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Personality Traits and Positive Reinforcement in Exercise

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Table of Contents

Abstract……………3

Literature Review; Personality Traits and Positive Reinforcement in Exercise……………4

The Current Study.............14

Method.............15

Results.............21

Discussion.............22

References.............27

Appendix A (Tables).............33

Appendix B (Graphs).............38

Appendix C (Study Materials and Measures).............41
Abstract

Obesity rates across college campuses are rising. Health habits, such as exercise, acquired during the college years tend to carry on through the rest of an individual’s life. The purpose of the current study is to identify the effects of positive reinforcement on success in exercise adherence for individuals displaying extraverted and neurotic personality traits. 16 volunteer participants ranging in age from 18-25 years from the College at Brockport were recruited. They completed surveys measuring behavior stages of change, exercise barriers/benefits and personality type. Participants then recorded exercise habits over an eight week period. Four of these eight weeks included positive reinforcement in the form of verbal praise for recorded exercise behavior as well as entry into weekly drawings for money. Analyses of main effects and interactions between personality type, positive reinforcement, and exercise behavior were calculated. Results indicated a significant increase in benefit scores following completion of the study. It is possible that by participating in the study, individuals were able to notice the benefits of regular exercise.
Personality Traits and Positive Reinforcement in Exercise

The evidence that physical activity has a positive effect on physical and mental health continues to mount. Indeed, exercise has been shown to reduce the risk of chronic disease, increase self-esteem, decrease stress, reduce depressive symptoms, and help control obesity (Knapen, Vancampfort, Morie, & Marchal, 2014; Welsh, Robinson, & Lindman, 1998). Yet, only 48% of adults in America meet the national recommended activity guidelines for adults. Specifically, 150 minutes of moderate aerobic activity a week, as well as at least two separate occasions of performing muscle strengthening activities are recommended (CDC, 2014). For many, a decline in physical activity occurs during the transition from adolescence to college; 70.7% of high school students meet the recommended physical activity guidelines, but among college students, this drops to 47.6% (Nelson, Gortmaker, Subramanian, & Wechsler, 2007). This timeframe, coined “emerging adulthood,” consists of a phase of identity exploration and independence (Arnett, 2000). Often, students are on their own for the first time in their lives and lack the structure they may have had beforehand. It is during in these years of exploration that many critical life decisions and health habits are established (Ehlinger, Laska, Lust, Pasch, & Story, 2009).

Several studies have found that college students have many opportunities to make negative health choices -- for example high amounts of screen time, sedentary behavior, poor nutrition choices, smoking, skipping meals, and heavy drinking (Ehlinger et al., 2009; Laska, Lust, Mathur, & Stigler, 2014; Odlaug, 2014). The effects of these negative health behaviors can be seen in the increased incidence of obesity in college students in recent years (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). These rising obesity trends on campuses – which are likely to carry over into adult society -- could be prevented with consistent physical activity...
(Armstrong, Henderson, Williams, & Burcin, 2014). Therefore, more research is necessary to understand what factors influence college students’ exercise habits.

Researchers have proposed that both external and internal factors determine success in exercise. For example, gender has been found to play a significant role in exercise behavior. Chun-Yan Chan (2014) reported that on average, male participants exercised more often and for greater durations than female participants. Additionally, they reported that internal thoughts such as “exercise tires me” and “exercise takes too much of my time” negatively impacted the individual’s decision to exercise. External influences on exercise behavior included (a) support from family and friends, which often has a positive impact, as well as (b) the monetary cost of utilizing a fitness facility, which typically has a negative effect.

**Personality and Exercise**

Some theorize that one major internal factor contributing to exercise adherence may be an individual’s personality type and the specific traits that s/he exhibits (Courneya, Bobick, & Schinke, 1999); that is, individuals exhibiting certain personality types may react to exercise differently (MacCann, Todd, Mullan, & Roberts, 2015). The most widely accepted trait theory of personality, The Five Factor Model, organizes personality traits in terms of five basic dimensions: extraversion, conscientiousness, neuroticism, agreeableness, and openness (Digman, 1990). In past studies of personality and exercise, extraversion has been of particular interest. Overall, individuals who score highly on extraversion are described as outgoing, confident, and possessing an overall positive affect (Murray, McNeil, Lowman, & Fleeson, 2009), and extraversion has been linked positively to exercise behavior in the literature (Buckworth, Granello, Belmore, 2002; Mathers, & Walker, 1999; Saklofske, Austin, Rohr, & Andrews, 2007). Buckworth, Granello, and Belmore (2002) conducted a correlational study to identify the...
relationship between extraversion and success in exercise adherence. The researchers found that those who displayed high levels of extraversion were likely to find success in maintaining an exercise regimen. Saklofske, Austin, Rohr, and Andrews (2007) also reported a positive association between exercise behavior defined as self-reported hours of exercise per week and extraversion. Similarly, Mathers and Walker (1999) identified those who scored high in extraversion as more likely to be regular exercisers. On the other hand, Potgieter and Venter (1995) found no significant difference in extraversion scores between exercise adherers and exercise dropouts. This discrepancy may be due to the methodology of their study. Unlike the other studies which used self-reports of physical activity participation, Potgieter and Venter (1995) defined a dropout as a participant who did not sign up to use the university gymnasium the following year. These participants may not necessarily have stopped exercising. For example, they may have signed up for a different gym, moved, or found another form of exercise outside of a gym environment (e.g., walking, running, biking).

Another personality trait of interest to the current study is neuroticism. Those who score high in neuroticism exhibit high levels of anxiety and generally negative affect (Watson, 1999). Potgieter, and Venter (1995) found that those who dropped out of an exercise program had higher scores in neuroticism compared to those who adhered throughout the year, which supported their initial hypothesis. Despite the incentive of a free workout session after completing their questionnaires, those who scored higher in neuroticism were less likely to come back to the campus gymnasium. Potgieter and Venter (1995) interpreted this as representing a possible association between high levels of neuroticism and negative attitudes towards exercise. In a separate study, Rhode, Coumeya, and Hayduk (2002) reported that those who scored high in neuroticism showed a significant effect of subjective norm towards exercise – with subjective
norm being defined as perceived social pressure to begin an exercise regimen. In other words, individuals who displayed neurotic tendencies reported being affected more by social pressure to start exercising and therefore expressed higher intent to do so even if they did not follow through. Subjective norm was measured through a questionnaire that included items such as “I feel pressure to exercise regularly in the next two weeks from most people in my social network” and “most people in my social network would approve if I exercised regularly in the next two weeks” (Courneya, Bobick, & Schinke, 1999). All in all, extraversion has been mostly shown to have a positive relationship whereas neuroticism exhibits a negative relationship with exercise behavior. Drawing on the Health Belief Model (Saklofske, Austin, Rohr, & Andrews, 2007), the proposed study will extend these findings by also considering the specific beliefs correlated with each personality type that may encourage or discourage exercise.

The Health Belief Model

The Health Belief Model (Saklofske, Austin, Rohr, & Andrews, 2007) has been utilized to attempt to explain the associations between extraversion, neuroticism, and regular exercise. This theory contains four judgements that people may consider when making a health-related behavior change. The first of these is “perceived severity,” or the perceived consequences individuals believe will occur if they do not carry out the positive health behavior. Next is “perceived susceptibility,” which is the degree of risk the individuals believe they will face if they perform the health behavior. “Perceived benefits” are the positive results from the individuals’ actions, such as bettering their health. Last, “perceived barriers” are factors that the individuals believe will interfere with their ability to perform the health behavior (e.g., time restrictions, lack of self-motivation, shortage of confidence, not finding exercise to be enjoyable, or a fear of being injured; CDC, 2011).
Perceived barriers, in particular, are considered a primary reason why someone might have trouble maintaining an exercise regimen. For example, Simonavice, and Wiggens (2008) measured perceived barriers among college students using the barriers section of the Exercise Barriers/Benefits Scale (Sechrist, Walker, & Pender, 1985); those who were not currently exercising listed significantly more perceived barriers to exercise than those who reported participating in a regular fitness regimen. The researchers posited that (a) those who have found success in exercise may have overcome these barriers over time, or (b) they may not have been susceptible to such obstacles in the first place.

Saklofske, Austin, Rohr, and Andrews (2007) found no significant association between extraversion and any of the four components of the Health Belief Model. However, they reported a negative association between neuroticism and both (a) perceived benefits and (b) perceived susceptibility to exercise. Both of these beliefs could be argued as possible explanations for the observed negative attitude towards exercise seen in individuals exhibiting neurotic traits. For example, if someone does not regard exercise as a beneficial behavior, s/he may be likely to have no inclination to exercise. Also, if people feel that they have a high chance of getting injured while exercising they may avoid that behavior.

The current study will expand upon the analysis of health beliefs or combination of health beliefs common within each personality trait that may contribute to an individual’s exercise behavior based on their stage of change according to the Transtheoretical Model (Cancer Prevention Research Center, 2007). By doing so, researchers and practitioners may identify where individuals need the most support. Meaning that, once a person’s personality traits and stage of change are identified, a focus on either (a) increasing exercise benefit beliefs and/or (b) decreasing barrier beliefs could become the focus their specific intervention.
The Transtheoretical Model

By definition, behavior change is necessary for a non-exerciser choosing to begin and maintain a regular exercise routine (Buckworth et al., 2002). The Transtheoretical Model (Buckworth et al., 2002; Marcus, Selby, Niaura, & Rossi, 1992; Simonavice, & Wiggens, 2008) has often been used to conceptualize an individual’s journey towards health behavior change. This model -- originally created to help explain the process individuals may go through as they decide to quit smoking -- has been adapted over the years to apply to other areas of positive health changes, such as exercise (Cancer Prevention Research Center, 2007). The Transtheoretical Model includes six stages, from pre-contemplation to termination, that together describe the process of making a health-related behavior change.

In the current context, individuals in the pre-contemplation stage have not realized that their lack of exercise has risks, but they are beginning to think about what will happen if they continue their sedentary behavior. This is followed by contemplation, which is when they have started to think about beginning an exercise program. Next is the planning stage, this is when someone intends to start an exercise regimen within the next 30 days. This stage is followed by action, when individuals act on their intent and start exercising. Once regular exercise has lasted at least 6 months and an individual intends to continue their current behavior, s/he is in the maintenance stage. When all goals are reached and the individual has full faith that s/he will not relapse into sedentariness, s/he has entered the final phase, titled termination. This phase is not often considered in the literature, as it is rare for someone to reach this point (Boston University School of Public Health, 2013). Research has found that those in the initial stages (pre-contemplation and contemplation) have a more difficult time adhering to an exercise regimen (Buckworth et al., 2002; Simonavice, & Wiggens, 2008). Both of these studies chose to focus on
stages of change, exercise behavior, and self-efficacy scores. Self-efficacy is defined as the beliefs in one’s ability to participate or succeed in a particular behavior (Bandura, 1994). The two aforementioned studies utilized the Stages of Exercise Behavior Change Questionnaire (Marcus, Selby, Niaura, & Rossi, 1992) to place participants into one of the six stages based on their responses, then compared the groups’ self-efficacy scores. As predicted, both studies noted that those in the pre-contemplation and contemplation stages scored significantly lower in perceived self-efficacy than those in the other stages. Buckworth et al. (2002) sought to identify the relationship between personality and the stages of change from the Transtheoretical Model; they found that extraverted individuals reported higher levels of self-efficacy than neurotic individuals (Buckworth et al., 2002).

Overall, the extant literature has found that exercise adherence is lowest for those in the first two stages of the Transtheoretical Model (Buckworth et al., 2002; Marcus, Selby, Niaura, & Rossi, 1992; Simonavice, & Wiggens, 2008). With an understanding of the Transtheoretical Model, this conclusion is intuitive. An individual who has only just begun thinking about starting an exercise regimen may have no confidence in her/his exercise ability, since s/he have not participated in such behavior before or for a long period of time. The proposed study will seek to obtain a further understanding of what it is that discourages those in the first two stages of change from initiating an exercise program specifically, reported health barriers/benefits. Further, a potential positive reinforcement intervention will be trailed. By doing so, a relationship between the Health Beliefs Model, the Transtheoretical Model, and the potential intervention may be established.

Positive Reinforcement
Behavior change can be promoted in many ways, including motivational interviewing, goal setting, and self-monitoring (Abraham, & Michie, 2008; Rollnick, Miller, Butler, & Aloia, 2008). One commonly used method is operant conditioning, specifically positive reinforcement for exercise behaviors (Skinner, 1953). Positive reinforcement occurs when a reinforcing stimulus, introduced after a certain behavior, promotes an increased chance of that behavior occurring again in the future. For example, an employee receives a paycheck for going to work; the money is the positive reinforcer that encourages the employee to continue working.

Some research in this topic area has demonstrated that reinforcement initially increases attendance at scheduled exercise sessions, but attendance then drops off over time (Hardman, Horne, & Lowe, 2011; Jeffery, Wing, Thorson, & Burton, 1998). However, others have concluded that positive reinforcement leads to long-term change (Pope, & Harvey-Berino, 2013). Hardman, Horne and Lowe (2011) randomly assigned children aged 7 to 11 years old to either the control condition or one of two levels of the treatment condition. In the reinforcement treatment group, children received a pedometer, peer modeling materials (i.e. activity diaries, letters, posters, and a song intended to motivate children to participate in physical activity), and verbal praise for reaching walking step goals. Children in the second treatment group received the pedometers and peer modeling materials, but they were not given verbal praise for reaching goals. Members of the control group received nothing. Initially, the researchers collected baseline data on the number of steps each participant took in a day. The researchers then recorded steps walked during the positive verbal praise condition and then again without verbal praise for reaching goals. Those who were in the full intervention phase took significantly more steps than those in the other two conditions. However, when the reinforcer was removed, the researchers found that activity decreased back down to baseline levels.
Instead of using verbal praise as an incentive, Jeffery, Wing, Thorson, and Burton (1998) conducted a study with obese adults who received money based on how many supervised walks they attended. The researchers had a control group and four different treatment groups (supervised exercise, trainer, incentive, and both trainer and incentive). Questionnaires on exercise levels, barriers to exercise, depression, binge eating, and nutritional intake were given each week. The researchers then recorded attendance at supervised walks. They found that attendance was highest in the condition where participants had a trainer as well as a monetary incentive. However, overall attendance decreased across all four treatment groups after 18 months.

On the other hand, Pope and Harvey-Berino (2013) reported positive reinforcement to be an effective method of long lasting behavior change. These researchers recruited participants on a college campus, utilizing monetary incentives to increase visits to the campus fitness center. Participants in the incentive group had access to a website that outlined fitness goals as well as fitness tips, and they were paid weekly for every time that they had worked out. The control group participants also had access to the website, but they did not receive monetary incentives. Attendance was recorded electronically at the campus fitness center. Goals increased as the experiment progressed, from one visit to the gym per week to five visits per week. Those participants in the incentive condition showed significantly greater levels of adherence to the program over 12 weeks than those in the control condition. However, data were not collected beyond the 12 weeks, so they did not observe exercise behavior after removal of monetary reinforcers. Unfortunately, there is no way to know whether the reinforcer led to long-term behavior change.
A common critique of utilizing reinforcers for exercise is that it potentially causes individuals to rely more on extrinsic motivation than intrinsic motivation (Pope & Harvey, 2015). Extrinsic motivators are factors found outside of the individual, such as approval from others and improved body image. In contrast, intrinsic motivation comes from enjoyment or seeking personal growth (Teixeira, Carraca, Markland, Silva, & Ryan, 2012). A majority of the extant research has used money for reinforcement, which is an example of an extrinsic motivator (Jeffery, Wing, Thorson, & Burton, 1998; Pope, & Harvey, 2015; Pope, & Harvey-Berino, 2013).

A study conducted by Pope and Harvey (2015) set out to determine whether reinforcement undermined intrinsic motivation. This particular study was conducted over the course of two semesters; participants were randomly assigned to one of three conditions; control, monetary incentives on a continuous schedule, or monetary incentives on a discontinuous schedule. Those initially in the continuous schedule condition received monetary reinforcement every time they reached their goals weekly in the fall semester, and then in the spring, they received money for randomly selected weeks. The discontinuous schedule group received money every week in the fall, but they received none during the spring semester. By offering the discontinuous schedule of reinforcement, the researchers hoped to assess whether there was a shift from extrinsic to intrinsic motivation when the monetary reinforcer was discontinued. Indeed, the researchers found that exercise adherence continued even following the suspension of reinforcer. The authors concluded that positive reinforcement did not leave participants with an overreliance on extrinsic motivation, and that intrinsic motivation levels did not decrease over the course of the semester (Pope & Harvey, 2015). Further, Sebire, Standage, and Vansteenkist (2009) found that those who displayed high levels of intrinsic motivation was positively
correlated with achievement in exercise, self-worth, and psychological well-being and was negatively correlated with anxiety. Drawing upon the literature, the current study will address the effectiveness of providing monetary reinforcement for exercise behaviors with college students while also addressing possible interactions with personality traits and health beliefs.

**The Current Study**

The current study analyzed the reported barriers and benefit beliefs that each participant held towards exercise. Understanding the barriers/beliefs that aid or hold individuals back from exercise can be helpful in identifying where someone is struggling. The individual may either not believe in the benefits of exercise or may be overwhelmed by barriers, for example. With an understanding of the current literature it is possible that these beliefs can shift as someone begins and continues with an exercise regimen.

Additionally, a majority of the current literature in this field is correlational and relies on self-report measures. Unfortunately, with self-report, participants have the opportunity to be intentionally or unintentionally dishonest. When correlated with objective measures, self-report has shown to exhibit response biases (Adams, Soumerai, Lomas, & Ross-Degnan, 1999). Pope and Harvey (2013) acknowledged that their data may have not provided them with a full understanding of their participant’s actual exercise behavior due to their lack of objective measures of exercise behavior. By tracking only a sign in to the fitness center, there was no evidence for exercise being completed by their participants. The current study will therefore incorporate objective means of measuring exercise behavior (i.e., fitness tracking apps available on cellphones that detect and record movement).

The literature in exercise science would also benefit from a study that combines personality traits and positive reinforcement. Identifying a relationship between the two would
offer guidance in selecting an appropriate method for behavior change for a specific individual. By knowing which behavior change methods work for differing personality traits, clinicians may be able to determine where to begin with their clients. This may lead to less trial and error in selecting behavior change methods for each individual as well as less chance for failure. Therefore, the purpose of the proposed study was to analyze the effects of positive reinforcement on levels of exercise adherence in college students while also assessing the possibility that personality factors moderate the relationship, specifically focusing on extraversion and neuroticism.

**Hypothesis 1:** Following the intervention, participants’ health perceptions will differ from the initial assessment. Specifically, (a) higher levels of perceived severity, (b) lower levels of perceived susceptibility to exercise, (c) higher perceived benefits of exercise, and (d) lower levels of perceived barriers to exercise, according to the Health Belief Model, will be reported.

**Hypothesis 2:** The number of workouts each participant completes will be greater during the reinforcer intervention weeks compared to the control weeks.

**Hypothesis 3:** Personality type will act as a moderator. Specifically, extraverted traits will significantly strengthen the relationship between positive reinforcement and exercise behavior to a greater extent than neuroticism.

**Method**

**Participants**

There were sixteen students aged 18 to 25 years old attending The College at Brockport, State University of New York who were recruited as participants. Charness and Gneezy (2009) reported an effect size of 0.60 in their study on incentives and their ability to increase exercise behavior in university students. Knowing this, the current study estimated a conservative effect
size of 0.45. Power analysis of this effect size indicated that 80 participants would have been necessary to obtain the recommended statistical power of 0.80 (Cohen, 1988), but unfortunately, this minimum sample size was not achieved. The sample was predominantly female (63%) and Caucasian (81%). Recruitment for this study occurred (a) through flyers placed around campus as well as (b) via the psychology department’s subject pool for introductory psychology students who are given the opportunity to participate in research. Participation was voluntary and included students who expressed a desire to begin an exercise program. To screen out exercisers from non-exercisers, participants completed The Exercise Stages of Change Questionnaire prior to the first assessment (Cancer Prevention Research Center (2007). For those who registered through the online system used to track introductory psychology student research participation, completion of this questionnaire was required before registering for the study. Anyone who expressed interest after learning about the study from a flyer was asked to email the primary investigator. A copy of the questionnaire was then emailed to the potential participant, who completed and returned it. Interested individuals whose scores indicated placement into one of the first two phases of the Transtheoretical Model (pre contemplation or contemplation) for exercise behavior were selected for participation in the study. Monetary compensation of $5.00 was offered to all participants for the first and second assessment sessions. Those who signed up through the online system had the option for class credit in place of money. Also, throughout the reinforcement phase of the study, those who met their exercise goals were entered into weekly drawings for $50.00. Of the sixteen participants who originally enrolled in the study, ten participants completed the entire study.

Measures
Prior to registering for the study, participants completed the following self-report measure to determine their current stage of exercise behavior (See Appendix C).

**Exercise Stages of Change Questionnaire.** The Exercise Stages of Change Questionnaire (Cancer Prevention Research Center, 2007) was administered to assess where participants currently were in their progress towards physical activity behavior change. This particular measure was developed by a group at the Cancer Prevention Research Center at the University of Rhode Island, headed by James Prochaska, the psychologist who originally theorized the Transtheoretical Model. The shortened version includes four items on past and current exercise as well as intent for future exercise. Sample items include, “I am currently physically active” and “I intend to become more physically active in the next 6 months.” The participant answers each item with a yes (1) or no (0). Scores of zero or one from each question are added together to give a final score that determines the stage of change that the participant is currently in (i.e. pre contemplation, contemplation, preparation, action, maintenance, and termination). A score of zero or one indicates that the participant is not currently physically active.

**Demographic Questionnaire.** Demographic information -- including gender, age, academic year, and race/ethnicity – were collected for descriptive purposes (See Appendix C).

**Physical Activity Readiness Questionnaire (PAR-Q).** Responses to The Physical Activity Readiness Questionnaire were utilized to determine the ability of each participant to begin engaging in exercise safely (See Appendix C). It includes items such as “Do you feel pain in your chest when you do physical activity?” or “Do you have bone or joint problems (for example, back, knee, or hip) that could be made worse by a change in your physical activity?” These questions are answered either yes or no. If any participant answered yes to one or more of
the seven items, they would have had to receive a note from a physician granting them permission to start working out. This was to ensure that everyone was safe and to reduce the chance of injuries. For the current study, none of the participants required a physician note based on their responses to this questionnaire.

**Exercise Barriers/Benefits Scale.** The Exercise Benefits and Barriers Scale was developed to assess individuals’ perceptions of exercise (Sechrist, Walker, & Pender, 1985). This measure includes 43 statements obtained from both the literature and interviews. Example items include “exercise is hard work for me,” “It costs too much to exercise,” and “I have improved feelings of well-being from exercise.” These statements are rated on a scale from strongly disagree (1) to strongly agree (4). Exercise-averse statements are reverse-scored, and item scores are summed (range 43-172). Higher scores indicate the participant reported a positive image of exercise. Evaluation of the measure resulted in nine factors, four barriers and five benefits. This measure has been found to have high test-retest reliability, $p = .89$ as well as internal consistency estimates (Cronbach’s alpha = .95). However, for the current study, Cronbach’s alpha calculations were at an unacceptable level of 0.41.

**Big Five Personality Test.** To measure personality, The Big Five Personality Test (Goldberg et al., 2006) was administered. This test was created by the International Personality Item Pool, a collaboration that develops publically available personality measures; the measure includes fifty items that are rated on a scale from 1 (disagree) to 5 (agree). Items include statements such as “Pay attention to details,” “Don’t talk a lot,” and “Talk to a lot of people at parties.” Items for each of the five personality factors or dimensions (extraversion, conscientiousness, neuroticism, agreeableness, and openness) are randomly distributed throughout the questionnaire, with some of the items for each factor reverse-scored. All item
scores for each factor are added together to get the final results. The score in each personality factor ranges from zero to forty. The higher the score, the greater that individual displays the specific trait. One study that used this measure estimated the internal consistencies for each of the five scales in this measure to be high, with the lowest being $p = 0.79$ (Gow, Whiteman, Pattie, & Deary, 2005). For the purposes of the current study, only the items pertaining to extraversion and neuroticism were administered. Additionally, for current purposes, each participant’s scores were categorized as high, average, or low in extraversion and neuroticism. As suggested by the creators of the questionnaire, the means for the sample were calculated. Scores that fell between one half of the sample’s standard deviation above and below the mean was categorized as an average level of the personality trait. Scores that fell outside of that range were classified as either high or low in that particular personality trait. Following administration of this shortened version, internal consistency was calculated. Cronbach’s alpha was 0.16, which falls in the unacceptable range.

**Procedure**

Participants attended an initial assessment session at the research laboratory where following informed consent they completed the demographic questionnaire, Physical Activity Readiness Questionnaire, Exercise Barriers/Benefits Scale, and Big Five Personality Test. Participants were then assigned a participant number and received the address of the study website. The website offered physical fitness tips through publically available fitness articles. They were then sent a google document to utilize as a place to record the duration of type of workout they completed each week that could only be seen by the participant and the head researcher. In order for a recorded workout to count towards the set goals, participants needed to complete a minimum of thirty minutes of physical activity at a time. To ensure that the
participants did complete thirty minutes of activity, they submitted screenshots of their workouts, as recorded through an app of their choosing (e.g. Map My Run, Map My Walk, Strava, Samsung Health, Google Fit, Nike+, and Fitbit). Participants were asked to select one app from a variety of examples (see Appendix A). Following a cross over research design, each participant was randomly assigned to be in either the control or experimental condition for the first four weeks. Over the first four weeks, participants in the treatment condition had goals set for them to reach that were preset by the head researcher. Week one had a goal of two workouts that week, week two had a goal of three workouts that week, week three was four workouts for the week, and week four was five workouts for the week. Those who were in the control condition recorded the number of workouts that they completed but were not given the outlined goals. When the record of workouts for someone in the intervention condition was uploaded, the participant received the email reinforcer. Emails from the head researcher congratulated participants, encouraged them to keep up the good work, and reminded them how many workouts were left to reach their goal for that week. Additionally, those in the treatment condition who reached the weekly goals were included in a drawing for a monetary prize given out to one participant each week; this was intended to serve as an additional incentive. After the first four weeks, those from the initial control condition received the reinforcement intervention and those who had previously received the intervention were switched to the control condition, allowing within subjects data to be collected. After these exercise habits had been recorded over eight weeks, participants returned to the lab to complete the Exercise Barriers/Benefits Scale. The scores from the control weeks were utilized as a baseline measure and compared to the scores of exercise during the intervention.
Results

Variable correlations and descriptive statistics can be found in Appendix A (Table 2, 3, and 5). This study set out to determine the reported barriers and benefits of exercise that participants indicated before and after an intervention. It was predicted that reported barriers would decrease and benefits would increase following completion of the study. A paired-samples t-test was conducted to compare the levels of barriers and benefits reported by participants. There was a significant change in benefit scores before ($M = 81.70, SD = 9.71$) versus following the study ($M = 89.70, SD = 12.26$); $t(9) = -2.98$, $p = 0.0075$, $d = 0.72$. These results suggest that participants believed there to be a greater benefit to exercise after participating in the study, supporting Hypothesis 1.

Further, it was predicted that physical activity levels would be significantly higher during the intervention weeks than the control weeks. However, physical activity levels were not significantly higher during the positive reinforcement intervention weeks ($M = 6.07, SD = 6.03$) than the control weeks ($M = 5.07, SD = 6.21$), refuting hypothesis 2. Individual workout behavior can be seen in Table 4, Figure 1.1, and Figure 1.2 in Appendix B.

Additionally, this study set out to determine whether personality factors (Extraversion and Neuroticism) would act as moderators between participant’s exercise behavior and the positive reinforcement intervention. It was predicted that extraversion would significantly strengthen the relationship between positive reinforcement and exercise behavior. A 2 (Condition; control vs. positive reinforcement weeks) X 2 (Order effects: control then positive reinforcement vs. positive reinforcement then control) X 3 (Extraversion score; high vs. average vs. low) X 3 (Neuroticism score; high vs. average vs. low) mixed factorial ANOVA was conducted to identify the relationships between these factors. However, no significant results
were noted, thus Hypothesis 3 was not supported (specific results can be found in Appendix A, Table 1).

**Discussion**

The purpose of this study was to test a possible positive reinforcement intervention aimed to increase exercise behavior in college students who fell into the first two phases of the Transtheoretical Model. A secondary aim of the study was to evaluate participant’s personality characteristics and Barriers/Benefits beliefs. It was expected that the participants’ scores on the Exercise Barriers/Benefits Scale would differ after completion of the study. Indeed, there was a significant difference in participants’ beliefs about the benefits of consistent physical activity after participating. It is possible that even in that short amount of time, participants were able to experience the well-known benefits of exercise such as stress relief and confidence. If this was the case, it is worth noting that exercise benefit beliefs can improve quickly for some. Demonstrating a positive regard towards exercise could lessen the difficulty of overcoming barriers to exercise over a longer period of time.

As the results of this study show, there were no significant differences in barriers that the sample reported before and after the intervention despite the increase in benefit beliefs. This could be due to the busy schedule of an average college student. It is possible that being enrolled in classes, being employed, and living on campus with their peers could impede on their time and lead them to believe that there are difficult barriers to overcome before exercising. Future research should seek to specifically identify which barriers to exercise are most commonly reported amongst college students rather than an overall score on their beliefs. By doing so, those common barriers can be addressed specifically for someone struggling to begin a workout regimen.
Additionally, it was predicted that the participants would respond well to the positive reinforcement intervention as shown through significantly increased physical activity levels. However, the results indicated no significant difference in activity for participants during the control versus intervention weeks. Individually, four of the participants worked out to a greater extent during the positive reinforcement intervention condition than the control condition as was predicted. This could indicate that some participants responded well to having pre-set goals and positive reinforcement while others did not. It is possible that this observation was due to personality differences as hypothesized (Courneya, Bobick, & Schinke, 1999). Further, between the two personality factors, it was expected that higher extraversion scores would significantly strengthen the relationship between positive reinforcement and exercise more so than high scores in neuroticism. However, no significant interactions were found involving either personality factor. It is possible that other personality variables accounted for these results (i.e. conscientiousness, openness, and agreeableness).

There are some limitations inherent in the current study. First and foremost, the sample was not large enough to reach the recommended statistical power. Perhaps conducting the study during the academic year kept interested individuals from signing up. Students tend to have many competing responsibilities during the academic year that they don’t have during breaks including classes, school work, and participation in various organizations on campus. Future research could try and follow a similar protocol over a break when potential participants do not have academic responsibilities interfering. Another possible explanation for the small sample size is the way recruitment was conducted. The online system only reached out to those in introductory psychology classes and flyers were only visible to those who attended class on campus. It may be beneficial to send out a school-wide/department wide email advertising the
study, thus allowing commuters and upperclassmen to become more aware of the study. Further, the length of the study could have deterred interested individuals. Committing to a study for eight weeks can be very time consuming for a student’s already busy schedule. Additionally, the sample was from one university, which would have made it difficult to generalize any significant results to the college-aged population as a whole. Generalizability is compromised as well by only recruiting emerging adults who are attending college. There are individuals who fall in the age range of emerging adulthood who are not college students. Therefore, the results do not extend to emerging adults who have differing lifestyles and responsibilities. Further, those who choose to participate were volunteers, which may already make them differ systematically from non-volunteers. For example, volunteers may have a stronger desire to begin exercising than the general population of those in emerging adulthood who are in the first two stages of change according to the Transtheoretical Model. It is also possible that the sample size was small due to the restriction of participants to those who fell into the first two stages of change. Students could have been interested but were already currently exercising and could not register for the study. The final limitation of the current study could be the overall length of time of the intervention. It is possible that four weeks of the intervention was not long enough to elicit long-term change or any change at all. Additionally, the pre-set goals were not individualized to each participant based on their current physical fitness level or previous experience with exercising. It is possible that the goals were set too high for participants, which could have discouraged them from exercising.

Fully understanding what factors influence exercise habits is crucial to helping people to establish a successful physical activity regimen. Knowing what methods work best for establishing behavior change in each person may increase physical activity for many. Programs
catering to college students could be implemented to combat the trends of rising obesity rates and negative health habits observed across campuses (Laska, Lust, Mathur, & Stigler, 2014). By doing so, students’ physical and mental well-being as well as the health choices they make throughout the rest of their lives may be positively affected (Ehlinger et al., 2009).

To reach this point, further research must be conducted, as previous research has found correlations between extraversion and neuroticism scores on the one hand and exercise beliefs and habits on the other (Austin, Rohr, & Andrews, 2007; Buckworth, Granello, Belmore, 2002; Mathers & Walker, 1999; Rhode, Coumeya, & Hayduck, 2002; Saklofske, Potgier & Venter, 1995). Specifically, future research could test the other three personality traits from the Five Factor Model, including conscientiousness, openness, and agreeableness. Only studying two of the five traits could limit clinicians if they encounter an individual who could be categorized as low in both extraversion and neuroticism, for example. Individuals who score high in conscientiousness may respond best to the positive reinforcement intervention based on previous studies which have found that traits such as self-motivation and vigilance in completing tasks were linked strongly to persevering in an exercise program (Courneya & Hellsten, 1998). Future research should address these various traits to get a complete picture of an individual by collecting scores on all five of the personality factors.

Additionally, the findings of this study may have differed with a larger and more diverse sample size. It would still be worth investigating the interaction between extraversion and neuroticism with positive reinforcement in exercise behavior with a larger sample size. Future research should also analyze other behavior change methods that are available, such as action planning, modeling, and goal setting (Abraham & Michie, 2008; Rollnick, Miller, Butler, &
Aloia, 2008). These methods may be utilized for those who do not find success with a positive reinforcement intervention.

Maintaining a regular exercise regimen is important for both physical and mental health. However, behavior change can be a difficult task to accomplish without an intervention. Developing a greater understanding of various exercise interventions can influence the specific method selected for each individual. As the findings of this study indicate, beliefs towards exercise may be important to address. Over the course of eight weeks, the participants reported significantly higher beliefs towards the benefits of exercise. Although this didn’t translate to actual exercise behavior in the current study, it is possible that this alteration of beliefs led to the first step of behavior change according to the Transtheoretical Model (i.e. Pre-contemplation to Contemplation). Perhaps, by increasing an individual’s beliefs towards the benefits of exercise, they can make that jump from pre-contemplation to contemplation by thinking about engaging in exercise behavior. Further, as their beliefs towards barriers did not significantly change in the current study, it is possible that barriers were what kept the participants from continuing on to the action stage (i.e. actual exercise behavior). Future research should address specific barriers in an effort to help individuals move from Contemplation to Action. Additionally, it is possible that personality type could influence an individual’s response to positive reinforcement. Despite non-significant results in the current study, there are three other personality types that could be addressed with a larger sample size. Identifying possible relationships between benefits, barriers, and personality type may eventually provide an extremely useful tool for counselors or personal trainers to help their clients reach and maintain their exercise goals.
References


### APPENDIX A

#### Table 1

*Mixed Analysis of Variance of Exercise Behavior by Personality Type, Positive Reinforcement Intervention, and Order of Intervention Administration*

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>Df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraversion</td>
<td>358.37</td>
<td>2</td>
<td>179.19</td>
<td>28.67</td>
<td>.131</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>67.23</td>
<td>2</td>
<td>33.62</td>
<td>5.38</td>
<td>.292</td>
</tr>
<tr>
<td>Order</td>
<td>95.12</td>
<td>1</td>
<td>95.12</td>
<td>15.22</td>
<td>.160</td>
</tr>
<tr>
<td>Intervention</td>
<td>1.36</td>
<td>1</td>
<td>1.36</td>
<td>1.63</td>
<td>.722</td>
</tr>
<tr>
<td>Intervention X Extraversion</td>
<td>20.38</td>
<td>2</td>
<td>10.19</td>
<td>1.63</td>
<td>.484</td>
</tr>
<tr>
<td>Intervention X Neuroticism</td>
<td>19.87</td>
<td>2</td>
<td>9.94</td>
<td>1.59</td>
<td>.489</td>
</tr>
<tr>
<td>Intervention X Extraversion X Order</td>
<td>30.82</td>
<td>1</td>
<td>30.82</td>
<td>4.93</td>
<td>.269</td>
</tr>
<tr>
<td>Intervention X Neuroticism X Order</td>
<td>2.82</td>
<td>1</td>
<td>2.82</td>
<td>.45</td>
<td>.62</td>
</tr>
<tr>
<td>Intervention X Extraversion X Neuroticism X Order</td>
<td>2.02</td>
<td>1</td>
<td>2.02</td>
<td>.32</td>
<td>.67</td>
</tr>
</tbody>
</table>

*Note.* SS = Sum of Squares. Df = Degrees of Freedom. MS = Mean Square Error. F = F statistic. p = P-Value (significance).
Table 2

**Means and Standard Deviations of Personality Scores, Extraversion and Neuroticism**

<table>
<thead>
<tr>
<th>Personality Type</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraversion</td>
<td>17.19</td>
<td>7.80</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>20.13</td>
<td>8.65</td>
</tr>
</tbody>
</table>

Table 3

**Means and Standard Deviations of Barriers/Benefits Scores**

<table>
<thead>
<tr>
<th>Score</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barriers - Time One</td>
<td>32.00</td>
<td>7.15</td>
</tr>
<tr>
<td>Barriers – Time Two</td>
<td>29.80</td>
<td>6.93</td>
</tr>
<tr>
<td>Benefits – Time One</td>
<td>81.70</td>
<td>9.71</td>
</tr>
<tr>
<td>Benefits – Time Two</td>
<td>89.70</td>
<td>12.26</td>
</tr>
</tbody>
</table>
Table 4

*Number of Workouts – Control versus Intervention Weeks*

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Control</th>
<th>Intervention</th>
<th>Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>8</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>20</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>2</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>8</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>13</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>6</td>
<td>14</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note:* Order, 1 = control then intervention, 2 = intervention then control
Table 5

_Correlations between Extraversion Scores, Neuroticism Scores, Control Week Exercise Behavior, Intervention Week Exercise Behavior, Barrier at Time One and Two, and Benefits at Time One and Time Two_

<table>
<thead>
<tr>
<th></th>
<th>Extraversion Score</th>
<th>Neuroticism Score</th>
<th>Control Weeks Exercise</th>
<th>Intervention Weeks Exercise</th>
<th>Barriers – Time One</th>
<th>Barriers – Time Two</th>
<th>Benefits – Time One</th>
<th>Benefits – Time Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraversion Score</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Neuroticism Score</td>
<td>0.08</td>
<td>--</td>
<td>--</td>
<td></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Control Weeks</td>
<td>0.30</td>
<td>- 0.21</td>
<td>--</td>
<td></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Intervention Weeks</td>
<td>0.21</td>
<td>- 0.46</td>
<td>0.67*</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Exercise Barriers – Time One</td>
<td>- 0.09</td>
<td>- 0.19</td>
<td>0.03</td>
<td>0.33</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Barriers – Time Two</td>
<td>0.57</td>
<td>0.02</td>
<td>- 0.04</td>
<td>- 0.35</td>
<td>- 0.08</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Benefits – Time One</td>
<td>- 0.38</td>
<td>0.12</td>
<td>- 0.25</td>
<td>- 0.36</td>
<td>- 0.36</td>
<td>- 0.14</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Benefits – Time Two</td>
<td>- 0.20</td>
<td>- 0.11</td>
<td>- 0.20</td>
<td>- 0.10</td>
<td>- 0.09</td>
<td>- 0.55</td>
<td>0.73*</td>
<td>--</td>
</tr>
</tbody>
</table>
APPENDIX B

Figure 1.1 – Recorded workouts per week for those in the control condition during the first four weeks
Figure 1.2 – Recorded workouts per week for those in the intervention condition during the first four weeks
APPENDIX C

(Initial Interest Email)

Dear Potential Participant,

Thank you for your interest in our exercise motivation study! This study is designed for those who wish to start exercising but have had trouble doing so on their own. If this describes you, we invite you to help test out our new supportive program. In addition to the positive results that exercise can bring, participants will be compensated $5.00 for the first assessment and $5.00 for the second assessment. Up to 100 students who are currently enrolled in PSH 110 may choose to receive research participation credits as compensation instead of being paid for these two sessions. Should you choose to participate, you will keep a record of your workout habits on the study’s website for a period of eight weeks. During four of these weeks you will be given increasing workout goals to strive for. Those that reach their goals each week will be entered in a weekly drawing for $50.00. If you are interested please sign up for one of our available assessment times listed below ...

... (list of dates, times, and locations)

If you have any other questions feel free to contact the lead investigator, Amy Schaefer at amals1@u.brockport.edu

(Weekly Reminder Email)

Dear ________,

This is just a reminder that on Sunday your weekly workout record is due. If you have reached the goal of X amount of workouts this week, you will be entered into our weekly drawing for fifty dollars!

We look forward to hearing from you,

Amy

(Reinforcing Emails)

Dear _____,

Congratulations on your completion of (workout) for (minutes/hours)!!!! We hope you had fun and that it made you feel great. Keep up the good work. X amount of workouts left till you reach your goal =) If you have any questions or suggestions feel free to contact me at amals1@u.brockport.edu

- Amy
Have you been thinking about working out but can’t seem to stick it out? We can help! Our study offers reinforcement and goals to instill workout habits into your daily life. If you are interested and would like more information contact Amy Schaefer at amals1@u.brockport.edu.
Find your Motivation

Motivation is what gets you started, habit is what keeps you going.

Jim Ryun

ARE YOU READY? Exercise becomes easier with just a little support!

Each week you will have an increasing goal to strive for: Those that reach it will be entered into a weekly drawing for $50.00!!

Here are your goals...

Week 1 (9/11-9/17): 2 workouts, 20 minutes each minimum
Week 2 (9/18-9/24): 3 workouts, 30 minutes each minimum
Week 3 (9/25-10/1): 4 workouts, 30 minutes each minimum
Week 4 (10/2-10/8): 5 workouts, 30 minutes each minimum
Don't Know Where to Start?

Starting to exercise can seem like a daunting task. Stereotypical workouts may seem difficult or may not strike your interest. Lucky for you, there are many options out there. Get out and find what you like. Here are some options to get you going and links to helpful articles.

* The College at Brockport has wonderful facilities for those who would like to learn how to lift weights or would like to use the cardio equipment. Personal trainers are available. Fitness Center Link: [http://www.brockport.edu/empass/fitt/fitness/index.html](http://www.brockport.edu/empass/fitt/fitness/index.html)

* Brockport also offers several group classes such as zumba, TRX, cycling, and yoga. The class schedule can be found here: [http://www.brockport.edu/empass/fitt/fitness/group.html](http://www.brockport.edu/empass/fitt/fitness/group.html)

Articles

General:

Specific weight lifting/zoom plans:
Demographics

1. What gender do you identify with?
   o Male
   o Female
   o Other

2. What is your year in college?
   o Freshman
   o Sophomore
   o Junior
   o Senior or above

3. What race/ethnicity do you identify with?
   o African-American
   o Asian-American or Pacific Islander
   o Caucasian
   o Hispanic/Latino
   o Native American or Alaskan Native
   o Other, please specify ___________________

4. What is your marital status?
   o Single
   o Married
   o Divorced/Separated
   o Widowed
   o Living together but not married

5. Do you have children?
   o Yes
   o No

6. Do you have a job outside school?
   o Yes
   o No
The Stages of Change Questionnaire

Physical activity includes activities such as brisk walking, jogging, cycling, swimming, or any other activity, such as gardening, in which the exertion makes you feel warmer or slightly out of breath.

<table>
<thead>
<tr>
<th>Question</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am currently physically active</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2. I intend to become more physically active in the next 6 months</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Scoring Algorithm

If (question 1 = 0 and question 2 = 0) then you are at stage 1.

If (question 1 = 0 and question 2 = 1) then you are at stage 2.
Big 5: In the table below, for each statement 1-20 mark how much you agree with on the scale 1-5, where 1=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree and 5=agree, in the box to the left of it.

<table>
<thead>
<tr>
<th>I…</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Am the life of the party</td>
<td></td>
</tr>
<tr>
<td>2. Get stressed out easily</td>
<td></td>
</tr>
<tr>
<td>3. Don’t talk a lot</td>
<td></td>
</tr>
<tr>
<td>4. Am relaxed most of the time</td>
<td></td>
</tr>
<tr>
<td>5. Feel comfortable around people</td>
<td></td>
</tr>
<tr>
<td>6. Worry about things</td>
<td></td>
</tr>
<tr>
<td>7. Keep in the background</td>
<td></td>
</tr>
<tr>
<td>8. Seldom feel blue</td>
<td></td>
</tr>
<tr>
<td>9. Start Conversations</td>
<td></td>
</tr>
<tr>
<td>10. Am easily disturbed</td>
<td></td>
</tr>
<tr>
<td>11. Have little to say</td>
<td></td>
</tr>
<tr>
<td>12. Get upset easily</td>
<td></td>
</tr>
<tr>
<td>13. Talk to a lot of different people at parties</td>
<td></td>
</tr>
<tr>
<td>14. Change my mood a lot</td>
<td></td>
</tr>
<tr>
<td>15. Don’t like to draw attention to myself</td>
<td></td>
</tr>
<tr>
<td>16. Have frequent mood swings</td>
<td></td>
</tr>
<tr>
<td>17. Don’t mind being the center of attention</td>
<td></td>
</tr>
<tr>
<td>18. Get irritated easily</td>
<td></td>
</tr>
<tr>
<td>19. Am quiet around strangers</td>
<td></td>
</tr>
<tr>
<td>20. Often feel blue</td>
<td></td>
</tr>
</tbody>
</table>
Example List of Physical Activity Tracking Apps

**Running/Walking**
- Map My Run
- Map My Walk
- Strava
- Samsung Health
- Google Fit
- Nike+
- Fitbit
- Pedometer

**Strength Training**
- Fit Notes-Gym Workout Log
- StrongLifts 5X5 Workout

**Biking**
- All Trails- Hiking and Biking
- Strava
- Map My Ride GPS Cycling Riding

- If a participant has a preferred app not on this list they will notify the experimenter
- Screenshots of completed workouts will be inserted into the participant’s personal Google Doc to record their exercise
Health Promotion Model - Instruments to Measure HPM Behavioral Determinants: Exercise Benefits/Barriers Scale [EBBS] (Adult Version)

Sechrist, Karen R.; Walker, Susan N.; Pender, Nola J.

http://hdl.handle.net/2027.42/85354
### EXERCISE BENEFITS/BARRIERS SCALE

DIRECTIONS: Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by circling SA for strongly agree, A for agree, D for disagree, or SD for strongly disagree.

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I enjoy exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>2.</td>
<td>Exercise decreases feelings of stress and tension for me.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>3.</td>
<td>Exercise improves my mental health.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>4.</td>
<td>Exercising takes too much of my time.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>5.</td>
<td>I will prevent heart attacks by exercising.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>6.</td>
<td>Exercise tires me.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>7.</td>
<td>Exercise increases my muscle strength.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>8.</td>
<td>Exercise gives me a sense of personal accomplishment.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>9.</td>
<td>Places for me to exercise are too far away.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>10.</td>
<td>Exercising makes me feel relaxed.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>11.</td>
<td>Exercising lets me have contact with friends and persons I enjoy.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>12.</td>
<td>I am too embarrassed to exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>13.</td>
<td>Exercising will keep me from having high blood pressure.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>14.</td>
<td>It costs too much to exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>15.</td>
<td>Exercising increases my level of physical fitness.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>16.</td>
<td>Exercise facilities do not have convenient schedules for me.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>17.</td>
<td>My muscle tone is improved with exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>18.</td>
<td>Exercising improves functioning of my cardiovascular system.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>19.</td>
<td>I am fatigued by exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>20.</td>
<td>I have improved feelings of well being from exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>21.</td>
<td>My spouse (or significant other) does not encourage exercising.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
<td>SD</td>
</tr>
</tbody>
</table>

(Continued on reverse side)
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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>22.</td>
<td>Exercise increases my stamina.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>23.</td>
<td>Exercise improves my flexibility.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>24.</td>
<td>Exercise takes too much time from family relationships.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>25.</td>
<td>My disposition is improved with exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>26.</td>
<td>Exercising helps me sleep better at night.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>27.</td>
<td>I will live longer if I exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>28.</td>
<td>I think people in exercise clothes look funny.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>29.</td>
<td>Exercise helps me decrease fatigue.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>30.</td>
<td>Exercising is a good way for me to meet new people.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>31.</td>
<td>My physical endurance is improved by exercising.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>32.</td>
<td>Exercising improves my self-concept.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>33.</td>
<td>My family members do not encourage me to exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>34.</td>
<td>Exercising increases my mental alertness.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>35.</td>
<td>Exercise allows me to carry out normal activities without becoming tired.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>36.</td>
<td>Exercise improves the quality of my work.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>37.</td>
<td>Exercise takes too much time from my family responsibilities.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>38.</td>
<td>Exercise is good entertainment for me.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>39.</td>
<td>Exercising increases my acceptance by others.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>40.</td>
<td>Exercise is hard work for me.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>41.</td>
<td>Exercise improves overall body functioning for me.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>42.</td>
<td>There are too few places for me to exercise.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
<tr>
<td>43.</td>
<td>Exercise improves the way my body looks.</td>
<td>SA</td>
<td>A</td>
<td>D</td>
</tr>
</tbody>
</table>

© K. Sechrist, S. Walker, N. Pender, 1985. Reproduction without authors' express written consent is not permitted. Permission is obtainable by downloading the Exercise Benefits/Barriers Scale (EBBS) Information and Permission Letter from deepblue.lib.umich.edu. If additional information is needed, contact Dr. Karen Sechrist by e-mail: krsech@pacbell.net.
EXERCISE BENEFITS/BARRIERS SCALE

Scoring Information

The instrument may be scored and used in its entirety or as two separate scales. The instrument has a four-response, forced-choice Likert-type format with responses ranging from 4 (strongly agree) to 1 (strongly disagree). Barrier Scale items are reverse-scored. Items on the Barrier Scale are numbers 4, 6, 9, 12, 14, 16, 19, 21, 24, 28, 33, 37, 40 and 42.

Missing data may be handled in one of two ways. If more than five percent of the items are unanswered, it is recommended that the response be discarded. If the missing item response rate is less than five percent, median substitution prevents falsely low scores.

Scores on the total instrument can range from 43 to 172. The higher the score, the more positively the individual perceives exercise. When the Benefits Scale is used alone, the score range is between 29 and 116. When the Barriers Scale is used alone, scores range between 14 and 56. If used alone, the Barriers Scale does not need to be reverse-scored. In this instance, the higher the score on the Barriers Scale, the greater the perception of barriers to exercise.
PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
2. Do you feel pain in your chest when you do physical activity?
3. In the past month, have you had chest pain when you were not doing physical activity?
4. Do you lose your balance because of dizziness or do you ever lose consciousness?
5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?
6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
7. Do you know of any other reason why you should not do physical activity?

PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

• start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
• take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

If you answered YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.
• You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
• Find out which community programs are safe and helpful for you.

DELAY BECOMING MUCH MORE ACTIVE:
• if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
• if you are or may be pregnant — talk to your doctor before you start becoming more active.

PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Informed Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

No changes permitted. You are encouraged to photocopy the PAR-Q but only if you use the entire form.

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

“I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction.”

NAME ____________________________________________

SIGNATURE ________________________________________ DATE ____________________________

SIGNATURE OF PARENT or GUARDIAN (for participants under the age of majority)

WITNESS __________________________________________

Note: This physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if your condition changes so that you would answer YES to any of the seven questions.