity include a decrease of perceived barriers to physical activity by hosting the study on the Mount Royal University campus which has a recreation facility, freely accessible by all students as membership to the MRU recreation facility is included in student services, and accessible to all student demographics. By making use of student access to the facility as well as the campus itself, well suited to all modalities of physical activity (resistance training, cardiovascular training, fitness classes, open gymnasium

courts, squash/racquetball courts, swimming pool, intramural activities), there is limited potential for additional cost to participants. The use of a naturalistic intervention is also a strength, as the magazines participants read for the study are the same magazines publically available, and were not created solely for the purpose of this study. Additionally, the use of a pedometer may lend itself as a strength, as counted steps may be accumulated wherever participants choose to be active both on, and off campus. With regard to external validity, strengths include a greater ability to generalize study findings to the general population as a non-clinical sample was used. The use of a convenience sample however, threatens external validity as an undergraduate population may not be representative of a larger, more diverse and generalized population.

While noted strengths will increase rigor of this proposed study, some threats do exist. The use of an insufficiently active sample population may threaten internal validity as participants may have a previous bias towards participation in exercise. Inversely, the use of a highly active sample population may also threaten internal validity as participants may have a predisposition towards engaging in physical activity. Additionally, participant self-reporting of pre- and post-test physical activity inventories may be reflective of desirable but not accurate physical activity participation.

Participants

Undergraduate students from Mount Royal University were recruited to participate in this study. Recruitment was done by placing study posters on Mount Royal University public bulletin boards, by using electronic posters in the online learning management system, and by the instructor in specific undergraduate classrooms.

Specifically, students enrolled (General Education 1101: Scientific and Mathematical Literacy for the Modern World, General Education 1102: Controversies in Science, and Massage Therapy 21001: Fundamentals of Research) were approached during class time by the principle investigator and were invited to participate in the research. Instructors for twelve Fall 2014 sections of these courses and MRU were supportive of the study and offered class time for recruitment and the opportunity for the students in the course to participate in research. There were ten sections of General Education courses, with approximately 35 students in each section, and two sections of Massage Therapy courses, with approximately 60 students in each section, totaling approximately 470 students.

Inclusion/exclusion criteria. Participation was limited to Mount Royal University students enrolled in courses during the Fall 2014 semester. All students in these courses aged 18 years or older were eligible to participate in the study.

Procedure

The study was presented to participants as an investigation of psychological factors related to exercise attitudes, intention and behavior in relation to health magazines. The primary researcher (E. Ori) explained the study to potential participants in the classroom. Participants volunteering for the study either completed the study during class time (for those classes where the instructors supported this) or they were asked to attend a pre-scheduled study participation session, held in a classroom at MRU. Data collection sessions were scheduled at mutually convenient times for both the researcher and participant(s). These sessions accommodated up to 30 participants per session. All participation remained entirely voluntary, and no participants were given

preferential treatment nor additional incentive for participating. The study participation session took up to 40 minutes, with most participants completing participation requirements within less than 30 minutes.

Participants were randomized to one of two groups: fitness article group or a robotics article group. Randomization software was used by inputting the total number of potential participants per sex (150 males, 150 females) for a two group assignment (intervention or control). Using randomization software, group assignment was completed prior to recruitment. At the point of entry into the study, participants were blocked by sex only. Participants randomized to the fitness article group read a fitness magazine article describing and depicting exercises from a celebrity while participants randomized to the fitness article group read a magazine article on robotics. More specifically, women in the fitness article group were given a magazine article from 'Shape Magazine' depicting and detailing a workout from a celebrity actress. Men in the fitness article group were given a magazine article from 'Men's Fitness Magazine' depicting and detailing a workout from a model/actor. Robotics article Robotics article group participants were given a magazine article from 'Popular Science Magazine' depicting and describing Google Inc.'s purchase of several international robotics companies. With the exception of the magazine article selected for reading ('Shape Magazine' for women, 'Men's Health Magazine' for men fitness article group, or popular non-health focused magazines 'Popular Science Magazine' for the robotics article group), participants in both fitness article and robotics article groups completed the same measures from entry to completion.

Participants first completed self-reported demographic information (sex, age, height, weight, program and year of study), and baseline (i.e., pre-test) assessments of attitudes, perceived behavioural control, behavioural intentions, and self-reported exercise participation via Godin Leisure Time Exercise Questionnaire (Time 0). At the same session and immediately following completion of baseline data, the intervention was delivered by giving each participant a magazine (based on randomization assignment), and asking the participant to read the flagged article. After the intervention, participants completed a recall task demonstrating comprehension of content. All participants then completed post intervention assessments of attitudes, and perceived behavioral control towards physical activity, as well as intention to engage in exercise (Time 1). Perceived credibility of the magazine article was also assessed at this time point. Following completion of their survey, participants were given pedometers to wear for one week, and asked to make record of daily total of steps taken. One week later, steps taken over one week were collected as well as attitudes, intentions, perceived behavioral control and self-reported physical activity inventories were re-assessed and collected via electronic survey. Participants were permitted to keep the pedometers in appreciation for study participation.

Measures

Internal consistency. In order to measure internal consistency of the scale questions for each dependent variable, all measures were assessed using Cronbach's alpha computation (Morgan, Gliner & Harmon, 2006; Tavakol & Dennick, 2011). Cronbach's alpha is a commonly used measure of internal consistency when multiple-item Likert-type scales are used, meaned, and aggregated (Morgan et al., 2006; Tavakol

& Dennick, 2011). Validity refers to the accuracy of measuring what is intended to be measured (Morgan et al., 2006; Tavakol & Dennick, 2011). Alphas represent the average correlation of each item in a test, to each other item (Morgan et al., 2006). Internal consistency scores are most widely accepted between .70 and .90 (Morgan et al., 2006; Tavakol & Dennick, 2011), though scores of .60-.69 are also considered acceptable when there are fewer than five items measured by a reliability test (Morgan et al., 2006). Alpha scores range from 0 to 1 with higher alpha scores indicating stronger correlations between test items (Tavakol & Dennick, 2011). The number of items assessed by the internal consistency test may affect the test score itself (Tavakol & Dennick, 2011). A lower number of items included in a test may underestimate the alphas, while more items included in a test may overestimate the alpha (Tavakol & Dennick, 2011). Alpha scores are considered unique to the specific test items and participants from each test (Tavakol & Dennick, 2011). Therefore, previous alpha estimates for the same/similar measures cannot be used as substitutes (Tavakol & Dennick, 2011). Alphas for each measure used are reported, below.

Attitude. Attitudes toward exercise were measured using four items on a 7 point scale, utilizing bipolar semantic differential adjectives. Two items were used to reflect affective attitudes (i.e., pleasant-unpleasant; satisfying - unsatisfying) and two items were used to assess instrumental attitudes (useless - useful; unimportant - important). The statement began with "for me to participate in regular exercise is…" This reflects Ajzen's conceptualization of attitudes and is similar to previous published exercise research (Bellows-Riecken, Rhodes, & Hoffert, 2012; Berry et al., 2011; Berry, McLeod, Pankratow, & Walker, 2013; Berry & Shields, 2013). The two items were then meaned

to determine an overall score for each: affective attitudes and instrumental attitudes. A higher score reflects more positive attitudes. At baseline, posttest and follow up, for the two instrumental attitude items, Cronbach's alpha's were .68, .67, and .67, respectively. At baseline, posttest and follow up, for the two affective attitude items, Cronbach's alpha's were .60, .60, and .66, respectively. See Appendix C for questions.

Perceived behavioral control. Perceived behavioral control (PBC) was measured with three items on a 7 point scale. The items were, (1) "How much would exercising at least 4 days per week for the next three months be under your control? (*very little control to complete control*)" (2)" How much would exercising at least 4 days per week for the next three months be easy or difficult to do? (*very difficult to very easy*)" and (3) "How confident are you that you can exercise at least 4 days per week for the next three months? (*not very confident to very confident*)". The three items were then meaned to determine an overall score of PBC, with a higher score indicating stronger control beliefs. This is similar to how perceived behavioral control has been measured in previous exercise research (Bellows-Riecken et al., 2012). At baseline, posttest and follow up, for the three perceived behavioural control items, Cronbach's alpha's were .82, .83, and .86, respectively. See Appendix C for questions.

Intentions. Intentions were measured with three items on a 7 point rating scale ranging from 1 (strongly disagree/definitely not) to 7 (strongly agree/definitely do). Participants were instructed to think about engaging in regular exercise when responding to the statements. The three items used to assess intentions were (1) "I intend to exercise regularly during the next week," (2) "I intend to exercise at least 4 times per week over the next month" and (3) "I intend to participate in as much regular exercise as I can every

week over the next month." This is similar to how intentions has been measured in previous research (Bellows-Riecken et al., 2012; Berry & Shields, 2013; Calitri, Lowe, Eves, & Bennett, 2009). Intention items were meaned to determine one overall score for intentions with a higher score indicating stronger intentions to exercise. At baseline, posttest and follow up, for the three intention items, Cronbach's alpha's were .86, .85, and .88, respectively, which is considered acceptable (Morgan et al., 2006; Tavakol & Dennick, 2011). See Appendix C for questions.

Exercise Behavior. Self-report, mild, moderate and strenuous intensity leisure time (total minutes) physical activity was assessed with a modified Godin Leisure Time Exercise Questionnaire (GLTEQ) similar to previous research (Godin & Shephard, 1997; Lamarche & Vallence, 2013). Participants were instructed to consider how many times per week over the past one month they engaged in mild, moderate and strenuous types of physical activity, and the average duration of each exercise session. Previous research has found that the GLTEQ compares favorably to other self-report measures of exercise (Jacobs, Ainsworth, Hartman & Leon, 1993). In order to determine a moderate-to-vigorous physical activity score, GLTEQ measures were assessed only for moderate and vigorous physical activity self-reports. Average reported duration was multiplied by weekly frequency to determine a total time in minutes. Total minutes were aggregated and meaned to determine an overall score (minutes) for moderate-to-vigorous physical activity. Only moderate-to-vigorous activity was used in analysis, in keeping with CSEP recommendations for physical activity (CSEP, 2012). See Appendix C for questions.

Daily Steps. Steps Count Piezo® SC-StepMV^{TM} digital hip pedometers were used to assess daily steps taken over a one-week period. Participants were given a 7-day

calendar on which to record total steps for each day. Previous research has indicated that a wear time of 7-10 days is necessary in order to achieve acceptable reliability for both leisure time physical activity and moderate-vigorous physical activity (Aadland & Ylvisaker, 2015). Participants were instructed to wear the pedometer at all times possible, each day for a total of seven days. At the end of each day, participants were asked to record their daily steps on the calendar sheet provided. At follow up, participants were asked to submit their step recoding. The daily steps were then averaged to determine an average daily step count.

Credibility. Perceived credibility of the article and author were assessed with five items created by the researcher. This assessment was created based upon the information in the magazine articles which was used by both fitness article groups and the robotics article group. Modeled after questioning used in previous research (Jones et al., 2003), these questions were created to determine participant perception of credibility of the source and content. Questions were created by the researcher as previous research did not include specific questions used, but only the type of questions (Likert-type), and semantic terms used of which four were also used for the current study: author competence, knowledge, credibility, and expertise (Jones et al., 2003). Questions addressed the content of the article and author, and did not assess the publication. Based on source expertise measures used by previous research, this measure assessed perception of subject matter expertise of the author, competence of the author, and whether the article was perceived as factual, informative and credible (Jones, 2003). Questions were rated on a on a four-point Likert- type scale from 1 (“not at all”) to 4 (“extremely”), similar to previous research (Jones et al., 2003). Items were meaned to come up with an

overall credibility score, where a higher score indicating greater perceived credibility. For the five credibility items, Cronbach's alpha for the intervention and robotics article groups were .87 and .80 respectively. See Appendix D, Appendix E, and Appendix F for questions.

Intervention

The intervention for this study consisted of readings from popular magazines, selected by the researcher. Women in the fitness article group were given a magazine article from 'Shape Magazine' depicting and detailing a workout from celebrity actress Sharon Stone. The magazine article was titled, "How Sharon Stays Sexy" and consisted of three pages of exercise prescription with a total of 541 words. Included with the exercise photos was descriptive 'how-to' advice as well as recommended frequency and repetition for each exercise, and target muscle groups utilized. The article included six exercises using a kitchen chair for exercise equipment, including deep chair squats, seated scissor kicks, seat lifts, chair dips, cobra pose and Sharon's stretch. Interspersed between the article pages were full-page advertisements for natural health products (toothpaste, mouthwash), athletic shoes, and fat burning dietary supplements.

Men in the fitness article group were given a magazine article from 'Men's Fitness Magazine' depicting and detailing a workout from a celebrity boxer. The magazine article was titled "The Warrior Body Workout" and consisted of three pages of exercise prescription with a total of 946 words. The article included 'how-to' photos and exercise descriptions with no exercise equipment. Four exercises were covered including boxer's jab, uppercuts, body weight squats, and aero-fly plyometric jump. Additional

exercises endorsed included jumping jacks, and jumping rope. Interspersed between the article's pages were full-page advertisements for whey protein powders (three separate brands).

Robotics article group participants were given a magazine article from 'Popular Science Magazine' depicting and describing Google Inc.'s purchase of several international robotics companies. The article was two pages in length, and included a brief synopsis of eight recent Google Inc. acquisitions of various global robotics companies, and consisted of 1001 total words. The article had illustrated images of robots. The pages of the article were not interspersed with advertisements.

Data Analyses

SPSS 22.0 was used for all data compilation and analysis. Descriptive statistics were computed and reported for all participants in both groups for demographic data, and for all study variables including intentions, attitudes, perceived behavioural control, and average minutes for moderate-vigorous activity (MVPA). Chi-squared analysis was computed to determine the distribution of the sample between groups for completing/not completing participation in the study through to Time 2 (follow-up). A chi-squared analysis was also computed to determine if there was a significant difference between the number of males and females participating in the study. Correlations among study variables were conducted and are reported for both intervention and robotics article groups. In order to examine if there were differences between intervention and robotics article group on intentions, attitudes, perceived behavioural control, and GLTEQ minutes (assessed at Time 0 and Time 2 only), a series of Repeated Measures Multivariate

Analysis of Variance (RM MANOVA) were conducted where group (intervention versus control) is the between participants factor and time (Time 0 to Time 1 and Time 0 to Time 2) is the within participants factor. To examine if there were differences between groups with respect to perceived credibility (assessed at Time 2 only) and behaviour (steps taken), an Analysis of Variance (ANOVA) was conducted.

Statistical significance was be established at $p < 0.05$ level. Erroneous data was coded as missing, and all data were cleaned and extreme outliers were removed. Outliers were detected by scanning the data for extreme cases. Participants reporting total GLTEQ minutes in excess of 6000mins/week (equivalent to over half of total minutes per week) were treated as extreme outliers. A total of two outliers were detected and deleted. No outliers were recorded for any other variables.

Chapter IV. Results

Participants

The sample included 151 Mount Royal University undergraduate student participants recruited into the study after seeking a potential 300 students, resulting in a total response rate of 50%. This is somewhat lower than previous research however, similar studies used incentivized measures to recruit students (class credit) which was not use in the present study (Berry & Shields, 2013; de Bruijn et al., 2012; Jones et al., 2007). However, this response rate is considered acceptable for survey-based study participation (Galea & Tracy, 2007). Participants varied in age from 18 through to 56 years. Mean participant age was reported at 24.01 years (*SD* = 6.6) with 149 participants reporting age at baseline (Time 0). Female participants outnumbered male participants with a total of 114 female participants and 37 male participants. Body Mass Index (BMI) was computed (mass [kg]/height^2 [meters]), and participant mean BMI was 23.26kg/m^2 (*SD* = 3.83). Study participant demographics for age and sex and BMI can be seen in Table 1. A frequency table reporting participant program of study can be seen in Table 2. Of the 151 participants initially recruited into the study, 78 were randomized to the fitness article group and 73 to the robotics article group.

A total of 102 participants completed the study, 59 participants from the fitness article group and 43 participants from the control. A higher proportion of participants from the fitness article group completed the study compared to the robotics article group ($\chi^2(1) = 5.40$, $p = .02$). There were no significant differences between participants who did and did not complete the study in terms of age (F (1, 147) = .23, $p = .62$), sex (F (1, 148) = .03, $p = .84$), BMI (F (1, 147) = 1.36, $p = .24$), program of study (F (1, 147) =

3.56, p = .06), instrumental attitude (F (1, 148) = .06, p = .79), affective attitude (F (1, 148) = 1.24, p = .26), behavioural intention (F (1, 148) = .00, p = .95), perceived behavioural control (F (1, 148) = .02, p = .86), and self-reported weekly leisure time physical activity frequency (F (1, 147) = 1.29, p = .25) measured at Time 0.

Table 1. Descriptive Statistics of Participants and Dependent Variables.

	Intervention			Control		
Variable	*N*	*M*	*SD*	*N*	*M*	*SD*
Sex[1]	77	1.75	.43	73	1.77	.42
Age	76	24.03	6.81	73	24.07	6.44
Weight (kg)	77	67.35	11.28	73	64.92	9.17
Height (cm)	76	167.98	9.35	73	64.92	14.50
BMI	76	23.80	3.62	73	22.70	3.99
Reads Health/Fitness Magazines Regularly[2]	77	1.64	.88	72	1.49	.76
T0 Behavioural Intention	77	4.92	1.51	73	5.04	1.57
T0 Instrumental Attitude	77	6.22	.60	73	6.25	.78
T0 Affective Attitude	77	5.75	.85	73	5.87	.88
T0 Perceived Behavioural Control	77	4.50	1.34	73	4.52	1.43
T0 GLTEQ (Total MVPA Minutes)	77	61.90	69.79	72	53.46	43.48
T1 Behavioural Intention	77	5.09	1.34	73	5.10	1.52
T1 Instrumental Attitude	76	6.16	.65	73	6.30	.61
T1 Affective Attitude	77	5.72	.88	73	5.97	.81
T1 Perceived Behavioural Control	77	4.56	1.35	73	4.76	1.43
T2 Behavioural Intention	61	4.91	1.54	46	5.12	1.67
T2 Instrumental Attitude	61	6.22	1.00	46	6.21	1.09
T2 Affective Attitude	61	5.74	1.00	46	6.07	.83
T2 Perceived Behavioural Control	61	4.31	1.32	45	4.59	1.47
T2 GLTEQ (Total MVPA Minutes)	61	39.65	24.78	46	42.44	39.24
Steps (Average, daily)	56	8520.15	3546.91	44	8521.87	3940.42
Credibility	77	2.83	.53	73	2.58	.62

1. Males coded 1; females coded 2
2. No coded 1; yes coded 2; sometimes coded 3

Table 2. Student Participant Demographics by Frequency – Program of Study

Program of Study	Frequency	Percentage
Massage Therapy	54	36%
Arts	21	14%
Business	17	11%
Sciences	13	9%
Nursing/Midwifery	12	8%
Physical Education	11	7%
Communications/Public Relations/Journalism	7	5%
Child Studies/Social Work	4	3%
Computer Science/Information Design	4	3%
Open Studies/Entrance Option	2	1%
Policy/Justice Studies	3	2%
Education	2	1%
Missing	1	1%

Note. $n = 150$

Table 3. Total Moderate-Vigorous Self-Reported GLTEQ Minutes

	Time 0 - Baseline			Time 2 – Follow-up		
	N	*M*	*SD*	*N*	*M*	*SD*
Fitness article group	77	61.90	69.79	61	39.65	24.78
Robotics article group	72	53.46	43.48	46	42.44	39.24

Randomization Check

To ensure a successful randomization, an ANOVA was used to compare control and fitness article groups on study variables. There were no significant differences between participants randomized to control and fitness article groups in terms of age ($F(1, 147) = .00$, $p = .96$), BMI ($F(1, 147) = 3.15$, $p = .07$), program of study ($F(1, 147) = 2.40$, $p = .12$), regular reading of health and fitness magazines ($F(1, 147) = 1.21$, $p = .27$), instrumental attitude ($F(1, 148) = .05$, $p = .81$) affective attitude ($F(1, 148) = .75$, p

= .38), behavioural intention (F (1, 148) = .24, *p* = .62), perceived behavioural control (1, 148) = .00, *p* = .95), and self-reported leisure time physical activity frequency (F (1, 147) = .29, *p* = .58) measured at baseline (Time 0). There was also no significant difference between the proportion of men and women randomized to the control and fitness article groups ($\chi^2(1) = .11$, p = .74). While there were more female participants overall, the distribution of participants was similar between groups with 26% males and 74% females being randomized to robotics article group, and 23% males and 77% females being randomized to fitness article groups.

Correlations among Study Variables

In order to examine any associations among study variables (e.g., intentions, attitudes, perceived behavioural control, credibility) before and after the intervention, a series of correlations were conducted. Specifically, correlation analysis was completed to examine the associations between study variables at Time 0 (baseline, prior to magazine exposure) and Time 1 (immediately following magazine exposure) to examine associations immediately following the intervention (see Table 4 and Table 5). Correlation analysis was also completed between Time 0 and Time 2 (one week following intervention exposure) to examine associations over the longer term (i.e., one week from baseline; see Table 6 and Table 7).

In general, significant, positive correlations were found between the variables affective attitude, instrumental attitude, perceived behavioural control, and behavioural intention for both control and fitness article groups at Times 0 and Time 1. Significant, positive correlations were found between the variables behavioural intentions,

instrumental attitudes, affective attitudes, and perceived behavioural control for the fitness article group at Time 0 and Time 2 (see Table 6). Significant, positive correlations were found between the variables behavioural intentions, affective attitudes, and perceived behavioural control for the robotics article group at Time 0 and Time 2 (see Table 7).

Table 4. Pretest and Post-test Correlation Table – Fitness Article Group Only.

Variable	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1. Sex[1]	-													
2. Age	.03	-												
3. BMI	.07	.03	-											
4. T0 Behavioural Intention	-.11	-.03	.00	-										
5. T0Instrumental Attitude	-.05	-.08	-.11	.27*	-									
6. T0 Affective Attitude	-.09	-.04	-.12	.38**	.35**	-								
7. T0 Perceived Behavioural Control	-.22*	.03	-.00	.73**	.17	.34**	.							
8.T1 Behavioural Intention	-.17	-.13	-.06	.86**	.26*	.48**	.69**	-						
9. T1 Instrumental Attitude	-.00	-.19	-.15	.34**	.83**	.23*	.26*	.35**	-					
10. T1 Affective Attitude	-.12	-.13	-.11	.32**	.33**	.79**	.31**	.48**	.31**	-				
11. T1 Perceived Behavioural Control	-.27**	-.04	-.04	.68**	.15	.32**	.92**	.66**	.19	.30**	-			
12. Credibility	.19	-.12	-.07	-.04	.14	.05	-.08	.08	.24	.14	-.15	-		
13. T0 GLTEQ (MVPA mins per week)	-.01	.02	-.11	.012	-.09	-.07	.29**	.04	.03	-.14	.26*	-.09	-	
14. Steps	-.39	-.20	-.25	.43	.08	.29	.48	.47	.31	.34	.42	.15	.06	-

1. Males coded 1; females coded 2
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table 5. Pretest and Post-test Correlation Table – Robotics Article Group Only.

Variable	*1*	*2*	3	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
1. Sex[1]	-													
2. Age	.10	-												
3. BMI	-.08	.36**	-											
4. T0 Behavioural Intention	-.01	-.16	-.15	-										
5. T0Instrumental Attitude	-.11	-.25*	-.18	.51**	-									
6. T0 Affective Attitude	-.00	-.01	-.31**	.46**	.55**	-								
7. T0 Perceived Behavioural Control	.17	-.20	-.23	.58**	.29*	.27*	-							
8.T1 Behavioural Intention	.01	-.17	-.05	.81**	.40**	.38**	.46**	-						
9. T1 Instrumental Attitude	.11	-.03	-.10	.42**	.61**	.60**	.26*	.30**	-					
10. T1 Affective Attitude	.04	.07	-.26*	.35**	.48**	.88**	.22	.32**	.67**	-				
11. T1 Perceived Behavioural Control	.20	-.13	-.12	.45**	.16	.19	.93**	.35**	.17	.17	-			
12. Credibility	-.23*	.10	.32**	.06	-.11	-.03	-.04	.25*	-.06	.01	-.00	-		
13. T0 GLTEQ (MVPA mins per week)	-.13	-.18	-.07	.22	-.00	-.01	.21	.14	-.10	-.26*	-.12	-.06	-	
14. Steps	.05	.01	-.10	.33	.26	.28	.07	.02	.13	.18	.09	-.02	.04	-

1. Males coded 1; females coded 2
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

Table 6. Pretest and Follow up Correlation Table – Fitness Article Group Only.

Variable	*1*	*2*	3	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
1. Sex[1]	-														
2. Age	.04	-													
3. BMI	.07	.03	-												
4. T0 Behavioural Intention	-.11	-.03	.00	-											
5. T0Instrumental Attitude	-.05	-.08	-.11	.27*											
6. T0 Affective Attitude	-.09	-.04	-.12	.38**	.34**	-									
7. T0 Perceived Behavioural Control	-.22	.03	-.00	.73**	.17	.34**	-								
8.T0 GLTEQ (Minutes)	-.01	.06	-.11	-.02	-.12	-.08	.17	-							
9. T2 Behavioural Intention	-.20	-.52**	-.05	.70**	.27*	.47**	.52**	-.24	-						
10. T2 Instrumental Attitude	-.01	-.01	-.27*	.06	.24	.01	.13	.03	.02	-					
11. T2 Affective Attitude	-.12	-.09	-.28*	.30*	.29*	.74**	.22	-.09	.47**	.09	-				
12. T2 Perceived Behavioural Control	-.40**	-.25*	-.23	.48**	.21	.43**	.63**	.04	.55**	.31*	.40**	-			
13. T2 GLTEQ (MVPA mins per week)	.26*	-.23	.04	.09	.09	.27*	.03	-.03	.35*	.03	.16	.34*	-		
14. Steps	-.39**	-.20	-.25	.43**	.08	.29*	.48**	.06	.51**	.20	.32*	.45**	.18	-	
15. Credibility	.19	-.12	-.07	-.04	.14	.05	-.08	-.04	.04	.07	.14	-.08	.11	.15	-

1. Males coded 1; females coded 2

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 7. Pretest and Follow up Correlations – Robotics Article Group Only.

Variable	*1*	*2*	3	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
1. Sex[1]	-														
2. Age	.10	-													
3. BMI	-.08	.36**	-												
4. T0 Behavioural Intention	-.01	-.16	-.15	-											
5. T0 Instrumental Attitude	-.11	-.25*	-.18	.51**	-										
6. T0 Affective Attitude	-.00	-.01	-.31**	.46**	.55**	-									
7. T0 Perceived Behavioural Control	.17	-.20	-.23	.58**	.29*	.27*	-								
8. T0 GLTEQ (Minutes)	-.15	.02	-.08	.09	-.17	-.10	.03	-							
9. T2 Behavioural Intention	.19	-.25	-.18	.73**	.37**	.36*	.65**	.05	-						
10. T2 Instrumental Attitude	.16	-.07	-.01	.25	.38**	.33*	.17	-.12	.11	-					
11. T2 Affective Attitude	-.00	.05	-.14	.39**	.35*	.74**	.14	.00	.41**	.48**	-				
12. T2 Perceived Behavioural Control	.23	-.07	-.13	.59**	.18	.27	.88**	.12	.72**	.17	.32*	-			
13. T2 GLTEQ (MVPA mins per week)	-.02	-.19	-.16	.09	.08	-.01	.29*	.31*	.30*	-.00	.11	.35*	-		
14. Steps	.05	.01	-.10	.33*	.26	.28	.07	.04	.20	.07	.15	.14	.21	-	
15. Credibility	-.23*	.10	.32**	.06	-.11	-.03	-.04	-.04	.09	-.07	.05	.02	-.19	-.02	-

1. Males coded 1; females coded 2
*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

It was hypothesized that participants who perceived the health magazine article to be credible would report stronger intentions to be active than those who deem the article to be of lower credibility. Contrary to the hypothesis, results from the correlation analysis showed that there were no significant correlations between credibility and behavioural intentions at any point in the study for participants who read the fitness magazine article. It was also hypothesized that participants who viewed the fitness magazine as more credible, would form more favourable attitudes towards exercise and would engage in more exercise than participants who perceived the magazine to be of low credibility. Again the results from correlation analysis showed there were no significant correlations between credibility and instrumental and affective attitudes, or credibility and GLTEQ moderate-vigorous total minutes and steps taken at any point in the study, for those reading the fitness magazine article.

Correlations were also used to examine the associations between indicators of behavior and affective and instrumental attitudes, perceived behavioral control and intentions. Behaviour was assessed two ways; a self-report measure (i.e., GLTEQ moderate-vigorous total minutes, assessed at follow up) and by a pedometer (average daily steps taken over one week). For participants randomized to the fitness article group, significant, positive correlations were found between steps taken and behavioural intention, affective attitude, perceived behavioural control, and self-reported physical activity at Time 2 (Table 6). No significant correlations were found for the robotics article group between steps taken and behavioural intention, instrumental attitudes, affective attitudes, or perceived behavioural control at Time 2. Self-reported total minutes of moderate-vigorous physical activity participation (GLTEQ) showed a positive significant correlation with perceived behavioural control, both taken at Time 2 (one week follow up) among the robotics article group.

Effects of the Intervention on Behaviour and Credibility

For a between groups comparison, an analysis of variance (ANOVA) was conducted to determine if there was a significant difference between the intervention and robotics article group on credibility and subsequent average daily steps taken after reading the magazine article. Results showed that there were no significant differences between the intervention and robotics article group in terms of steps taken (F (1, 98) = 0.00, p = .99). However results showed a significant difference between the intervention and robotics article group for credibility (F (1, 148) = 7.14, p = .00). Examination of the means (see Table 1) shows that the intervention (M = 2.83) group perceived the article as more credible than the robotics article group (M = 2.58). An examination of the groups in terms of sex showed that there was a significant difference between the female intervention and robotics article group for credibility (F (1, 112) = 13.96, p = .00) though not for males (F (1, 34) = .88, p = .35). Examination of the means showed that the female fitness article group (M = 2.89, SD = .51) perceived more credibility with the magazine article than the female robotics article group (M = 2.50, SD = .60). There were no significant differences between female intervention and robotics article groups for steps taken (F (1, 75) = .86, p = .35) though there was a significant difference between male intervention and robotics article groups for steps taken (F (1, 21) = 6.08, p = .02). Examination of the means showed that males in the fitness article group (M = 11296.42, SD = .3487.71) reported more daily steps than males of the robotics article group (M = 8182.08, SD = .2532.25).

Effects of the Intervention from Baseline (Time 0) to Post Test (Time 1)

In order to investigate the effects of reading a fitness magazine article on attitudes, behavioral intentions and perceived behavioral control from baseline (Time 0) to *immediately*

following the intervention (Time 1), a repeated measures multivariate analysis of variance (RM MANOVA) was computed. Instrumental and affective attitudes, perceived behavioral control and behavioural intentions were the dependent variables. Group (experimental versus control) was the between participants factor and time was the within participants factor (with two levels, Time 0 and Time 1). There was no significant effect for group (F (4, 144) = .53 , p = .70, eta^2 = .01), showing there were no overall differences from Time 0 to Time 1 between the intervention and robotics article group in terms of attitudes, perceived behavioural control and behavioural intention. However, there was an overall significant effect for time (F (4, 144) = 3.46, p = .01, eta^2 = .08). The univariate tests showed that perceived behavioral control was the key variable (F (1, 147) = 12.54, p = .01, eta^2 = .07), and an examination of the descriptive statistics show that perceived behavioral control increased from Time 0 (M = 4.52, SD = 1.43) to Time 1 (M = 1.59, SD = 1.47) among the robotics article group (see Table 1). Results from the multivariate analysis also showed a significant group by time interaction (F (4, 144) = .2.42, p = .05, eta^2 = .06). The univariate tests showed that perceived behavioral control was again the important variable (F (1, 147) = 5.67, p = .01, eta^2 = .03), with the robotics article group showing greater increases in control over time than the fitness article group.

Effects of the Intervention from Baseline (Time 0) to Follow Up (Time 2)

In order to investigate the effects of reading a fitness magazine article on attitudes, behavioral intentions, perceived behavioral control, and self-reported physical activity (GLTEQ minutes) from baseline (Time 0) to one week later (Time 2), a repeated measures multivariate analysis of variance (RM MANOVA) was conducted. Instrumental and affective attitudes, perceived behavioral control, behavioural intentions, and GLTEQ scores were the dependent variables, with group (experimental versus control) as the between participants factor, and time

was the within participants factor (with two levels, Time 0, and Time 2). There was no significant effects for group (F (4, 100) = .54, p = .74, eta^2 = .02), showing there were no overall differences from Time 0 to Time 2 between the experimental and robotics article group in terms of attitudes, perceived behavioural control, behavioural intention, and GLTEQ MVPA minutes. There was also no overall significant effect for time (F (4, 100) = 1.73, p = .13, eta^2 = .08), and no group by time interaction (F (5, 100) = 1.05, p = .38).

Chapter V. Discussion

The purpose of this study was to examine the role of fitness media on perceived credibility, intentions, attitudes, perceived behavioural control and exercise behaviour. Results showed that the fitness article group reading a fitness magazine perceived the article to be significantly more credible than the robotics article group, who read an article on robotics. However credibility of the fitness article had no association with intentions, attitudes, perceived behavioural control or exercise, at any point after reading the magazine article (Time 1 or Time 2).

Role of Credibility

A purpose of this study was to examine the perception of credibility between intervention and robotics article groups, as well as the relationship between perceived credibility and attitudes, perceived behavioural control, intentions, and behaviour. Results showed that the fitness article group reported higher levels of credibility for the fitness magazine article than the control group. That is, participants reading the article on exercise written by a celebrity, perceived that article to be more credible than those participants who were reading the article on robotics. It should be noted that credibility in both groups for each article topic, was found to be relatively high, so both articles appeared "credible" to the participants. There may be several reasons why both articles were thought of as credible, and why the celebrity fitness magazine articles were rated as higher in credibility than a neutral article on robotics. First both articles were presented "as is" in the magazine itself. They were not mock articles, created by researchers (cf. Berry, Spence & Stolp, 2011). The fact that all study articles appear in a published magazine may offer a significant level of credibility to participants. Participants did

rate the fitness magazine with a higher degree of credibility than those reading about robotics. This may have to do with exposure to physical activity and exercise media, and appearance-based behaviour modeling from previous media exposure (Maibach, 2007). That is, participants may well be accustomed to media messaging around physical activity from a multitude of outlets (Maibach, 2007). This consistent and prolonged exposure over time may have already influenced participants' favourable perceptions of credibility from media sources. The blurring of distinctions between entertainment, news, and advertisements may have also influenced perceptions of credibility such that participants generally perceive high levels of credibility with many media sources (Maibach, 2007).

It is also possible that participants reported higher levels of credibility to the fitness article based on the context of the research study. That is, participants were aware that the principal investigator was an exercise physiologist/psychology research graduate student, and they were participating in a study about exercise. This may have subconsciously created an inference of credibility around all physical activity related information including the fitness magazine article. Further, it is not uncommon for the general population to believe they are already informed about exercise whereas robotics may appear to be a specialized subject. Messages promoting physical activity is common in magazines (Berry, McCarville & Rhodes, 2008). This comfort and familiarity with health and exercise information may have led to a sense of acceptance of the fitness magazine article as 'common sense' information whereas those reading about robotics were less sure of the accuracy and credibility of the article as a 'common sense' subject. Additionally, it is possible that perceived credibility was high due to the message source (Berry & Shields, 2013). That is, articles for both intervention and robotics article groups were presented as articles written for the magazine, they were not product or service

advertisements. Previous research has shown that source attribution may influence perceived credibility, where the perception of credibility increases when the message is not commercial/sales-based (Berry & Shields, 2013). Ultimately, despite these potential explanations, it is noteworthy that participants perceived high levels of credibility overall, and greater levels of credibility with a fitness magazine article written by a celebrity, than with a neutral article on robotics.

Perception of credibility for the fitness magazine article was entirely assumptive on the part of participants. That is, no information about the article author(s), education, or expertise was given to participants prior to or during the intervention. This is within the design of using a naturalistic approach however, it is dissimilar from previous studies. Previous research evaluating the perception of credibility on attitudes, intention to exercise and exercise behaviour have given participants explicit details regarding source expertise, education and profession (Jones et al., 2003; Berry & Shields, 2013). In their study, Jones et al. included a brief description of the source creator citing, "Sally Martin is a medical doctor who is currently practicing at the University Hospital in Edmonton. She received her medical degree from Stanford University…" (credible source) and, "Sally Martin is a high school student enrolled in Biology 30 at Harry Ainlay Composite High School. She is currently volunteering at…" (non-credible source; Jones et al., 2003). Similarly, Berry & Shields (2013) established credibility with participants by having the (television advertisement) spokesperson self-identify as "a Professional Fitness and Lifestyle Consultant". A more naturalistic approach allowed participants an opportunity to evaluate the credibility of the magazine without researcher influence.

Further, it was hypothesized that among participants in the fitness article group, credibility would be positively associated with intentions to exercise. Despite the fitness article group reporting higher credibility than the robotics article group, within the fitness article group, no significant associations were found between credibility and behavioural intentions. This is dissimilar to findings reported by Jones et al. (2003) who showed that higher perceptions of credibility were more positively associated with intentions to exercise. However baseline scores for behavioural intentions were already quite high with most people reporting fairly strong intentions to be active. It is possible that fitness magazine credibility does not matter for participants in this study. As magazines are public, published media, widely accessible, participants may have felt that it is a credible resource for exercise information due to this publication format. Participants may have also already been accustomed to magazine messages promoting exercise. It is possible that magazine credibility did not have an effect on exercise intentions as participants are already acquainted with exercise magazine messaging, and upon reading the intervention, were not exposed to any new or sensational exercise information. Previous research has used researcher-created media in order to examine the perception of credibility on intentions (Jones et al., 2003; Berry & Shields, 2013). These media sources, created by researchers, used more extreme circumstances not generally seen in commercial media publications. For example, the use of a high-school student in comparison with a Stanford University educated medical doctor (Jones et al., 2003) or a Heart and Stroke Foundation advertisement for "killer abs" (Berry & Shields, 2013) is more polarizing than what is encountered in common, everyday media sources. It is possible that the use of a naturalistic approach, such as using commonly available magazines not created or manipulated by the

researcher, was too benign to elicit any significant effect of credibility on participants' intentions to exercise.

In previous research, participants who believe exercise media is appearance-based, express lower intentions to exercise (Berry, Jones, McLeod & Spence, 2011). However, perception of appearance versus health-based messaging was not assessed in this study. Both the 'Shape Magazine' and 'Men's Fitness Magazine' articles were appearance-based in nature in that the outcomes of the exercise routine and information focused on appearance goals. For example, the 'Shape Magazine' article was titled "How Sharon Stays Sexy" while the 'Men's Fitness Magazine' article is titled "The Warrior Body Workout". Both articles include information on achieving a desirable body by using specific exercises touted by, and including images of celebrities. It is possible that there was no effect of the magazine article on intentions to be active among the fitness article group as participants believed the message to be appearance based. Previous research has found that popular health and fitness messaging may contribute to thoughts about appearance standards (Berry & Shields, 2013). This connection of appearance-based messaging may contribute to feelings of unattainable goals (Berry et al., 2011). The fitness magazines were conveyed by celebrities, and were deemed to be highly credible by participants. However, if the appearance-based nature of the fitness magazines were influential, it is likely that participants would have reported lowered intentions to exercise after reading the article (Berry et al., 2011). Given that participant intentions to exercise remained stable from baseline (Time 0) to posttest (Time 1), it is possible that the appearance-based nature of the fitness magazines was not an influencing factor on intentions to exercise.

It was also hypothesized that for participants of the fitness article group, credibility would be positively associated with more favourable attitudes towards exercise and more engagement

in exercise. Results however, showed that there was no association between credibility and attitudes or steps taken. Although this is contrary to the hypothesis, it is similar to findings in previous research where credibility showed no effect for attitudes or exercise behaviour (Jones et al., 2003). However, previous research examining credibility and attitudes is conflicting. While Jones et al. showed no effect for credibility on attitudes or behaviour in the immediate response, participants reported engaging in more exercise behaviour over a two-week period after the intervention was delivered (2003). Yet these results conflict with another study examining credibility, attitudes and exercise intentions (Berry & Shields, 2013). Findings from Berry & Shields showed that participants reporting higher levels of source credibility also reported higher instrumental attitudes towards physical activity and exercise than participants reporting lower levels of source credibility, immediately after viewing the intervention (Berry & Shields, 2013). In terms of physical activity behaviour, measures of GLTEQ scores indicated no significant relationship with credibility (Berry & Shields, 2013). Given the results of the current study and findings from Berry & Shields (2013), it is possible then, that after reading one exercise magazine article, perception of credibility simply does not have any effect on exercise behaviour. It is worth noting however, that reported attitudes towards physical activity were very high, indicating that both groups believed physical activity to be a beneficial and enjoyable thing to do. This may be the socially desirable response, given that these highly favourable attitudes towards physical activity did not result in an increase in steps taken when compared to the robotics article group. It is also possible that the effect of the intervention of reading one magazine article, once, was too subtle to influence attitudes or exercise behaviour.

Another purpose of this study was to examine the influence of credibility on exercise behaviour. Results showed no significant difference between the intervention and robotics

article group in terms of steps taken over a one-week period after reading the magazine article. An examination of the means shows near identical scores for steps taken in both groups. While perceived to be credible, it is possible that the fitness magazine articles did not have any effect on steps taken as the one-time exposure was insufficient to elicit any effect on steps taken. Additionally, participants may not have been interested in the fitness message in terms of exercise selection and were therefore uninfluenced by the fitness magazine's message. That is, the fitness magazine articles did not promote walking or running to increase exercise but rather touted a series of stationary exercises such as triceps dips on a chair, and boxer's punches. Participants may have believed these articles to be credible sources of exercise information but may not have been influenced by the fitness magazine articles, to walking/running more steps. Finally, participants may have simply read the magazine article as instructed by the researcher, but viewed the article more as a source of entertainment. That is, while the fitness magazine may have been perceived to be credible, participants may not have found any value in its message. More specifically, participants may have considered the fitness magazine as a source of information but also entertainment. The use of a celebrity to convey the message may have extended the celebrity's status as an entertainer, and therefore participants did not act upon the fitness article. It is worth noting that steps taken were only captured over one week following the magazine reading, therefore it is not possible to determine whether these results are typical for both groups, or whether there was a change in steps taken after reading the magazine article.

Effects over Time

In order to examine the effects of the intervention over time on attitudes, behavioural intentions and perceived behavioural control, repeated measures MANOVAs were conducted from baseline (Time 0) and posttest (Time 1), as well as at baseline (Time 0) and follow up (Time 2), between intervention and robotics article groups. Overall, there was no significant effect for group, but there was an effect for perceived behavioural control over time. Results showed that from baseline to posttest, perceived behavioural control showed a significant increase among the robotics article group indicating that perceived control increased immediately after reading the magazine article on robotics. This is unusual given that the robotics article was unrelated to exercise and/or fitness messaging. It is also possible that having the robotics article group answer exercise related questions yet read a non-exercise based magazine article was not appropriate, and this finding is spurious in nature.

Overall, at posttest (Time 1) and the longer term (one week; Time 2), there were no significant effects for group or time with attitudes. Results showed that attitudes toward exercise in the fitness article group did not significantly vary from those of the robotics article group at any time points. Similarly, within groups there were no significant differences found for attitudes from Time 0 to Time 1 or from Time 0 to Time 2, either for the intervention or robotics article group. Those whose attitudes towards exercise were already formed may have been less likely to experience a shift in attitudes from a single exposure. However, participant attitudes towards exercise were quite high among both intervention and robotics article groups at baseline. Given the high scores for both instrumental and affective attitudes, there was little room to influence favourable attitudes towards exercise at posttest (Time 1) or at follow-up (Time 2). It is also possible that the subtle effects of a one-time exposure to the fitness magazine were

insufficient to elicit a significant effect on already favourable participant attitudes. That is, a one-time exposure to the fitness magazine was too subtle to affect participant attitudes towards exercise but that given more time with the fitness magazine (e.g., participants kept the magazine for one week), there may have been an effect on attitudes toward exercise. Given the opportunity to re-read the fitness article, participants may have had more time to consider the message, influencing attitudes with repeated exposure. Additionally, attitudes may have been unaffected by the fitness magazine as the articles were not relevant for participants. More specifically, participants may have perceived the fitness articles to be credible, but did not believe the message extended to them, possibly believing that the exercises discussed within the magazines were insufficient to achieving the magazine's reported goals. For example, the 'Men's Fitness Magazine' article touts "…you'll see how a regimen of simple punches, light weights, and total intensity can build a knockout physique in as few as 30 minutes per session." (Olajide, Michelfelder & Sommeseth, pg. 128). It is possible that while participants thought this exercise information was credibly written and presented, it did not influence thoughts around exercise pleasantness, usefulness, satisfaction or importance, ultimately not affecting participant attitudes toward exercise. It is also possible that the fitness articles were too exercise-specific to affect attitudes towards exercise. Both the 'Shape Magazine' and 'Men's Fitness Magazine' articles detail exercises, how-to, repetitions, and frequency in order to achieve a specified goal. The measures used to assess attitudes were general to exercise as "moderate to strenuous effort activity for at least 30 minutes". It is possible that there was a mismatch between the magazine articles and measurement questionnaires. This potential discrepancy might have influenced the results of the attitudes measure. Finally, participants may not have identified with the goals, exercises or celebrities in the fitness magazines. That is, participants may not have held any

interest in the specific exercises or goals being promoted in the fitness magazine articles, and instead preferred entirely different exercise modalities. Participants may have also been disinterested in the celebrity promoting the magazine's exercises. Additionally, the fitness magazine articles were presented by celebrities of a different generation than the mean participant age. That is, in both the Shape Magazine and Men's Fitness magazines, the celebrities presenting the information are over the age of 50, while participants reading these articles were on average, 24 years of age. This may have created a disconnect between the celebrity promoting the exercise and study participants as participants did not identify with the older age of the celebrities and thus did not believe the exercises presented applied to them. However, participants did still find the information presented by these older celebrities credible. The mismatch between celebrity and participant ages may have allowed participants to find credibility in the information presented while preventing an increase in exercise attitudes after reading the fitness magazine articles. This disconnect between the magazine message, specific celebrity presenting the information, and personal preferences for exercise may have resulted in a lack of effect on exercise attitudes for the fitness article group.

Among the fitness article group, the exercise magazine article had no effect on control beliefs at posttest (Time 1) or at follow-up (Time 2). This may be due to familiarity with the exercise messaging of the magazine article. That is, the magazine article explained and demonstrated exercise routines which could be performed relatively easily with little equipment or access to facilities. For example, the 'Shape Magazine' article demonstrated exercises using only a kitchen chair for equipment. It is probable that participants had access to a kitchen chair in order to perform these exercises. Given this common access to basic equipment, it is unlikely that the magazine article promoted new awareness of or control over exercise opportunities.

Therefore, students were likely already aware of their control beliefs around exercise, and the magazine did not provide any further opportunity to increase those perceptions of control about exercise participation. The fitness articles were also possibly too exercise-specific and again, it is possible that there was a mismatch between the magazine articles and measurement questionnaires for control beliefs. This potential discrepancy might have influenced the results of the perceived behavioural control measure.

Finally, there was also no effect of the intervention on intentions. An examination of the means showed that behavioural intentions itself remained stable throughout all three time points across both groups. This is similar to the results for attitudes and perceived behavioural control among the fitness article group. It may be that those participants who report higher intentions to participate in exercise are also already engaging in regular exercise. These participants may already identify with exercise, and being a physically active individual increased the likelihood that they would report stronger intentions to be more physically active than individuals who do not identify as being physically active (de Bruijn et al., 2012). Therefore it is possible that regular participation in exercise is also influencing future intention to exercise and that those pre-formed behaviours were unaffected by reading the fitness magazine article (Calitri et al., 2009).

There was no increase for intentions to exercise from Time 0 to Time 1 or from Time 0 to Time 2 in both groups. Intentions to exercise remained stable from baseline through to follow up, showing no effect of the fitness magazine article on the fitness article group's intentions to exercise. This may be due to the brief exposure of the magazine article during the intervention. That is, participants were only given one opportunity to read the selected magazine article, after which they returned the magazine to the principal investigator, completed the data collection session and left. Participants were not permitted nor requested to retain or revisit the magazine

article after their first reading. It is possible that the short-lived exposure to the magazine article was insufficient to influence intentions to exercise. Given multiple opportunities to read and view the magazine article may have, over time, increased intentions to exercise. Consequently, participants may have intended to act and possibly engage in the exercises outlined by the magazine article, given the chance to revisit the magazine, potentially bringing the magazine to exercise sessions so as to replicate the exercises listed within.

Previous research examining the role of media messaging on physical activity attitudes, intentions and behavior has used the Theory of Planned Behavior as a general conceptual framework, focusing primarily on people's attitudes and intentions towards the behavior as the key theoretical concept (Berry et al., 2011; Berry & Shields, 2013; Berry & Howe, 2004; Calitri, Lowe, Eves & Bennett, 2009). This study furthered previous research by also including perceived behavioral control. Consistent with previous research examining attitudes, perceived behavioural control and intentions, as well as with theoretical propositions by Ajzen (1991), positive associations were found among participants' attitudes, control beliefs, and intentions at posttest for the fitness article group (T1; Ajzen, 1991; Berry et al., 2011; Spink et al., 2012). That is participants with more favourable attitudes towards exercise and who reported higher control beliefs, also reported higher intentions to be active immediately after reading the fitness magazine article. This is consistent with previous studies examining the relationship between attitudes, control beliefs and intentions (Rhodes & Courneya, 2004; Rhodes & Courneya, 2005; Spink, Wilson, & Bostick, 2012). However, while attitudes, perceived behavioural control, intentions to exercise, and steps taken were correlated, the fitness magazines had no effect on these variables at any time points. It appears then, that the intervention was too subtle affect participants thoughts and behaviours around exercise, as well as exercise participation.

Chapter VI. Conclusion

Although a significant difference in credibility was found between groups, with the fitness article group reporting that the article was more credible than the robotics article group, credibility itself was not significantly associated with behavioural intentions, attitudes, perceived behavioural control, or steps taken. This finding is contrary to the hypotheses. It is possible that the effect on the fitness article group of reading a fitness magazine only once was too small to influence attitudes, behavioural intentions or exercise behaviour itself. This may be due to preformed cognitions around exercise which were not altered by reading one magazine article alone. It may also be due to already established exercise involvement so that participants' exercise involvement was not affected by the magazine article. Additionally, credibility scores were high in both groups, indicating that the magazines were perceived as credible sources of information. However, it does not appear that the perception of credibility influenced exercise itself. Participants reporting high levels of credibility with the fitness magazine article were already high intenders to exercise. However, this intention to be physically active did not materialize into more steps taken after the magazine article was no longer available. It is possible that the effect of the magazine article and its associated perception of credibility had a short-lived response. The effect of credibility on behaviour over the long term may be important to explore in future research.

It was found that participants did perceive the fitness magazines to be a credible resource. This may be important to health promoters as magazines serve as primary resources of health information for specific groups of the general population (Dutta-Bergman, 2004). It may be useful to for health promoters to leverage this platform in promoting healthful, physical activity behaviours to a broad audience. However, it is also concerning that celebrities are considered

credible sources of exercise information. There is potential for misinformation to be conveyed to a large audience, perceiving celebrities to be credible. This may be detrimental, as incorrect information may be acted upon, negatively affecting the health of those who perceive it to be reliable information.

Several strengths existed for this study. First, recruiting an undergraduate population with full access to on-campus physical activity opportunities eliminated potential perceived barriers to exercise involvement. This may have allowed participants an opportunity to evaluate attitudes, perceived behavioural controls and intentions to be physically active without barriers such as physical space to be active, and costs associated with recreation centre access, as Mount Royal University students have access to a recreation centre and campus, well suited to exercise. Additionally, the use of pedometers was a strength as this reflected a somewhat more objective record of physical activity over one week, both for intentional and intermittent physical activity on and off campus. Previous research has shown that the use of pedometers is considered an objective measure of physical activity tracking (Hart, Ainsworth, & Tudor-Locke, 2011; Lewis, Lyons, Jarvis, & Baillargeon, 2015).

Another strength of this research includes the use of published, publically available magazines, presented in situ. Magazines used for this study were widely available to the public, allowing an examination of currently available physical activity information, without researcher manipulation. The addition of perceived behavioural control as a variable, add to the body of research investigating the effects of media on exercise. As perceived behavioural control has not been widely examined in studies around exercise, this allows for another consideration when studying physical activity, exercise, and health promotion interventions.

While there are several noted strengths, there were also some limitations to this study. Individuals each hold their own unique cognitions about exercise. These preformed thoughts may have contributed to already-established attitudes and intentions towards exercise. Future research may consider the use of a thorough evaluative tool to understand each participants' pre-established cognitions about exercise. Further, the attitudes measures used a "4 days per week over the next 3 months" commitment timeframe. Although an assessment of exercise behaviour was included (GLTEQ) at one-week follow-up, the timeframe for the GLTEQ self-reported measure was only for the previous 7 days. This mismatch between measurement time frames may have limited the consistency of the measures used. The use of a convenience sample also provided some limitations. Although the use of a non-clinical sample is a strength, participant ages ranged from 18-56 years, with the mean participant age being 24 years. This limits the generalizability of study findings as it does not address populations that fall outside of this age range. Additionally, generalizability is limited to populations who have some university education which may not represent the larger municipal, provincial or national populace. Further, participants were predominantly female which may limit generalizability of findings to female groups.

One limitation of the study includes the use of only two groups: an intervention and robotics article group. The addition of a third group exposed to sensational health/fitness media (e.g., 'Dr. Oz: The Good Life Magazine') may have assisted in evaluating different types of health/fitness magazines. By creating a third randomized group, this study may have been able to more closely evaluate the perception of credibility and associated cognitions and behaviours around exercise. Additionally, the creation of a true robotics article group not tasked with reading any magazine would have provided a more neutral comparison to the fitness article

group. The use of the specific magazine articles may also be limiting. Participants may not have identified with the exercise modality or celebrity presented within the magazines which may have prevented any effect on intentions to exercise.

While the use of pedometers assisted in assessing a more objective method of assessing physical activity participation, not having participants wear the pedometers for one week prior to reading the magazine article served as a limitation. With only posttest steps recorded, it is not possible to determine any variance in steps taken in relation to reading the magazine. Additionally, while the pedometers provided step count information, more detailed accounts of exercise participation, time, and type were only captured by GLTEQ self-reported measures and cannot be quantified by step counts. Pedometer logs may have also been over reported by participants, as it may have been the socially desirable thing to do. That is, participants were aware the study was examining exercise, and was being conducted by an exercise physiologist/exercise psychology graduate student. Participants may have then reported step counts which may have been higher than actual, as they were aware of the exercise nature of the study. Lastly, the use of a newly created credibility measure was limiting. The current credibility measure was not previously used or validated. It may have been helpful to have used a previously validated credibility questionnaire, to ensure internal validity of the measure.

Ultimately this research provides results that may be useful for future research projects. Health promoters may wish to consider the effects of credibility on cognitions and behaviours around exercise, in determining what may be considered effective exercise promotion and educative material. By examining the effect of perceived credibility of popular health and exercise publications, health promoters may gain more insight into what exercise messages the public considers factual and reliable. This may assist in creating health promotion materials that

will be accepted by the public. Further, understanding which resources are considered credible and why, may assist health promoters in leveraging those resources already deemed credible, in order to deliver a health message. An overall understanding of the influence popular, commercial media has on the public provides an opportunity to assess alternative ways in which to promote exercise messaging to create more healthful, physically active Canadians.

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Appendix A

Athabasca University
Canada's Open University

MEMORANDUM

DATE: April 2, 2014

TO: Elaine Ori

COPY: Dr. Terra Murray (Supervisor)
Dr. Vive Kumar (REB Chair)
Alice Tieulié, Acting REB Secretary

FROM: Dr. Sherri Melrose, Chair, Centre for Nursing & Health Studies Research Ethics Review Committee

SUBJECT: **Ethics Proposal CNHS-14-01: "Influence of Health Magazine Messaging on Intention to Exercise"**

Thank you for providing the additional information requested by the Centre for Nursing & Health Studies Research Ethics Review Committee as per the conditional approval memo dated March 18, 2014.

I am pleased to advise that the above noted project has now been awarded **APPROVAL TO PROCEED.**
You may begin your research immediately.

This approval of your application will be reported to the Athabasca University Research Ethics Board (AU REB) at their next monthly meeting. The AU REB retains the right to request further information, or to revoke the approval, at any time.

The approval for the study "as presented" is valid for a period of one year from the date of this memo. If required, an extension must be sought in writing prior to the expiry of the existing approval. **A Final Report is to be submitted when the research project is completed.** The reporting form is available online at: http://www.athabascau.ca/research/ethics/ .

As implementation of the proposal progresses, if you need to make any significant changes or modifications, please forward this information immediately to the Centre for Nursing & Health Studies Research Ethics Review Committee Chair via sherrim@athabascau.ca for further review.

If you have any questions, please contact the Centre for Nursing & Health Studies Research Ethics Review Committee Chair (above) or the Research Ethics Board office at rebsec@athabascau.ca

Appendix B

MOUNT ROYAL UNIVERSITY
1910

Research Services

t: 403.440.6069 | f: 403.440.6299
e: hreb@mtroyal.ca
research.mtroyal.ca

April 2, 2014

Elaine Ori
Continuing Education and Extension
Mount Royal University

Dear Elaine,

Re: **Application Number 2014-23**
Influence of Health Magazine Messaging on Intention to Exercise

You provided us with the Athabasca University's Research Ethics Board's conditional approval letter, ethics application, questionnaire, and consent forms. The revised documentation incorporating MRU HREB's recommendations was found to be in order on **April 1, 2014.**

HREB and Mount Royal University adhere to the Tri-Council Policy Statement, "Ethical Conduct for Research Involving Humans". As such, I am pleased to advise you that ethical clearance for this proposal has been granted to **April 1, 2015.** Please note that this clearance is contingent upon adherence to the submitted protocol e-mailed **April 1, 2014**. Prior permission must be obtained from the Board before implementing any modification(s) to the submitted documentation.

Researchers are required to notify the Mount Royal University HREB immediately if any untoward or adverse event occurs during their research or if data analysis or other review reveals undesirable outcomes for participants (including the researchers).

You are required to submit a progress report by **April 2015.** If this study is concluded before **April 2015**, a study completion report will be required by **April 2015.** A brief study completion report form is available on-line at http://www.mtroyal.ca/Research/Ethics/HumanresearchHREB/ethics_forms

The study completion and progress reports will require the following information:

1. The number of subjects that have been/were recruited;
2. Any unusual and/or severe complications, adverse events or unanticipated problems involving risks to subjects or others, withdrawal of subjects from the research, or complaints about the research;
3. The status of the study, e.g., still collecting data, analyzing data, disseminating results;
4. The (expected) date of termination of this project.

Please accept the Board's best wishes for continued success in your research.

Yours sincerely,

David Cann, PhD
Chair, Human Research Ethics Board

DC/PW

4825 Mount Royal Gate SW, Calgary, Alberta, Canada T3E 6K6

Appendix C

Survey Set 1

Please complete the following series of questions before you read the magazine article. Remember that all of your information will be kept private with the researchers. If you are uncertain how to answer any questions, please ask the researcher for help. Thank you.

Name: _____

Date: _____

Please tell us a bit about you. We will use this information to help us describe study participants.

Male ☐ Female ☐

Age: _____

Height: _____

Weight:_____ (lbs or kg)

Current MRU Program of Study:_____

Current year of study:_____

Email address:_____ (for study follow-up purposes only)

Do you typically read health and fitness magazines? _____

Exercise Behavior:

Consider a typical week (7 days), how many times on the average do **YOU** do the following kinds of exercise and approximately how long in duration do you do that activity for? **Write the appropriate number in each box for each level of activity intensity and for each duration, in minutes. If you do not do that type of activity, simply put a 0 in the line.**

How many times per week in the past month have you done:

	Times Per Week	Average Duration
a. STRENUOUS PHYSICAL ACTIVITY (HEART BEATS RAPIDLY, SWEATING) (e.g., Curves workout, aerobics classes, jogging, swimming laps, hard bicycling, singles tennis, soccer)	_____	_____
b. MODERATE PHYSICAL ACTIVITY (NOT EXHAUSTING, LIGHT SWEATING) (e.g., brisk walking, doubles tennis, easy bicycling, pilates, yoga, easy swimming, dancing, golf without a power cart)	_____	_____
c. MILD PHYSICAL ACTIVITY (MINIMAL EFFORT, NO PERSPIRATION) (e.g., easy walking, bowling, lawn bowling, shuffleboard, golf with a power cart)	_____	_____

For the following questions, consider exercise as planned, structured, repetitive, and purposeful and done for the improvement or maintenance of one or more components of physical fitness.

Regular means participation in exercise most days of the week.

Answer the following questions by circling the best number to represent your level of agreement with the statements below. For example, if you do not agree that you intend to exercise regularly over the next week, you might circle 2:

I intend to exercise regularly during the next week

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

The following questions concern **YOUR PLANS** for exercising during the next week.

I intend to exercise regularly during the next week

1	2	3	4	5	6	7

Strongly Disagree — Strongly Agree

I intend to exercise at least 4 times per week over the next month

1	2	3	4	5	6	7

Definitely — Definitely Not

I intend to participate in regular exercise as much as I can every week over the next month

1	2	3	4	5	6	7

Strongly Disagree — Strongly Agree

Answer the following questions by circling the best number to represent your level of agreement with the statements below. For example, if you think that exercising 4 days per week or more over the next three months is quite useless, you might circle 2:

By exercise, we mean engaging in moderate to strenuous effort activity for at least 30 minutes, most days of the week.

Do you think that exercising for at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely useless	*quite useless*	*Slightly useless*	*neither useless nor useful*	*slightly useful*	*quite useful*	*extremely useful*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely useless	*quite useless*	*Slightly useless*	*neither useless nor useful*	*slightly useful*	*quite useful*	*extremely useful*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unimportant	*quite unimportant*	*slightly unimportant*	*neither unimportant nor important*	*slightly important*	*quite important*	*extremely important*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unsatisfying	*quite unsatisfying*	*slightly unsatisfying*	*neither unsatisfying nor satisfying*	*slightly satisfying*	*quite satisfying*	*extremely satisfying*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unpleasant	*quite unpleasant*	*slightly unpleasant*	*neither unpleasant nor pleasant*	*slightly pleasant*	*quite pleasant*	*extremely pleasant*

How much would exercising at least 4 days per week for the next three months be under your control?

1	*2*	*3*	*4*	*5*	*6*	*7*
Very little control			*Moderate Control*			*Complete Control*

How much would exercising at least 4 days per week for the next three months be easy or difficult to do?

1	*2*	*3*	*4*	*5*	*6*	*7*
Very Difficult			*Somewhat easy*			*Very Easy*

How confident are you that you can exercise at least 4 days per week for the next three months?

1	*2*	*3*	*4*	*5*	*6*	*7*
Not very confident			*Somewhat confident*			*Very confident*

I think that over the next week, most people who are important to me will perform exercise regularly.

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely disagree	*quite disagree*	*somewhat disagree*	*neither disagree nor agree*	*somewhat agree*	*quite agree*	*extremely agree*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely disapproving	*quite disapproving*	*somewhat disapproving*	*neither disapproving nor approving*	*somewhat approving*	*quite approving*	*extremely approving*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely supportive	*quite supportive*	*somewhat supportive*	*neither supportive nor unsupportive*	*somewhat unsupportive*	*quite unsupportive*	*extremely unsupportive*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely discouraging	*quite discouraging*	*somewhat discouraging*	*neither discouraging nor encouraging*	*somewhat encouraging*	*quite encouraging*	*extremely enouraging*

The following questions refer to your exercise habits that is, your participation in planned, structured, repetitive, and purposeful exercise. Answer the following questions by circling the best number to represent your level of agreement with the following statements.

For example, if exercise is something you quite agree to doing frequently, you might circle 2:

Exercise is….	*Extremely Agree*	*Quite Agree*	*Somewhat Agree*	*Neither Agree nor Disagree*	*Somewhat Disagree*	*Quite Disagree*	*Extremely Disagree*
...something I do frequently	*1*	*2*	*3*	*4*	*5*	*6*	*7*

Exercise is….	Extremely Agree	Quite Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Quite Disagree	Extremely Disagree
…something I do frequently	1	2	3	4	5	6	7
…something I do automatically	1	2	3	4	5	6	7
…something I do without consciously having to remember	1	2	3	4	5	6	7
…something that makes me feel weird if I do not do it	1	2	3	4	5	6	7
…something I do without thinking	1	2	3	4	5	6	7
…something that would require effort not to do it	1	2	3	4	5	6	7
…something that belongs to my daily routine	1	2	3	4	5	6	7
…something that belongs to my weekly routine	1	2	3	4	5	6	7
…something I start doing before I realize I'm doing it	1	2	3	4	5	6	7
…something I would find hard not to do	1	2	3	4	5	6	7
…something that I have no need to think about doing	1	2	3	4	5	6	7
…something that is typically 'me'	1	2	3	4	5	6	7
… something that I have been doing for a long time	1	2	3	4	5	6	7
…something that makes me feel weird if I do not do it	1	2	3	4	5	6	7

End of Survey Set 1

Appendix D

Survey Set 2

Shape Magazine

Please complete the following series of questions before you read the magazine article. Remember that all of your information will be kept private with the researchers. If you are uncertain how to answer any questions, please ask the researcher for help. Thank you.

Name:_____
Date:_____

Shape Magazine Recall task

Please answer the following questions based on the magazine article you have just read.

1. To perform a deep chair squat you must (circle all that apply):
Squeeze glutes together
Wear shorts
Lift heels
Squeeze abdominals

2. Sharon does twice as many stretches as she does strength moves in her sessions
True
False

3. When standing in the tub, Sharon performs:
Her favorite song
Back stretches
Leg circles
Yoga

4. Which of Sharon's exercises target legs (list two):
_____
_____

5. In order to get a total body workout, this article recommends (circle all that apply):
Adding Sharon's moves to your own workout
Doing these exercises in order
Trying yoga
Taking a dance class

6. The size/shape of the model's body was:
Muscular
Lean
Regular
Overweight
Did not notice

Answer the following questions by circling the best number to represent your level of agreement with the following statements. For example, if you quite agree that the images in this article compliment the article, you might circle 2:

I find the images in this article enhance the article

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

I find the images in this article enhance the article

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

Based on the images included in this article, I plan to exercise at least 4 times per week over the next month

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

The images are the most informative part of this article

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

I prefer the images more than the article

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

The images included in this article were helpful

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

Answer the following questions by circling the best number to represent your level of agreement with the following statements. For example, if you think that the article you have read was written by someone that is somewhat knowledgeable, you might circle 2:

I believe this article is written by someone knowledgeable in the topic area:

1	2	3	4
not at all knowledgeable	*a little knowledgeable*	*somewhat knowledgeable*	*extremely knowledgeable*

I believe this article is written by someone knowledgeable in exercise:

1	*2*	*3*	*4*
not at all knowledgeable	*a little knowledgeable*	*somewhat knowledgeable*	*extremely knowledgeable*

I think this article is written by a competent author

1	*2*	*3*	*4*
not at all competent	*a little competent*	*somewhat competent*	*extremely competent*

I believe this article is informative

1	*2*	*3*	*4*
not at all informative	*a little informative*	*somewhat informative*	*extremely informative*

I believe this article to be credible

1	*2*	*3*	*4*
not at all credible	*a little credible*	*somewhat credible*	*extremely credible*

I believe this article is factual

1	*2*	*3*	*4*
not at all factual	*a little factual*	*somewhat factual*	*extremely factual*

The following questions concern **YOUR PLANS** for exercising during the next week.

For the following questions, consider exercise as planned, structured, repetitive, and purposeful and done for the improvement or maintenance of one or more components of physical fitness.

Regular includes participation in exercise most days of the week.

Answer the following questions by circling the best number to represent your level of agreement with the statements below. For example, if you do not agree that you intend to exercise regularly over the next week, you might circle 2:

I intend to exercise regularly during the next week

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

I intend to exercise regularly during the next week

1	2	3	4	5	6	7

Strongly Disagree — Strongly Agree

I intend to exercise at least 4 times per week over the next month

1	2	3	4	5	6	7

Definitely — Definitely Not

I intend to participate in regular exercise as much as I can every week over the next month

1	2	3	4	5	6	7

Strongly Disagree — Strongly Agree

Answer the following questions by circling the best number to represent your level of agreement with the statements below. For example, if you think that exercising 4 days per week or more over the next three months is quite useless, you might circle 2:

By exercise, we mean engaging in moderate to strenuous effort activity for at least 30 minutes, most days of the week.

Do you think that exercising for at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely useless	*quite useless*	*Slightly useless*	*neither useless nor useful*	*slightly useful*	*quite useful*	*extremely useful*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely useless	*quite useless*	*Slightly useless*	*neither useless nor useful*	*slightly useful*	*quite useful*	*extremely useful*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unimportant	*quite unimportant*	*slightly unimportant*	*neither unimportant nor important*	*slightly important*	*quite important*	*extremely important*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unsatisfying	*quite unsatisfying*	*slightly unsatisfying*	*neither unsatisfying nor satisfying*	*slightly satisfying*	*quite satisfying*	*extremely satisfying*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unpleasant	*quite unpleasant*	*slightly unpleasant*	*neither unpleasant nor pleasant*	*slightly pleasant*	*quite pleasant*	*extremely pleasant*

How much would exercising at least 4 days per week for the next three months be under your control?

1	*2*	*3*	*4*	*5*	*6*	*7*
Very little control			*Moderate Control*			*Complete Control*

How much would exercising at least 4 days per week for the next three months be easy or difficult to do?

1	*2*	*3*	*4*	*5*	*6*	*7*
Very Difficult			*Somewhat easy*			*Very Easy*

How confident are you that you can exercise at least 4 days per week for the next three months?

1	*2*	*3*	*4*	*5*	*6*	*7*
Not very confident			*Somewhat confident*			*Very confident*

I think that over the next week, most people who are important to me will perform exercise regularly.

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely disagree	*quite disagree*	*somewhat disagree*	*neither disagree nor agree*	*somewhat agree*	*quite agree*	*extremely agree*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely disapproving	*quite disapproving*	*somewhat disapproving*	*neither disapproving nor approving*	*somewhat approving*	*quite approving*	*extremely approving*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely supportive	*quite supportive*	*somewhat supportive*	*neither supportive nor unsupportive*	*somewhat unsupportive*	*quite unsupportive*	*extremely unsupportive*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely discouraging	*quite discouraging*	*somewhat discouraging*	*neither discouraging nor encouraging*	*somewhat encouraging*	*quite encouraging*	*extremely enouraging*

End of Survey Set 2
Thank you for your participation!

Appendix E

Survey Set 2

Men's Fitness Magazine

Please complete the following series of questions before you read the magazine article. Remember that all of your information will be kept private with the researchers. If you are uncertain how to answer any questions, please ask the researcher for help. Thank you.

Name:_____

Date:_____

Men's Fitness Magazine Questions

Please answer the following questions based on the magazine article you have just read.

1. A pyramid stance requires that you stand with your feet parallel.
True
False

2. You will require several pieces of equipment to perform this workout including (list two):
_____
_____

3. In the second round of the left jab exercise, you should (circle all that apply):
Use a 5 to 10lb weight
Jump around between punches
Take one second to throw a punch
Wear a mouth guard

4. When performing a body weight squat, it is recommended that you
Lock your knees when you stand up
Squat as low as you can
Place one foot forward
Wear weight lifting shoes

5. It is recommended that you rest between sets of the following exercises (circle all that apply):
Aero Fly
Jump Rope
Right & Left Jab
Body Weight Squat

6. The size/shape of the model's body was:
Muscular
Lean
Regular
Overweight
Did not notice

Answer the following questions by circling the best number to represent your level of agreement with the following statements. For example, if you quite agree that the images in this article compliment the article, you might circle 2:

I find the images in this article enhance the article

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

I find the images in this article enhance the article

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

Based on the images included in this article, I plan to exercise at least 4 times per week over the next month

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

The images are the most informative part of this article

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

I prefer the images more than the article

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extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

The images included in this article were helpful

1	2	3	4	5	6	7
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

Answer the following questions by circling the best number to represent your level of agreement with the following statements. For example, if you think that the article you have read was written by someone that is somewhat knowledgeable, you might circle 2:

I believe this article is written by someone knowledgeable in the topic area:

1	2	3	4
not at all knowledgeable	*a little knowledgeable*	*somewhat knowledgeable*	*extremely knowledgeable*

I believe this article is written by someone knowledgeable in exercise:

1	*2*	*3*	*4*
not at all knowledgeable	*a little knowledgeable*	*somewhat knowledgeable*	*extremely knowledgeable*

I think this article is written by a competent author

1	*2*	*3*	*4*
not at all competent	*a little competent*	*somewhat competent*	*extremely competent*

I believe this article is informative

1	*2*	*3*	*4*
not at all informative	*a little informative*	*somewhat informative*	*extremely informative*

I believe this article to be credible

1	*2*	*3*	*4*
not at all credible	*a little credible*	*somewhat credible*	*extremely credible*

I believe this article is factual

1	*2*	*3*	*4*
not at all factual	*a little factual*	*somewhat factual*	*extremely factual*

The following questions concern **YOUR PLANS** for exercising during the next week.

For the following questions, consider exercise as planned, structured, repetitive, and purposeful and done for the improvement or maintenance of one or more components of physical fitness.

Regular includes participation in exercise most days of the week.

Answer the following questions by circling the best number to represent your level of agreement with the statements below. For example, if you do not agree that you intend to exercise regularly over the next week, you might circle 2:

I intend to exercise regularly during the next week

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

I intend to exercise regularly during the next week

1	2	3	4	5	6	7

Strongly Disagree — Strongly Agree

I intend to exercise at least 4 times per week over the next month

1	2	3	4	5	6	7

Definitely — Definitely Not

I intend to participate in regular exercise as much as I can every week over the next month

1	2	3	4	5	6	7

Strongly Disagree — Strongly Agree

Answer the following questions by circling the best number to represent your level of agreement with the statements below. For example, if you think that exercising 4 days per week or more over the next three months is quite useless, you might circle 2:

By exercise, we mean engaging in moderate to strenuous effort activity for at least 30 minutes, most days of the week.

Do you think that exercising for at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely useless	*quite useless*	*Slightly useless*	*neither useless nor useful*	*slightly useful*	*quite useful*	*extremely useful*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely useless	*quite useless*	*Slightly useless*	*neither useless nor useful*	*slightly useful*	*quite useful*	*extremely useful*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unimportant	*quite unimportant*	*slightly unimportant*	*neither unimportant nor important*	*slightly important*	*quite important*	*extremely important*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unsatisfying	*quite unsatisfying*	*slightly unsatisfying*	*neither unsatisfying nor satisfying*	*slightly satisfying*	*quite satisfying*	*extremely satisfying*

Do you think that exercising at least 4 days per week over the next three months would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely unpleasant	*quite unpleasant*	*slightly unpleasant*	*neither unpleasant nor pleasant*	*slightly pleasant*	*quite pleasant*	*extremely pleasant*

How much would exercising at least 4 days per week for the next three months be under your control?

1	*2*	*3*	*4*	*5*	*6*	*7*
Very little control			*Moderate Control*			*Complete Control*

How much would exercising at least 4 days per week for the next three months be easy or difficult to do?

1	*2*	*3*	*4*	*5*	*6*	*7*
Very Difficult			*Somewhat easy*			*Very Easy*

How confident are you that you can exercise at least 4 days per week for the next three months?

1	*2*	*3*	*4*	*5*	*6*	*7*
Not very confident			*Somewhat confident*			*Very confident*

I think that over the next week, most people who are important to me will perform exercise regularly.

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely disagree	*quite disagree*	*somewhat disagree*	*neither disagree nor agree*	*somewhat agree*	*quite agree*	*extremely agree*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely disapproving	*quite disapproving*	*somewhat disapproving*	*neither disapproving nor approving*	*somewhat approving*	*quite approving*	*extremely approving*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely supportive	*quite supportive*	*somewhat supportive*	*neither supportive nor unsupportive*	*somewhat unsupportive*	*quite unsupportive*	*extremely unsupportive*

I think that if I were to exercise regularly over the next month, most people who are important to me would be:

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely discouraging	*quite discouraging*	*somewhat discouraging*	*neither discouraging nor encouraging*	*somewhat encouraging*	*quite encouraging*	*extremely enouraging*

End of Survey Set 2
Thank you for your participation!

Appendix F

Survey Set 2

Popular Science Magazine

Please complete the following series of questions before you read the magazine article. Remember that all of your information will be kept private with the researchers. If you are uncertain how to answer any questions, please ask the researcher for help. Thank you.

Name:_____

Date:_____

Popular Science Recall Task

Please answer the following questions based on the magazine article you have just read. Circle the appropriate response(s)

1. Google recently purchased eight robotics companies, for the estimated purchase price of:
$5 billion
$100's of millions
$10's of billions
No one knows

2. Specialists are concerned that the world's best robotics minds will be lost to
Oblivion
The world of academics
The Googleplex
The Pacific Ocean

3. Google's purchases includes companies who specialize in (list three)
_____
_____
_____

4. Google has also purchased a robotics marketing company with complex video production capabilities
True
False

5. Speculations about Google's robotics future include the creation of (circle all that apply)
A bipedal Roomba
Visual advertisements to showcase new products
Google manufacturing bots
Humanoid robots

Answer the following questions by circling the best number to represent your level of agreement with the following statements. For example, if you quite agree that the images in this article compliment the article, you might circle 2:

I find the images in this article enhance the article

1	*2*	*3*	*4*	*5*	*6*	*7*
extremely agree	*quite agree*	*somewhat agree*	*neither agree nor disagree*	*somewhat disagree*	*quite disagree*	*extremely disagree*

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End of Survey Set 2
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