IT’S THE THOUGHT THAT COUNTS: FRAMED EXERCISE OUTCOME DIFFERENTIALLY INFLUENCE PHYSICAL ACTIVITY IN YOUNG ADULTS

A thesis submitted
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by

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Kate, a freshman in college, knows that the infamous “freshman fifteen” is not just an urban legend. In fact, she has watched many of her close friends inch up in size since first arriving on campus and is terrified that she too may become a victim of the same fate. Kate’s boyfriend, Tom, has not had much time to himself since starting college. Between classes, his part-time job, and homework, Tom is left feeling run down and in need of a way to release some stress so he can start feeling more like his old self again. Albeit for very different reasons, both Kate and Tom decide to start going to the gym regularly to exercise. Kate and Tom are not unique; when people decide to begin an exercise routine, or simply make plans to increase their amount of daily physical activity, the reasons they make those choices tend to vary across a broad spectrum.

Physical Activity

That being said, the colossal health epidemic today in the United States is not a result of the fact that people have varying reasons for wanting to exercise. The health epidemic faced by Americans today is a result of that fact that people are simply not choosing any reason to exercise. The Surgeon General (U.S. Department of Health and Human Services [USDHHS], 2000) reports that more than sixty percent of adults in America do not participate in regular physical activity and twenty-five percent are not at all active. It is well-known that physical activity plays a large role in both primary prevention (i.e., the avoidance of illness) and secondary prevention (i.e., the management
of illness). Such evidence exists for chronic disease states such as cardiovascular disease (Oguma & Shinoda-Tagawa, 2004; Katzmarzyk, Church, & Blair, 2004), diabetes mellitus (Helmrich, Ragland, Leung, & Paffenbarger, 1991), cancer (Lee, 2003), and osteoporosis (Bonaiuti, et al., 2002). Of particular importance to many Americans today, physical activity also plays an integral role in weight regulation (Hardman, 1996). The benefits of regular physical activity underscore the importance of promoting this lifestyle change in order to improve people’s quality and quantity of life (Blair, Kohl, Gordon, & Paffenbarger, 1992).

**Overview**

Since physical activity is vital to physical health, how do we best encourage people to be active? The present study investigates how the type of reason described in a message (extrinsic versus intrinsic) interacts with the type of message frame (gain versus loss) in encouraging people to be physically active. A novel goal of this study is to examine the impact of self-determined motives to exercise on framed health messages. Investigating both motivation to exercise and message frame is important to the goal of encouraging people to be more physically active for a number of reasons.

First, much like we saw with Kate and Tom, people choose to exercise for different reasons, any of which can contribute to behavior change. These reasons can be classified on a continuum of self-determination (Deci & Ryan, 1987). Self-determination is defined as the free choice of one’s own acts, and both Kate’s reason and Tom’s reason to exercise fall onto this continuum at different levels of self-determination. The social
pressures that cause Kate to begin exercising are an example of *extrinsic motivations*. Extrinsic motivations come from outside the person, and are oftentimes equated with external pressures, such as the desire to fit in or please another person. Tom, on the other hand, begins exercising as a way to feel better about himself and relieve stress. These *intrinsic motivations* provide no obvious external incentives, and are often times equated with internal motivations, such as personal satisfaction and enjoyment.

Second, with the growing need to establish effective interventions for increasing physical activity, much attention has been given to how messages should be designed to most effectively promote regular physical activity and exercise. Health message framing is one important consideration in designing effective health messages. A health message can be framed to highlight either the benefits of engaging in a particular behavior (gain frame) or the consequences of failing to engage in a particular behavior (loss frame). For example, a gain framed message aimed at increasing exercise might be “Regular exercise will improve your strength and endurance”, whereas a loss framed message might be “Lack of exercise will make you gain weight”. This variation in how health information can be presented is important because research has shown that although often conveying essentially identical information, one type of message frame may be more effective than another at promoting behavior change depending on the person and the situation (i.e., Rothman & Salovey, 1997).

Establishing a link between self-determination and message frame in regards to exercise promotion is particularly important because of the complexity of exercise behavior. Most exercise interventions have not been successful in promoting regular
exercise over the long-term, and as such, it suggests that researchers have not yet tapped into the most effective way to motivate people to exercise. In the health literature, there is a great deal of evidence that shows how message framing can be an effective tool in promoting behavior change, as well as the importance of self-determination in enduring long-term behavior change. However, to date, frame and motivation are yet to be investigated together in the health literature. As I will argue next, considering how frame and motivation interact has the potential to improve communications promoting exercise behavior.

_Intrinsic and Extrinsic Motivation_

Deci and Ryan’s (1980) cognitive evaluation theory (CET), a mini-theory within the larger self determination theory framework, brought the terms intrinsic and extrinsic motivation to the forefront with a focus on one’s level of individual self determination for a particular goal. CET defined the effects of internal and external events on intrinsic motivations, and eventually led to the conceptualization of intentional acts as varying along a motivational continuum (Deci & Ryan, 1990). Behaviors that are _intrinsically_ motivated are completely self-determined. Intrinsically motivated behaviors are said to be free from external pressures, and bring about inherent interest and enjoyment. On the other hand, _extrinsically_ motivated behaviors can range from being _somewhat_ self-determined, such as a student diligently completing homework to further his or her career, to _completely_ other-determined, such as a student completing homework to avoid receiving a poor grade from an instructor or admonishment from parents. Formulated by
internal or external pressures and controls, these extrinsically-motivated behaviors are engaged in for reasons other than an inherent interest in the activity itself.

In health behavior change, self-determination, or the free choice of one’s own acts, is thought to contribute to long term success (Deci & Ryan, 1985). Accordingly, successful adherence to an exercise regimen is dependent on the reasons for which one chooses to exercise (Mullan & Markland, 1997). For instance, those individuals like Tom, who report exercising for more intrinsic reasons (i.e., feeling good) often show superior levels of adherence to an exercise program than those individuals like Kate, who report exercising for more extrinsic reasons (i.e., weight loss, opinions of others). As part of the continuum, intrinsic motivations to exercise appear to be essential in maintaining exercise adherence (Markland & Hardy, 1993); however, for many individuals, intrinsic motivations are simply not strong enough to invoke initial behavior change. As with Kate, extrinsic motives for weight loss or improved fitness are quite often the initial spark that leads one to adapt a more active lifestyle. Consequently, at any given moment, many individuals may be motivated to exercise for more intrinsic reasons, but many others may be motivated for more extrinsic reasons.

Health Message Framing

In addition to focusing on intrinsic or extrinsic reasons for exercising, exercise promotion messages can be gain framed or loss framed. Gain framed messages, which highlight the benefits of engaging in a health behavior, and loss framed messages, which highlight the consequences of failing to engage in a health behavior, have been found to
be differentially effective for a wide variety of behaviors. In particular, the function a health behavior serves has been found to be one important variable in determining which frame will be most effective at promoting behavior change (Rothman & Salovey, 1997). A loss frame advantage has been documented for behaviors that serve to detect disease, such as breast self-examination (Meyerowitz & Chaiken, 1987), mammography (Banks, et al., 1995; Schneider, et al., 2001), HIV testing (Kalichman & Coley, 1995), amniocentesis (Marteau, 1989), and skin cancer evaluations (Block & Keller, 1995). On the contrary, for behaviors that serve to prevent the onset of a disease, such as the use of sunscreen (Detweiler, Salovey, Bedell, Pronin, & Rothman, 1999) and mouthwash (Rothman, Martino, Bedell, Detweiler, & Salovey, 1999), a gain frame advantage has been documented. Likewise, because exercise is a prevention behavior, gain framed messages have been found to be more effective than loss framed messages (Jones, Sinclair & Courneya, 2003; McCall & Martin Ginis, 2004; Robberson & Rogers, 1988).

However, a meta-analytic review of health message framing studies (O’Keefe and Jensen, 2007) found gain frame messages to be only slightly more persuasive than loss frame messages in encouraging prevention behaviors, such as exercise. In response to this conclusion, others have noted that this finding may be due to the fact that “there may be variability in how certain types of behaviors within the disease prevention behavior category are construed; as a result gain framed messages may be differentially effective” (Latimer, Salovey, & Rothman, 2007, pp. 646). Variability in how the purpose of an illness prevention behavior, such as exercise, is construed is an important issue in the message framing literature that is worth investigating further. Accordingly, the present
study examines the effectiveness of gain and loss framed messages within the context of both intrinsically and extrinsically focused exercise messages.

**Matched Messages**

With two general types of motivations to encourage exercise (intrinsic and extrinsic), and two ways to frame health messages (gain framed and loss framed), the next logical issue becomes one of a matching hypothesis. The present study investigates which type of reason to exercise presented with which type of message frame best encourages people to be physically active. As I describe, there are those combinations where frame and motivation are theoretically congruent, called matched messages, and those combinations where frame and motivation are theoretically incongruent, called mismatched messages. Furthermore, matched and mismatched messages may be differentially effective, depending on the context in which the message is presented.

What should constitute a matched message? First, research has shown that gain framed appeals to self-esteem (an intrinsic motivation) are more effective than loss framed appeals to self-esteem (Robberson & Rogers, 1988). Since some individuals may choose to exercise to enhance self-esteem, this suggests that gain framed messages would be best matched with intrinsic motivations. Second, research has also shown that loss framed appeals to physical health outcomes (i.e., losing weight) are more persuasive than gain-framed appeals to those outcomes (Robberson & Rogers, 1988). Since many individuals choose to exercise for these more extrinsic health reasons, this suggests that loss framed messages would be best matched with extrinsic motivations (Figure 1).
Indeed, people who are motivated to change behavior as a result of an extrinsic goal often do so for the sake of the “avoidance of punishment” (Deci & Ryan, 1987, pp. 1033), which is consistent with the emphasis of loss framed messages. Loss framed messages highlight the costs of failing to engage in a particular behavior (i.e., “Lack of exercise will make you gain weight.”) and work to motivate individuals to avoid negative consequences by changing their behavior. In contrast, people who pursue goals for intrinsic reasons are likely to do so for the pursuit of the inherent rewards of the behavior, a motivation that is consistent with the emphasis placed in gain framed messages. Thus, this reasoning also suggests that intrinsic motivations might be best matched to a gain framed message and extrinsic motivations to a loss framed message.

Next, what might make a match more effective than a mismatch? The literature on regulatory fit (Higgins, 2000) describes the value that can be derived from a message in which the motivation and frame are matched, and the processes by which that value can promote behavior. Regulatory fit is essentially an increase in motivation as a result of a match between an individual’s goal orientation (approach versus avoidance focused) and the manner in which the goal is construed, as in a framed health message. If an individual who is approach focused pursues a goal in a manner that is consistent with their orientation, a regulatory fit will exist. Similarly, if an individual who is avoidance focused pursues a goal in a manner that is consistent with the avoidance orientation, than regulatory fit will also have occurred. As such, Higgins (2000) reported that, “Regulatory fit contributes to value through increasing strength of engagement… fit makes people engage more strongly in what they are doing and feel right about it” (pp. 209). In turn,
this stronger engagement and subjective experience of “feeling right” can influence attitudes, and ultimately behavior.

Regulatory fit has been shown to influence behavior in a variety of domains (i.e., Cesario, Grant, Higgins, 2004; Idson, Liberman, & Higgins, 2004; Spiegel, Grant-Pillow, & Higgins, 2004), including exercise. For example, framed messages that were matched to individuals’ approach versus avoidance regulatory focus led to more positive feelings towards exercise and more participation in physical activity than messages that did not fit (Latimer, et al., 2007). Moreover, matched messages may be more effective for behavior change because they are easier to process than mismatched messages. Lee and Aaker (2004) found that messages where the frame and the regulatory focus were matched were more persuasive than messages where frame and focus were mismatched, and this increase in persuasiveness was attributable to a greater ease of processing the message. Making a message appear more persuasive is an essential component of behavior change because research has consistently shown that this enhancement of overall message persuasion leads to successful behavior change (Mann, Sherman, & Updegraff, 2004; Updegraff, Sherman, Luyster, & Mann, 2007).
Mismatched Messages

In the context of this study, mismatched messages are loss framed messages that describe intrinsic reasons for exercising, and gain framed messages that describe extrinsic reasons for exercising (Figure 1). As I will explain, a mismatch may also successfully engender behavior change, but it may do so because it produces a different subjective experience for a reader than a match does.

Although it may seem counter-intuitive, messages that are matched to some characteristic of the recipient may in some cases cause rejection of the message (Tykocinski, Higgins, & Chaiken, 1994), which would be ineffective in producing behavior change. For example, the mismatch phenomenon is apparent in a study of self-discrepancies (Higgins, 1987), in which the content of a message was manipulated to either match or mismatch an important self-discrepancy in the recipient. When the message matched a person’s self-discrepancy, it resulted in increased distress and the overall message was more likely to be rejected. In contrast, a message that was not matched to an individual’s self-discrepancy did not produce distress and resulted in greater acceptance. Thus, there is some evidence that mismatches can, under certain conditions, result in greater acceptance of a message than matches. In particular, this is the case if a match activates an issue of insecurity in the recipient.

Although the present study did not examine matches between the content of a message and a particular insecurity or self-discrepancy in the recipient, it is possible that a mismatch between the frame of an exercise message and the type of reason for
exercising emphasized in the message could, under some conditions, lead to greater acceptance of the message than a match. This situation could arise when an individual is not paying very close attention to the overall message. When an individual is not concerned or interested in the content of a message, it is much more difficult for that message to be persuasive and spark a change in behavior. However, Zhang (1996) was able to overcome this challenge by adding humor to messages in an effort to “grab the attention” of unengaged participants. Zhang found that those messages that had an element of humor were more persuasive than those without humor for the unengaged participants. Similarly, a mismatched message has the potential to operate in the same fashion as humor, to the extent that a mismatch might also cause an uninterested person to pay closer attention to the message. Reading a message that does not seem to “fit” or “feels wrong”, as regulatory fit theory might predict for mismatched messages, may be more likely to grab the attention of an unengaged reader than a matched message. The simple act of causing an otherwise uninterested reader to “yield” (Tykocinski, et al., 1994) to a message is often enough to give the message a persuasive edge if it results in deeper information processing than a matched message might.

Thus, there is evidence that both matching and mismatching can, although through very different mechanisms, lead to increased persuasion and be conducive of behavior change. In the present study, I hypothesize that an individual difference variable, need for cognition, should determine which combination of motivation and frame (matched or mismatched) is most effective at increasing exercise behavior.
**Need for Cognition**

Indeed, one variable that is likely to influence the extent to which matching message frame and motivation will result in behavior change is an individual’s need for cognition. Need for cognition is an individual difference variable that refers to one’s tendency to enjoy and engage in effortful and analytic thinking (Cacioppo & Petty, 1982). Individuals high in need for cognition generally pay attention to, think deeply about, and are more persuaded by the quality of arguments. Conversely, low need for cognition individuals pay less attention to, think less deeply about, and are persuaded more by peripheral cues such as environmental characteristics of the message (i.e., humor, attractiveness of the layout) (Petty & Cacioppo, 1986). For the high need for cognition individuals paying close attention to the actual message content in the present study, I expect that matched messages should be processed more fluently and should be more likely to “feel right” (Higgins, 2000), leading to message acceptance and increased persuasion.

For the low need for cognition individuals paying less attention to the message content and more attention to peripheral cues, mismatched messages should be more “attention grabbing” and may stimulate deeper processing of the message - thereby increasing overall persuasiveness. Hence, the underlying process in which individuals high versus individuals low in need for cognition are successfully persuaded by a message may differ tremendously (Petty & Cacioppo, 1986), and this variation is what I
hypothesize to be responsible for the differential effectiveness of the matched versus the mismatched messages.

Present Study

Thus, while a novel goal of the present study is to examine the impact of self-determined motives to exercise on framed health messages, need for cognition may moderate the findings. The theoretically grounded match of intrinsic motivations to a gain framed message and extrinsic motivations to a loss framed message is hypothesized to be more effective at increasing exercise behavior than a mismatch only for those individuals who possess a high need for cognition. For individuals low in need for cognition, the reverse finding is hypothesized where a mismatch of intrinsic motivations to a loss frame and extrinsic motivations to a gain frame is expected to be most effective at increasing exercise behavior.

The research hypotheses will be examined in a study of young adults randomized to read one of four exercise messages (gain-intrinsic, gain-extrinsic, loss-intrinsic, or loss-extrinsic). Baseline measures of previous exercise behavior, as well as level of need for condition, will be assessed prior to the presentation of the message. After reading the exercise message, daily exercise behavior will be measured by having participants report physical activity for the following week.
Method

Participants

One hundred and ninety-two introductory psychology undergraduate students at Kent State University participated in the study in exchange for partial fulfillment of an introductory psychology class requirement or extra credit points. Consistent with other message framing studies focusing on health behavior change (i.e., Banks et al., 1995; Schneider et al., 2001; Updegraff, et al., 2007) only those individuals who were not regular exercisers (according to the Stage of Behavior measure) were included in the analyses of this study. Fifteen participants did not provide any data for the follow up and were excluded from data analyses (12.8% attrition). There was no significant difference between those participants who provided follow up data and those that did not provide follow up data in regards to gender, need for cognition, or past exercise behavior ($p$’s $> .05$). The final sample of one hundred and seventy-seven participants consisted of 144 females and 33 males with ages ranging from 16 to 35 ($M = 19.0$, $SD = 1.91$). The majority of participants reported that they were not currently exercising, but that they intended to exercise within the next 30 days (59.9%) or within the next 6 months (32.2%). Only 7.9% of participants reported not currently exercising with no intention to exercise in the future. The sample was predominantly Caucasian (84%) and African American (11%).
Procedure

Participants completed measures individually on the computer using MediaLab research software (Jarvis, 2006). Before reading an article advocating exercise and regular physical activity, participants completed a set of personality questionnaires that included a measure of need for cognition, as well as a set of exercise related questionnaires that included stage of behavior change, reason for exercising, and a recall of past exercise behavior. Next, participants were randomly assigned to read one of four versions an exercise article (described below). After reading the article, participants were given a sheet of paper and pencil and asked to think about the message to help them generate five ways that they could incorporate exercise in their everyday lives. At the end of the session, participants were given a web link to access an internet-based survey. Participants were told to log onto the survey each evening, beginning with the day they came into the lab, and reflect upon their daily exercise behaviors by answering the survey questions.

Measures

Pre-Message

Need for cognition (Appendix A1) was assessed using the abbreviated 18-item need for cognition (NC) scale (Cacioppo, Petty, & Kao, 1984). The scale contained statements about situations that required participants’ reactions to demands for cognitive effort, such as “I would prefer complex to simple problems.” Participants rated their
agreement to the 18 statements using a Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree). The reliability of the measure was strong ($\alpha = .89$).

*Stage of Exercise Change* (Appendix A2) was assessed using the short form of the Exercise Behavior Stage Change Scale (Marcus, et al., 1992). This single item measure first stated:

Regular exercise is planned physical activity performed to increase physical fitness. Such activity should be performed 3 to 5 times per week for 20-60 minutes per session. Exercise does not have to be painful to be effective, but should be done at a level that increases your breathing rate and causes you to break a sweat. Participants were then asked if they exercised regularly according to that definition and answered YES or NO. If they answered NO, they had to indicate if they intended to start exercising regularly in the next 30 days, the next 6 months, or not at all. Participants who answered NO, they had not been exercising regularly, but intended to begin exercising regularly in the next 6 months were placed in the preparation stage of exercise behavior change, and those who intended to begin exercising regularly in the next 6 months were placed in the contemplation stage. Participants who were not exercising regularly and did not intend to in the future were placed in the precontemplation stage of change.

*Reason for exercising* (Appendix A3) was assessed with a single question. Participants were given 5 options and asked to indicate which reason best described why they might chose to exercise. Two options, “I exercise because other people want me to” and “I exercise because it is good for my health”, reflected more extrinsic reasons one might chose to exercise. Two options, “I feel good about myself when I exercise” and “It
is fun and enjoyable to exercise”, reflected more intrinsic reasons one might chose to exercise. Participants also had the option of answering, “I have no desire at all to exercise” if it fit their position most accurately.

Past exercise behavior (Appendix A4) was assessed using the Godin Leisure-Time Exercise Questionnaire (Godin & Shephard, 1997). Two items asked participants to reflect upon their exercise behaviors over the past 7 days. The first question asked participants how many occasions over the last week they had engaged in strenuous exercise (heart beats rapidly), moderate exercise (not exhausting), and mild exercise (minimal effort) for at least 15 minutes. Responses ranged on a Likert scale from 1 (0 times) to 5 (9 or more times). Consistent with the scoring instructions established by Godin & Shephard (1997), the weekly frequencies (ranging from 1 to 5) of strenuous, moderate, and light activities were multiplied by nine, five, and three, respectively. Total weekly physical activity was calculated in arbitrary units by summing the products of the separate components. The formula for an individual’s weekly physical activity score was \((9 \times \text{Strenuous}) + (5 \times \text{Moderate}) + (3 \times \text{Light})\). The second question was used to calculate the frequency of weekly physical activities one engaged in “long enough to work up a sweat”. Participants responded 1 (never), 2 (sometimes), or 3 (often). Based on this scaling method, each participant was assigned an arbitrary number that was reflective of the amount of physical activity and the intensity of physical activity engaged in over the past week. High scores were associated with high levels of weekly physical activity and low scores were associated with low levels of weekly physical activity.
Post-Message

The “*message booster*” (Appendix B) component explained to participants, “We know the best way to incorporate exercise into your daily life is to plan ahead. Please take a few minutes to think about the steps that you might take to begin exercising regularly or increase the amount of exercise you partake in each day.” Further, participants were told to write down up to 5 ways that they might personally be able to incorporate exercise into their schedule- not how the average person might.

*Exercise behavior in the following week* (Appendix A5) was assessed via an online survey. The online survey contained a modified version of the Godin-Leisure Time Exercise Questionnaire (Godin & Shephard, 1997). The modified version required participants to make a daily recall of their physical activity, as opposed to a weekly recall as in the original version. The first question asked participants on how many occasions over the last day (24 hours) they had engaged in strenuous exercise (heart beats rapidly), moderate exercise (not exhausting), and mild exercise (minimal effort). Responses ranged on a Likert scale from 1 (0 minutes) to 5 (more than 45 minutes). In scoring this question, the daily frequencies (ranging from 1 to 5) of strenuous, moderate, and light activities were multiplied by nine, five, and three, respectively. Total daily physical activity was calculated in arbitrary units by summing the products of the separate components. The formula for an individual’s daily physical activity score was \((9 \times \text{Strenuous}) + (5 \times \text{Moderate}) + (3 \times \text{Light})\). The second question was used to calculate the frequency of daily physical activities one engaged in “long enough to work up a sweat”. Participants responded 1 (not at all), 2 (less than 1 hour), or 3 (more than 1 hour). Based on this
scaling method, each participant was assigned an arbitrary number that was reflective of the amount of physical activity and the intensity of physical activity engaged in over the past 24 hours. Throughout the follow up period, participants accumulated a maximum of 7 daily physical activity scores. At the end of 7 days, participant daily physical activity scores were averaged across the number of days they had responded to provide a weekly follow up physical activity score in a comparable metric to the measure of past weekly exercise behavior.

Materials

Four articles were tailored from the American Heart Association’s “Physical Activity in Daily Life” web page (www.americanheart.org/presenter.jhtml?identifier=2155) to use for the specific purpose of this study (Appendix C). The articles had an educational tone and presented various facts about exercise and physical activity that were customized to reflect the concerns and health issues of a young adult population. All articles presented identical guidelines to help begin an exercise program or increase daily physical activity. However, arguments promoting regular exercise were presently differently in each version. To enhance the perceived validity of the articles, each message included a logo for a fictitious fitness and nutrition organization (Ohio Council for Fitness and Nutrition). The information contained in the article was consistent with information and recommendations supplied by the America Heart Association, the National Cancer Institute, the Surgeon General,
and the United States Department of Health and Human Services. Thus, each version of the article presented accurate information.

Of the four articles, two were presented in a gain framed manner and two were presented in a loss framed manner. In each subset of gain and loss frame articles, there was both an intrinsically motivated message and an extrinsically motivated message. As such, two gain framed articles highlighted the positive outcomes of exercising regularly- one focused on the intrinsic incentives of regular exercise (e.g., “Exercise now- FEEL better later!”), and one focused on the extrinsic incentives of regular exercise (e.g., “Exercise now- LOOK better later!”). Two loss framed articles highlighted the negative outcomes of not exercising regularly- one focused on the intrinsic consequences of not exercising regularly (e.g., “Forgot to exercise? Forget FEELING HAPPY!”), and one focused on the extrinsic consequences of not exercising regularly (e.g., “Forgot to exercise? Forget the BATHING SUIT!”)
Results

Analytic Strategy

The overarching goal of the present study was to examine the interaction between message frame, exercise motivation, and need for cognition in promoting exercise behaviour among sedentary young adults. Statistically, the successful characterization of this aim was represented in a three-way interaction between the individual difference variable need for cognition (NC), the frame of the message (MF), and the type of motivational outcome highlighted in the message (MO). It was predicted that NC would moderate the effectiveness of the MF x MO interaction at increasing exercise behavior such that theoretically matching the MF to the MO would result in a larger increase in exercise behavior for those high in NC compared to those low in NC. However, for those low in NC, mismatching the MF to the MO would result in a larger increase in exercise behavior compared to those high in NC. As noted earlier, a theoretically matched message contains an extrinsically motivated outcome that is loss framed or an intrinsically motivated outcome that is gain framed. On the other hand, the mismatched message contains an extrinsically motivated outcome that is gain framed or an intrinsically motivated outcome that is loss framed.

One variable in the three-way interaction was continuous (NC), therefore the significance of this interaction was tested through moderated multiple regression (Aiken & West, 1991). Predictor variables included in the regressions analyses were NC, MF, MO, as well as the two-way and three-way interaction product terms created by each.
There were no specific hypotheses in regards to the two-way interaction effects; however, these product terms were still included in the model such that the hypothesized three-way interaction (NC x MF x MO) would be regressed independent of the effects of the lower-order terms. MF (gain = -1, loss = 1) and MO (extrinsic = -1, intrinsic = 1) were effect-coded categorical predictors in the model. Since the outcome of interest was that of change in current exercise behavior, all regressions included the baseline measure of exercise behavior as a control variable.

In an effort to simplify the interpretation and presentation of the results, MF and MO variables were collapsed into a single categorical variable that represented whether participants had received a matched or mismatched message. Additionally, a tertiary-split was used to transform the NC variable into a categorical variable representing those with high, average, and low need for cognition in relation to the given sample. The simple effects of message match versus message mismatch were examined via planned comparisons that were analyzed separately for the high need for cognition participants, the average need for cognition participants, and the low need for cognition participants.

Analyses

Asked the reason they might chose to exercise, the majority of the sample said they would chose to exercise to feel good about themselves (49.2%) or generally for the sake of good health (33.9%). Other reasons to exercise that participants endorsed included for enjoyment purposes (5.6%) and to please others (4.0%), while a few participants had no desire to exercise at all (7.3%). There was not a significant interaction
between the reasons participants reported for wanting to exercise (more extrinsic or more extrinsic) and the motivation of the message they viewed (extrinsic or intrinsic) \( (p = .38) \), suggesting that the participants’ personal motivation to exercise did not bias the overall appeal of the messages. Table 1 presents a summary of descriptive statistics for all major study variables. Correlations among major study variables are presented in Table 2.

Table 1. Descriptive Statistics of Study Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
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<tr>
<td>Past Exercise</td>
<td>24.0</td>
<td>11.1</td>
</tr>
<tr>
<td>Need for Cognition</td>
<td>16.1</td>
<td>10.2</td>
</tr>
<tr>
<td>Follow-Up Exercise</td>
<td>1.58</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Table 2. Correlations Among Major Study Variables.

<table>
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<th></th>
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<th>2</th>
<th>3</th>
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<tr>
<td>Exercise</td>
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<td>.268*</td>
</tr>
<tr>
<td>Need for Cognition</td>
<td>-.054</td>
<td>--</td>
<td>.094</td>
</tr>
<tr>
<td>Follow-Up Exercise</td>
<td>.268*</td>
<td>.094</td>
<td>--</td>
</tr>
</tbody>
</table>

* p < .01

Table 3 shows the results of the moderated regression analysis for self-reported exercise behavior. There was no main effect of either message frame or type of
motivational outcome ($p$’s > .26), and there were also no two-way interactions that
significantly accounted for participants’ report of exercise behavior ($p$’s > .15). However,
the NC x MF x MO interaction was significant ($\beta = -.21, p = .005$), indicating that the
effectiveness of the match or mismatch of MF x MO depended on participant NC.

Table 3. Regression Analysis Predicting Change in Exercise Behavior (N=177)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>$\beta$</th>
<th>t</th>
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<td>0.25</td>
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<td>0.06</td>
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<td>0.08</td>
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<tr>
<td>MF x MO</td>
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<td>0.73</td>
<td>0.06</td>
<td>0.94</td>
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<td>MF x NC</td>
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<td>0.11</td>
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<td>MO x NC</td>
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<td>0.52</td>
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<tr>
<td>MF x MO x NC</td>
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<td>1.30</td>
<td>-0.21</td>
<td>-2.84</td>
<td>0.005</td>
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Figure 2a displays the mismatch MF x MO interaction for those low in NC. For
these individuals, the mismatched messages that were gain framed with extrinsic
motivational outcomes and loss framed with intrinsic motivational outcomes were most
persuasive. Figure 2b displays the predicted match MF x MO interaction for those high in
NC. For these individuals, the matched messages that were gain framed with intrinsic
motivational outcomes and loss framed with extrinsic motivational outcomes were most
persuasive.
Further, as is evident in Figure 3, planned comparisons show that low need for cognition participants that were mismatched (estimated $M = 18.2, SE = 1.78, n = 28$) increased their weekly physical activity significantly more than those who were matched (estimated $M = 13.2, SE = 1.45, n = 38$), $p = .032$. Conversely, the high need for cognition participants that were matched ($M = 20.7, SE = 2.04, n = 34$) increased their weekly physical activity significantly more than those that were mismatched ($M = 14.1, SE = 1.70, n = 30$), $p = .017$. No statistically significant difference between the message match and mismatch condition was found for individuals with average levels of need for cognition, $p = .123$. 

**Fig. 2a.** Estimated means of exercise behavior as a function of message frame and motivation- LOW need for cognition.  
**Fig. 2b.** Estimated means of exercise behavior as a function of message frame and motivation- HIGH need for cognition.
Fig. 3. Estimated marginal means of exercise behavior showing planned comparisons between message match/mismatch condition and need for cognition.
Discussion

While Kate and Tom may not be unique in their reasons for choosing to exercise, they are definitely in the minority of Americans who are choosing to live an active lifestyle. Because more than sixty percent of adults in the United States do not participate in regular physical activity, lack of physical activity is a major public health epidemic (U.S. Department of Health and Human Services [USDHHS], 2000). Although many exercise interventions have aimed to help alleviate this epidemic, most have not been successful in promoting regular exercise over the long-term. The present study sought to better understand the most effective way to encourage regular physical activity in young adults, taking into account the various motivations that people may have for exercising. Theoretically matched and mismatched messages of motivation and frame were hypothesized to influence exercise behavior depending on an individual’s need for cognition. As predicted, the matched messages were most effective at increasing exercise behavior in those individuals with a high need for cognition. Also, as predicted, the mismatched messages were most effective at increasing exercise behavior in those individuals who did not tend to enjoy and engage in effortful and analytic thinking. With these hypotheses supported, it can be concluded that, indeed, a combination of motivation and message frame might matter when it comes to exercise behavior change, but the most effective combination may depend on characteristics of the person being presented the message.
Practically, these findings may have some important implications for those in the exercise promotion field, and also for those in the health domain in general. Consider the personal trainer trying to help her clients stick to their exercise regimens, the high school physical education teacher encouraging his students to be more active, or the doctor relaying the importance of physical activity to his patients -- how might the information gained from this study make their jobs a little easier? The process of crafting a message, whether written or verbal, aimed at encouraging health behavior change is something that many such individuals may typically have not put much thought into.

Using the matched/mismatched message framework from the present study as a guide, exercise promotion advocates should consider how engaged their targeted population is to decide what type of message might be best to present. A highly engaged population might be more likely to reflect the characteristics of a high need for cognition individual paying great attention to argument quality, while a less engaged population might be more likely to reflect the characteristics of a low need for cognition for individual best persuaded through “attention grabbing” peripheral cues. For example, the personal trainer might expect her clients, having already taken a first step by hiring a personal trainer, to be highly engaged in the topic of exercise and a matched message might be most effective at encouraging adherence. Conversely, the high school physical education teacher contending with uninterested youngsters, or perhaps even the doctor giving medical advice to professional couch potatoes only interested in quick fixes, might expect message recipients to be much less engaged in the topic of exercise and a mismatched message might be most effective for encouraging exercise.
Thus, on the whole, the findings of this study suggest that both gain- and loss-framed messages, as well as messages that focus on either intrinsic or extrinsic reasons to exercise, can be successful at engendering behavior change. Each matched and mismatched combination of frame and motivation may have the potential to be a valuable tool in the exercise behavior change process. Compared to previous literature on health message framing for prevention behaviors, the overall gain frame advantage that was found, though not statistically significant, is consistent with the notion that prevention behaviors are best promoted through gain framed messages (Rothman & Salovey, 1997). However, given the slight advantage of gain frames in this study, the findings are also consistent with the notion that gain framed messages might be “differentially effective” (Latimer, Salovey, & Rothman, 2007, pp. 646) and not automatically the best choice in frame for a behavior like exercise. Knowing what kind motivation the message is referring to and how engaged the message recipient is can aid in determining whether to frame a message in a gain or loss fashion.

The overall advantage of messages that focused on intrinsic motivations, though not statistically significant, is somewhat consistent with what self-determination theory might predict for exercise behavior change. Markland and Hardy (1993) report that having an intrinsic motivation to exercise appears to be essential in maintaining exercise adherence. Though the self-determination continuum suggests that an individual must progress from being more extrinsically motivated before being intrinsically motivated (Deci & Ryan, 1990), the participants in this study appeared to be most persuaded to exercise after reading the messages containing intrinsic motivations. It is possible that the
intrinsic motivations were more successful because of prior experiences participants may have had with exercise messages. Because of physical education in schools and media health campaigns, it is unlikely that there were any participants in this study encountering an exercise promotion message for the first time. Traditional physical education programs tend to focus more on the external outcomes of exercise, such as increased endurance and strength; most media health campaigns reflect the severity of the obesity epidemic and promote weight loss. Prior exposure to mostly extrinsic reasons to exercise may have given the intrinsic messages an advantage by providing a fresh and alternative motivation for participants.

When it comes to reasons to exercise, maybe people get the feeling that they have “heard it all before”, and therefore the impact of a message is limited. Instead of using the typical approach of promoting exercise through extrinsic outcomes, such as weight-loss and fitness, the findings of this study suggest that maybe a new tactic is needed to help individuals gain a fresh outlook on exercise. In view of the fact that it is assumed most people understand exercise promotes weight loss and fitness, maybe providing the less well-known intrinsic outcomes of exercise, such as improved self-esteem and confidence, would be more conducive to exercise persuasion. Because there was not a significant interaction between the reason participants reported they might chose to exercise and the type of motivation described in the message they viewed, we know that simply reiterating one’s personal motivations in a message is not the best approach to successful exercise persuasion. Rather, what really matters might be if the message provides a novel way of
thinking about exercise motivation, or, as this study best exemplifies, how a message is framed.

Since the addition of motivational outcomes to the message framing equation may have played a role in the effectiveness of each individual message, one issue that becomes apparent is that of the frame-motivation relationship in other health domains. Might the significant interaction of motivation and message frame be specific only to exercise because of the inherent complexity of the behavior, or would motivation influence framing effects for other health behaviors too? It would seem likely that people might have intrinsic and extrinsic reasons to quit smoking, for example, but unlikely that people might have the same variety of reasons to get a flu shot or use dental floss, for example. If the complexity of reasons for which a person might choose to engage in a behavior really matters, then the match/mismatched framework discovered in the present study might actually be domain-specific. It seems plausible to believe that more simple health behaviors, like vaccinations and oral health behaviors, are apt to be effectively persuaded by matching the message frame to the prevention versus detection function of the behavior, but more complex behaviors may require a more complex and individualized matching process. Future studies might look at a comparison between simple and complex health behaviors using the matched/mismatched framework to see if there is a similar distinction between the different combinations of frame and motivation.

Additionally, a more diverse span of sample characteristics should be investigated under the premises of the present study. The current sample was limited in that it was relatively homogeneous in age and gender. Might young adults have different perceptions
about exercise than middle-aged or older adults? How might these perceptions influence the effectiveness of matched versus mismatched messages? A more diverse sample might better address this limitation. The current sample might also have been limited in terms of range in the individual difference variable need for cognition. In other words, how representative was the need for cognition levels of current sample compared to that of the overall population? Since the high and low levels of need for cognition were determined based on the relative levels of need for cognition from the given sample of college undergraduates, it is unclear as to whether the individuals who scored “high” in this study are the same as individuals in the general population who might be considered to be high in need for cognition.

An important next step for this line of research would be to further investigate the mechanisms that were predicted to be responsible for the effectiveness of the matched messages (“feeling right”, fluency) versus the mismatched messages (attention, elaboration). While the results provide clear evidence that individual need for cognition did influence the effectiveness of the matched versus mismatched messages, the present study did not make an attempt to empirically test the mechanisms responsible for that differential effect. Further, while the present study measured exercise behavior, rather than intentions, behavior was documented via self-report. Future studies might benefit from the inclusion of a more objective measure of exercise as an outcome.

Despite those limitations, this study is unique in that it is the first of its kind to investigate message frame and intrinsic versus extrinsic motivations together in the health behavior change realm. While most exercise interventions have not been successful in
promoting regular exercise over the long-term, the results of this study are a useful addition to the exercise behavior change literature, as well as to the health behavior change domain as a whole. One day Kate might decide to quit smoking and Tom might give up drinking, and the findings of this study suggest that by knowing a little bit about how both Kate and Tom approach the task of effortful thinking, we would be able to effectively craft a framed and motivated message suited to their health behavior change needs. The frame and motivation relationship uncovered in the present study may pan out to be an important component in the practice of health behavior change if future research is as successful as this investigation proved to be.
References


Appendix A

Measures

A1. Need for Cognition Scale

The next set of questions will ask you about some of your preferences. There are no right or wrong answers, so please answer honestly.

Please rate your agreement with the following statements, using the scale presented below.

1  Strongly disagree
2  Somewhat disagree
3  Neutral
4  Somewhat agree
5  Strongly agree

1. It is often hard for me to make up my mind about things because I don't really know what I want.
2. I would prefer complex to simple problems.
3. I like to have the responsibility of handling a situation that requires a lot of thinking.
4. Thinking is not my idea of fun.
5. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.
6. I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.
7. I find satisfaction in deliberating hard and for long hours.
8. I only think as hard as I have to.
9. I prefer to think about small, daily projects to long-term ones.
10. I like little tasks that require little thought once I have learned them.
11. The idea of relying on thought to make my way to the top appeals to me.
12. I really enjoy a task that involves coming up with new solutions to problems.
13. Learning new ways to think doesn't excite me very much.
14. I prefer my life to be filled with puzzles that I must solve.
15. The notion of thinking abstractly is appealing to me.
16. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.
17. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.
18. It's enough for me that something gets the job done; I don't care how and why it works.
A2. *Stage of Change- Exercise Scale*

“Regular Exercise is any planned physical activity (e.g., brisk walking, aerobics, jogging, bicycling, swimming, rowing, etc.) performed to increase physical fitness. Such activity should be performed 3 to 5 times per week for 20-60 minutes per session. Exercise does not have to be painful to be effective but should be done at a level that increases your breathing rate and causes you to break a sweat.”

Do you exercise regularly according to that definition?

- Yes, I have been for MORE than 6 months.
- Yes, I have been for LESS than 6 months.
- No, but I intend to in the next 30 days.
- No, but I intend to in the next 6 months.
- No, and I do NOT intend to in the next 6 months.
A3. *Reason for Exercising*

Which of the following BEST describes your reasons for exercising?

- I have no desire at all to exercise
- I exercise because other people want me to
- I feel good about myself when I exercise
- I exercise because it is good for my health
- It is fun and enjoyable to exercise
A4. Godin Leisure-Time Exercise Questionnaire

Please answer the following questions based on your activities over the past WEEK.

1. Strenuous exercise is activity that causes your heart to beat rapidly. Examples include (but are not limited to) running, football, soccer, basketball, or swimming.

How many times did you engage in strenuous exercise in the past week during your free time?

0 times
1-2 times
3-5 times
6-8 times
9 or more times

2. Moderate exercise is activity that is not exhausting. Examples include (but are not limited to) fast walking, baseball, tennis, volleyball, easy biking, and dancing.

How many times did you engage in moderate exercise in the past week during your free time?

0 times
1-2 times
3-5 times
6-8 times
9 or more times

3. Mild exercise is activity that requires minimal effort. Examples include (but are not limited to) yoga, archery, fishing, bowling, golf, and easy walking.

How many times did you engage in mild exercise in the past week during your free time?

0 times
1-2 times
3-5 times
6-8 times
9 or more times

4. In your leisure time this week, how often did you engage in ANY PHYSICAL ACTIVITY long enough to work up a sweat (heart beats rapidly)?

Never   Sometimes   Often
A5. Modified Godin Leisure-Time Exercise Questionnaire

Please answer the following questions based on your activities TODAY.

1. Strenuous exercise is activity that causes your heart to beat rapidly. Examples include (but are not limited to) running, football, soccer, basketball, or swimming.

For how many minutes did you engage in strenuous exercise today during your free time?

- 0 minutes
- 1-15 Minutes
- 16-30 Minutes
- 31-45 Minutes
- More Than 45 Minutes

2. Moderate exercise is activity that is not exhausting. Examples include (but are not limited to) fast walking, baseball, tennis, volleyball, easy biking, and dancing.

For how many minutes did you engage in moderate exercise today during your free time?

- 0 minutes
- 1-15 Minutes
- 16-30 Minutes
- 31-45 Minutes
- More Than 45 Minutes

3. Mild exercise is activity that requires minimal effort. Examples include (but are not limited to) yoga, archery, fishing, bowling, golf, and easy walking.

For how many minutes did you engage in mild exercise today during your free time?

- 0 minutes
- 1-15 Minutes
- 16-30 Minutes
- 31-45 Minutes
- More Than 45 Minutes

4. In your leisure time today, how often did you engage in ANY PHYSICAL ACTIVITY long enough to work up a sweat (heart beats rapidly)?

- Not at All
- Less than 1 Hour
- More than 1 Hour
You have just read some important information about exercise.

We know that the best way to incorporate exercise into your daily life is to plan ahead.

Please take a few minutes to think about the steps that you might take to begin to exercise regularly or increase the amount of exercise you partake in each day.

*On the spaces provided below, write down *up to 5* ways that you might be able to incorporate exercise into your schedule. Some examples include taking a brisk walk after dinner, utilizing the Kent State fitness center after class, or waking up early to do yoga. Please think about ways that you *PERSONALLY* might be able to incorporate exercise into your schedule—*NOT* how the average person could.*

1. 

2. 

3. 

4. 

5.
Exercise Articles

C1. Gain Extrinsic Message

Exercise Now - Look Better Later!

"We are what we repeatedly do." — Aristotle

"Live longer and stay healthier!"

There is good news for all Americans. Scientific evidence shows that physical activity done at a moderate-intensity level can produce incredible physical health benefits. According to the United States Department of Health and Human Services, people who are physically active are more likely to be at a healthy weight. As a result of being at a healthy weight, physically active people are more likely to be in good overall physical health.

"Exercise will improve your appearance!"

Benefits of physical activity include:

- Avoiding the "Freshman 15"
- Better grades with increased energy
- Improved self-esteem and confidence
- Better physical and mental health
- Improved quality of life
- Body definition and muscle tone
- Relaxation and reduced stress

Getting started is easy...

If you have not been active, start slowly. Choose something that fits into your daily life. Choose an activity you like, or try a new one. Ask a friend to exercise with you, or join a group. Allow small amounts of time in your day for physical activity. If the weather is bad, try a fun exercise video in your dorm room! Or dance to your favorite play list of songs!

Scientists have proven that being active reduces the risk of heart disease, obesity, high blood pressure, osteoporosis, stroke, depression and premature death.

Regular exercise is the best way to promote overall health and longevity!
Exercise Now-
Feel Better Later!

“We are what we repeatedly do.” – Aristotle

“Live longer, stay healthier, and be happier!”

There is good news for all Americans. Scientific evidence shows that physical activity done at a moderate-intensity level can produce incredible health benefits. According to the United States Department of Health and Human Services, people who are physically active are more likely to be at a healthy weight and happy with their appearance. As a result of being at a healthy weight, physically active people are more likely to be in good overall physical health, to be emotionally stable and possess superior social confidence.

“Getting Started Is Easy!”

If you have not been active, start slowly. Choose something that fits into your daily life. Choose an activity you like, or try a new one. Ask a friend to exercise with you, or join a group. Allow small amounts of time in your day for physical activity. If the weather is bad, try a fun exercise video in your dorm room! Or dance to your favorite play list of songs!

“Exercise... will improve your life!”

Benefits of physical activity include:

- Avoiding the “Freshman 15”
- Better grades with increased energy
- Improved self-esteem and confidence
- Better physical and mental health
- Improved quality of life
- Body definition and muscle tone
- Relaxation and reduced stress

Scientists have proven that being active reduces the risk of heart disease, obesity, high blood pressure, osteoporosis, stroke, depression and premature death.

Regular exercise is the best way to promote overall health and longevity!
C3. Loss Extrinsic Message

Forgot to Exercise?
Forget the Bathing Suit!
“We are what we repeatedly do.” —Aristotle

Avoid premature death, health hassles, and unhappiness!

There is bad news for many Americans. Scientific evidence shows that lack of physical activity can have severe health consequences. According to the United States Department of Health and Human Services, people who are sedentary are more likely to be overweight. As a result of being overweight, sedentary people are more likely to suffer serious overall physical health problems.

Lack of exercise... will make you gain weight!

Consequences of lack of physical activity include:
- Weight gain—“Freshman 15”
- Increased anxiety and stress
- Poor grades with low energy levels
- Decreased self-esteem
- Poor physical and mental health
- Decreased quality of life
- Lack of body definition and muscle tone

Getting started is easy...

If you have not been active, start slowly. Choose something that fits into your daily life. Choose an activity you like, or try a new one. Ask a friend to exercise with you, or join a group. Allow small amounts of time in your day for physical activity. If the weather is bad, try a fun exercise video in your dorm room! Or dance to your favorite play list of songs!

Health Check
Lack of regular exercise will lead to overall health problems and premature death!
C4. Loss Intrinsic Message

Ohio Council for Fitness & Nutrition
da healthy balance for life.

Forgot to Exercise?
Forgot Being Happy!

“We are what we repeatedly do.” —Aristotle

"Avoid premature death, health hassles, and unhappiness!"

There is bad news for many Americans. Scientific evidence shows that lack of physical activity can have severe health consequences. According to the United States Department of Health and Human Services, people who are sedentary are more likely to be overweight and unhappy with their appearance. As a result of being overweight, sedentary people are more likely to suffer serious overall physical health problems, suffer from extreme emotional problems, and lack social confidence.

"Lack of exercise... will make you miserable!"

Consequences of lack of physical activity include:

- Weight gain: “Freshman 15”
- Increased anxiety and stress
- Poor grades with low energy levels
- Decreased self-esteem
- Poor physical and mental health
- Decreased quality of life
- Lack of body definition and muscle tone

Getting started is easy...

If you have not been active, start slowly. Choose something that fits into your daily life. Choose an activity you like, or try a new one. Ask a friend to exercise with you, or join a group. Allow small amounts of time in your day for physical activity. If the weather is bad, try a fun exercise video in your dorm room! Or dance to your favorite play list of songs!

Scientists have proven that not being active increases the risk of heart disease, obesity, high blood pressure, osteoporosis, stroke, depression and premature death.

Health Check

Lack of regular exercise will lead to overall health problems and premature death!