

HEALTH INTERVENTION IN FIRST SEMESTER FRESHMEN

An Evaluation of a Health Intervention for First Semester Freshmen

by

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Abstract

Studies have shown that exercise habits formed in college are maintained through post-graduation life. The purpose of this study was to present and evaluate a small group health intervention for use in a college setting. Twenty, first semester freshmen were recruited from general education courses to complete this study. Students were then randomly assigned to a control or experimental group with ten in each group. Both groups were given a battery of tests including; Godin Leisure-Time Exercise Questionnaire, Rodgers and Sullivan Self-Efficacy Survey, ten repetition max bench press, and ten repetition max leg press. A t-test was used to analyze data from the control and experimental groups and found no difference in pre-intervention scores at a 95% confidence level. The experimental group participated in a resistance training fitness class that met once a week for four weeks in small groups of three to four. After the four weeks, the experimental group was given a written program developed from exercises learned during the class to follow for an additional four weeks. At the end of the second four weeks both the experimental and control groups were asked to perform the same post tests. Using paired t-test a significant change was found for each measure in the experimental group, while no significant change was found in the control group at a 95% confidence level. This intervention was proven to be effective in self-efficacy, physical activity, and muscular strength. Further research should be done to compare this intervention with other similar interventions. More research is needed to investigate long term effects of these interventions in subsequent years during and even after college.

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HEALTH INTERVENTION IN FIRST SEMESTER FRESHMEN

Table of Contents

Abstract.....	ii
Acknowledgements.....	iii
Table of Contents.....	iv
List of Tables and Figures.....	v
Chapter	
1 Introduction.....	1
Problem Statement.....	3
Guiding Questions.....	4
Hypotheses.....	4
Definition of Terms.....	6
2 Review of Related Literature	8
Health Intervention Importance.....	8
Physical Activity.....	9
Self-Efficacy and Exercise.....	10
Muscular Strength	12
College Population Examined.....	14
3 Methodology	17
Design.....	17
Sample.....	17
Instruments.....	18
Procedures.....	20
4 Results.....	22
5 Discussion.....	27
Conclusions.....	28
Limitations.....	29
Recommendations.....	29
Implications.....	30
References.....	31
Appendix	
A PAR-Q Form	37
B Self-Efficacy Survey.....	39
C Godin Leisure-Time Exercise Questionnaire.....	41
D Weekly Written Programs.....	43
E Four Week Individual Written Packet.....	48
F Full Results Table.....	49

HEALTH INTERVENTION IN FIRST SEMESTER FRESHMEN

List of Tables and Figures

Table 1 – Classification of Total Weekly Amounts of Aerobic Physical Activity – 10

Table 2 – One-repetition Maximum Prediction Coefficients – 13

Table 3 – One-repetition Maximum Normative Ratios – 13

Table 4 – t-values, p-values, and related hypotheses in experimental group – 22

Table 5 – t-values, p-values, and related hypotheses in control group – 23

Figure 1 – Physical Activity Averages – 24

Figure 2 – Bench Press Averages – 24

Figure 3 – Leg Press Averages – 25

Figure 4 – Self-Efficacy Averages - 26

Chapter 1

Introduction

Rationale for the Study

Obesity and fitness related ailments have been steadily increasing in the United States placing a greater emphasis on proper health and wellness education and professional development for health educators performing health interventions (Borrell, 2014). *Healthy People 2020* (2010) suggested that physical activity and fitness are major factors in maintaining a healthy society. With proper education and training, fitness professionals can help the American public become more active and fit. To increase physical activity it is important to understand three aspects; 1) how and when are health habits formed, 2) how health professionals can enact changes on those health habits, and 3) how can these changes be assessed.

Increasing amounts of literature as noted by Keating's Meta-Analysis (2005) point to college as a key time in the formation of health habits. The same physical inactivity that typifies a large portion of the United States population is evident among college students. *Healthy Campus 2020* (2010) lists physical inactivity as a priority health risk for college students and college campuses. Only 43.6% of the college students surveyed by the American College Health Association met the adult physical activity recommendations (Haskell et al., 2007). Cullen et al. (1999) found that physical activity levels declined 62.5% during the transition from high school to college. In contrast, studies show that health habits formed in college can be steadily maintained throughout a person's post-graduate life (Sparling and Snow, 2002) (Fish, 1996). Sparling and Snow

(2002) found that from senior year in college, 84.7% of regular exercisers continued their regiment post-graduation, while 81.3% of non-exercisers were no more active post-graduation. These findings have led health and wellness experts to suggest that college-level physical education curricula and fitness opportunities available in college represent a vital opportunity to shape life-long physical activity habits of the general public.

If health habits are formed in college, how can a health professional help college age students become more physically active? According to the American Council on Exercise, over 50% of individuals who start an exercise plan quit after just six months (Bryant 2010). How can health professionals increase these odds? According to Keating (2005), “There are 2 strategies that public health professionals often employ, based on an examination of the literature: (1) changing the surrounding physical environments to integrate physical activity into daily routine activities and (2) providing complimentary sophisticated services as an amenity of the surrounding physical environments”(p. 116). These two strategies can easily be applied in a college setting. Many colleges have exercise facilities as well as trained health professionals in order to perform health interventions both on an individual and a larger scale basis (Leslie and Sparling 2001).

How can the success of health interventions be assessed? Many health interventions aim to increase the subjects’ physical activity levels. This is an important measure to look at as many studies use it as their main determinant of success (Leslie et al. 2000, Pinto & Marcus 1995, Wallace et al. 2000). However, the ideal level of physical activity is not widely agreed upon. The United States Department of Health and Human Services recommends moderate to vigorous activity three to five times per week for thirty minutes each time (2008). Healthy People 2020 suggests at least thirty minutes of

moderate physical activity every day (2010). No matter what suggested requirement chosen, level of physical activity is a widely used determinant for overall health and wellness.

One of the most telling determinants in adherence to exercise is a client's self-efficacy (Bryant 2010). Self-efficacy is the belief and conviction that one can perform a given activity (Caruso 1992). An increase in exercise self-efficacy can then be used to judge one form of success in personal training. Self-efficacy is not a simple measure. It takes more into account than just knowing how to do an exercise. Exercise self-efficacy, as it is defined in this study, deals with planning time to exercise, feeling comfortable while exercising, and using exercise for intrinsic reasons. All of these measures have been proven to increase adherence and boost motivation (Rodgers and Sullivan 2001).

Physical attributes can also be used to judge the effectiveness of a health intervention. Many measures like body composition, muscular strength, muscular endurance, aerobic capacity, and body weight can be used to assess progress. For this study, muscular strength was used to assess progress using the ten repetition maximum bench press and leg press. These two measures can assess a participant's upper body and lower body strength.

Problem Statement

According to Keating's (2005) Meta-Analysis of College Students' Physical Activity Behaviors, "Interventions to promote students' physical activity are still at an early stage and have only produced moderate effects"(p.117). Drawing from this Meta-Analysis, the researcher in this study investigated a type of physical activity intervention

by examining early interventions with college freshmen. There is limited research on early interventions in the freshman year. By developing a health intervention for college freshmen the researcher plans to affect change at an early stage in the students' college career. When freshmen are targeted in a resistance training based health intervention, how will self-efficacy levels, physical activity levels, and muscular strength be affected? Thus, the purpose of this study is to investigate a possible health intervention strategy and its effects on these three measures.

Guiding Questions

The following questions guided this study.

1. How does a four week small group training program followed by a four week written program affect a college freshman's exercise habits?
2. How does a four week small group training program followed by a four week written program affect a college freshman's muscular strength?
3. How does a four week small group training program followed by a four week written program affect a college freshman's exercise self-efficacy?

Hypotheses

The following four pairs of hypotheses guided this study.

The first null hypothesis was that a four week small group training program followed by a four week written program will decrease or have no affect on a college freshman's exercise habits as measured by the Godin Leisure-Time Exercise Questionnaire. The first research hypothesis is that a four week small group training

program followed by a four week written program will increase a college freshman's exercise habits as measured by the Godin Leisure-Time Exercise Questionnaire.

The second null hypothesis was that a four week small group training program followed by a four week written program will decrease or have no affect on a college freshman's muscular strength as measured by a ten repetition max bench press test. The second research hypothesis was that a four week small group training program followed by a four week written program will increase a college freshman's muscular strength as measured by a ten repetition max bench press test.

The third null hypothesis was that a four week small group training program followed by a four week written program will decrease or have no affect on a college freshman's muscular strength as measured by a ten repetition max leg press test. The third research hypothesis was that a four week small group training program followed by a four week written program will increase a college freshman's muscular strength as measured by a ten repetition max leg press test.

The fourth null hypothesis was that a four week small group training program followed by a four week written program will decrease or have no affect on a college freshman's exercise self-efficacy as measured by the self-efficacy survey used in research done by Rodgers and Sullivan (2001). The fourth research hypothesis was that a four week small group training program followed by a four week written program will increase a college freshman's exercise self-efficacy as measured by the self-efficacy survey used in research done by Rodgers and Sullivan (2001).

Definition of Terms

- Self-efficacy – is the belief and conviction that one can perform a given activity.
- Exercise Self-efficacy – the ability to plan time to exercise, feel comfortable while exercising, and use exercise for intrinsic reasons.
- Intervention – an orchestrated attempt to change another individual’s habits.
- Program – a designed set of workouts and interventions in order to increase self-efficacy.
- Physical activity – any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level
- Muscular strength – highest resistance that can be moved through the full movement range at a controlled movement speed.

Chapter Summary

With obesity and fitness related ailments steadily increasing in the United States, a greater emphasis must be placed on proper health and wellness interventions. With proper education and training, fitness professionals desire to help the American public become more active and fit. Health habits are typically formed during early adulthood while in college. Health professionals can enact changes on those health habits by providing well timed and effective health interventions and physical activity options. These changes are typically assessed by physical activity levels, physical attributes like strength and body composition, self-efficacy, and stages of behavioral change. In this study the researcher used a four week small group training class and a four week written

program to investigate a health intervention in freshmen college students with the goal of increasing exercise self-efficacy, muscular strength, and total physical activity.

Chapter 2

Review of Related Literature

Overview

The purpose of this study was to perform and evaluate a small group health intervention plan for first semester freshmen in a college setting. This chapter includes reviews of similar scholarly works and their application to the current study.

Health Intervention Importance

An increasing amount of literature suggests that physical activity on a regular basis is a primary factor in maintaining a healthy lifestyle (Healthy People 2020, Borrell 2014,). Many adults have jobs and live lives that make it difficult to obtain a level of physical activity needed to maintain a healthy lifestyle (Humpel, Owen, Leslie 2002). Only 45% of Americans engage in physical activity at the minimum recommended levels; this percentage has been on a steady decline since 1994 (Centers for Disease Control and Prevention 2013). A sedentary lifestyle has been one factor leading to the dramatic increase in overweight individuals (Borrell, 2014, Flegal, Carroll, Ogden, & Curtin, 2010). With a dramatic increase in the number of overweight individuals, comes a dramatic increase in health related illnesses and deaths. (Borrell, 2014, Humpel 2002) As a result, health professionals including personal trainers and group fitness instructors have been making efforts to promote physical activity. Increasing physical activity levels still remains a struggle for the general population. This struggle leads to studies such as the one performed here to develop strategies for increasing physical activity.

Physical Activity

Physical activity, as it is explained in the *2008 Physical Activity Guidelines for Americans*, is “any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level.” (p. 2) According to the same publication the benefits of physical activity include increased cardiovascular and muscular fitness, improved cardiovascular and metabolic risk factors, improved bone health, and improved body composition (US Department of Health and Human Services 2008). Vigorous leisure-time physical activity was also associated with life satisfaction in a study done on university students (Pedišić et al. 2015). Physical activity can then be broken down to baseline, or activities of daily living, ADLs, and health enhancing physical activity. ADLs are activities related to normal movements such as walking, standing, lifting objects, and the like. This is usually dependant on one’s job or lifestyle. Health enhancing physical activity is typically seen as an activity that is long enough in duration to raise heart rate, breathing rate, and possibly break a sweat. *The 2008 Physical Activity Guidelines for Americans* advocates for the increase of both baseline and health enhancing physical activity.

Many health interventions aim to increase the subjects’ physical activity levels. This is an important measure to look at as many studies use it as their main determinant of success (Leslie 2000, Pinto 1995, Wallace 2000). However, the ideal level of physical activity is not widely agreed upon. The United States Department of Health and Human Services recommends moderate to vigorous activity three to five times per week for thirty minutes each time (2006). Healthy People 2020 suggests at least thirty minutes of moderate physical activity every day (2010). Table 1 below lists *2008 Physical Activity*

Guidelines recommendations and classifications of weekly activity. No matter what suggested requirement chosen, physical activity is a widely used determinant for overall health and wellness.

Levels of Physical Activity	Range of Moderate-Intensity Minutes a Week	Summary of Overall Health Benefits	Comment
Inactive	No activity beyond baseline	None	Being inactive is unhealthy.
Low	Activity beyond baseline but fewer than 150 minutes a week	Some	Low levels of activity are clearly preferable to an inactive lifestyle.
Medium	150 minutes to 300 minutes a week	Substantial	Activity at the high end of this range has additional and more extensive health benefits than activity at the low end.
High	More than 300 minutes a week	Additional	Current science does not allow researchers to identify an upper limit of activity above which there are no additional health benefits.

(US Department of Health and Human Services 2008)

Self-Efficacy and Exercise

Bandura, a leader and pioneer in self-efficacy thinking, believes that self-efficacy determines whether one attempts to perform a given task, how persistent one is when difficulties are encountered, and ultimately how successful one is in performing the task.

In a work titled *Self-Efficacy Defined* (1994) Bandura writes,

“A strong sense of efficacy enhances human accomplishment and personal well-being in many ways. People with high assurance in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such an efficacious

outlook fosters intrinsic interest and deep engrossment in activities. They set themselves challenging goals and maintain strong commitment to them. They heighten and sustain their efforts in the face of failure. They quickly recover their sense of efficacy after failures or setbacks. They attribute failure to insufficient effort or deficient knowledge and skills which are acquirable. They approach threatening situations with assurance that they can exercise control over them. Such an efficacious outlook produces personal accomplishments, reduces stress and lowers vulnerability to depression.” (p.1)

It is a commonly accepted principle that self-efficacy is a primary predictor of exercise adherence (Fletcher, Banasik, 2001, Bryant 2010). As a mediator between physical action, motivation, and knowledge, self-efficacy impacts the intensity, duration, and type of activity chosen. These variables can determine the success and failure of an exercise program. McAuley and Blissmer (2000) found self-efficacy was directly correlated with exercise behavior. Exercise self-efficacy was found to be a critical variable leading to higher physical activity levels in college students (Sullum, Clark, King 2000). Self-efficacy was also listed to be a higher determinant of physical activity levels in females as compared to males (Wallace, Buckworth, Kirby, Sherman 2000). Studies by these researchers lead the investigator in this study to believe that an increase in self-efficacy would lead to an increase in physical activity.

Exercise self-efficacy as measured in this study relates to prior research done by Rodgers and Sullivan (2001). The purpose of their study was to examine three different types of self-efficacy: task, coping, and scheduling and their relation to levels of exercise involvement. From this research they produced a survey with questions in each field that related to self-efficacy and it's relation to exercise. This survey allowed the investigator the ability to quantify a normally qualitative measure.

Muscular Strength

The American Council on Exercise defines muscular strength as the “highest resistance that can be moved through the full movement range at a controlled movement speed” (Bryant 2010) (p. 317). Similar to muscular power and endurance, muscular strength is a common measure used to evaluate one’s progress and physical capabilities. Muscular power measures how fast a subject can generate force, while muscular endurance measures how long that force can be sustained. While there are many different techniques to gain muscular strength typical programs include performing exercises 2-6 sets of 6-12 repetitions per set (Baechle & Earle 2008).

Typical tests to measure strength include one repetition maximum, 10 repetition maximum, cadence lifting, and body weight movements such as push-ups or pull-ups. While one repetition maximum tests are the most popular, they may not be right for participants who are new to lifting. Novice lifters may not know proper form or be intimidated by heavy weights and quit before they reach their true maximum. (Bryant 2010) When this happens, tests of relative strength which rely on conversion factors can be used instead of one repetition maximum testing. The relative strength method used in this study is the 10 repetition method. Most people can complete 10 repetitions with 75% of their maximum resistance (Baechle & Earle 2008). Table 2 shows conversion factors to predict one repetition maximum when looking at repeated efforts in leg press and bench press developed by Brzycki (1993).

Number of Repetitions Completed	Leg Press Coefficient	Bench Press Coefficient
1	1	1
2	1.0475	1.035
3	1.13	1.08
4	1.1575	1.115
5	1.2	1.15
6	1.242	1.18
7	1.284	1.22
8	1.326	1.255
9	1.368	1.29
10	1.41	1.325

(Brzycki 1993)

Normative values for bench press strength and leg press strength for subjects under 20 years of age can be found in Table 3 (Cooper Institute 2004). It is important to note that these values are found by dividing the one repetition maximum by the subject's body weight.

		Female		Male	
Classification	Percentile	Leg Press	Bench Press	Leg Press	Bench Press
Superior	95	1.88	0.88	2.82	1.76
Excellent	80	1.71	0.77	2.28	1.34
Good	60	1.59	0.65	2.04	1.19
Fair	40	1.38	0.58	1.90	1.06
Poor	20	1.22	0.53	1.70	0.89
Very Poor	5	1.06	0.41	1.46	0.72

(Cooper Institute 2004)

College Population Examined

The special population that receives extra attention in this study and many others is the college student. Studies have shown that physical activity, or lack thereof, of the general population occurs in a similar frequency in the collegiate population (Stone 2002) Keating (2005) performed a meta-analysis of the physical activity adaption and maintenance in college students and found self-efficacy a major driving factor behind success. Joseph (2014) showed that physical activity among university students increased self-esteem and self-efficacy. *Healthy Campus 2020* (2010) lists physical inactivity as a priority health risk for college students and college campuses. Only 43.6% of the college students surveyed by the American College Health Association met the adult physical activity recommendations (Haskell et al., 2007). Cullen et al. (1999) found that physical activity levels declined 62.5% during the transition from high school to college. Studies also show that health habits formed in college can be steadily maintained throughout a person's life (Sparling and Snow, 2002) (Fish, 1996). Sparling and Snow (2002) found that from senior year in college, 84.7% of regular exercisers continued their regiment post-graduation, while 81.3% of non-exercisers were no more active post-graduation. These findings have led health and wellness experts to suggest that college-level physical education curricula and fitness opportunities represent a vital opportunity to shape life-long physical activity habits of college students (Sparling 2003). Research on how to do this is lacking (Ferrara 2009).

The common college health intervention was first taught in 1860 at Amhurst College as an activity based physical education course (Strand et al. 2010) Such courses gained popularity reaching a peak in 1972 when 94% of colleges were implementing the

classes (Strand et al. 2010). Between 1960 and 1990 most of these classes were molded to include some form of lecture or theoretical teaching (Strand et al. 2010). By the 1990s lecture and theoretical courses were the norm (Adams & Brynteson 1995). Less than 40% of colleges now require physical education courses (Cardinal, Sorensen 2012). Typically both courses provide positive results; however, Adams and Brynteson (1995) interviewed several alumni on the value of these courses and found more value in the conceptual than the activity classes.

Woekel et al. (2013) studied one course that combined both conceptual and activity elements. This course included a 100 minute lecture course once per week and an activity portion twice per week. The lecture portion provided conceptual ideas on how to be physically active and incorporate proper nutrition. The lab portion provided instruction on an activity or skill. Students were then asked to reflect on each session. Four themes were then generated; 1) Awareness and knowledge of general fitness and nutrition, 2) Short-term benefits in physical activity levels and nutrition behaviors, 3) Long-term changes in physical activity and nutrition behaviors, and 4) Benefits of self-perceptions. Although this study was not quantitative in nature it is a valuable resource in planning and assessing lifetime fitness classes.

Quantitative studies evaluating the efficacy of similar life fitness courses have mostly assessed their short-term effects on students' knowledge, attitudes, or behaviors (Corbin & Cardinal, 2008). These studies have shown positive improvements in attitude and slight improvements in physical activity behavior (Cardinal & Spaziani, 2007; DeVoe et al., 1998; Sallis et al., 1999). Danoff and Raupers (2014) performed a similar one semester conditioning course which provided improvements in some fitness and

strength measures. Barfield et al. (2012) researched the potential differences between a traditional instructional program for resistance training, independent, and CrossFit style workouts in a collegiate setting. They found that a traditional instructional setting, like the one used in this research study, was better than a CrossFit approach for increasing muscular strength, muscular power, and decreasing BMI.

Chapter Summary

With a growing obesity and overweight population, there is a clear need for more effective health interventions. Health interventions typically revolve around making adults more physically active. Self-efficacy is a major determinant for a person's physical activity levels. When a person becomes more physically active, there are ways to measure physiological changes such as muscular strength. This study focused on the collegiate population as studies have shown a strong relationship between college physical activity and post-graduation activity habits.

Chapter 3

Methodology

Overview

The purpose of this study was to perform and evaluate a small group health intervention program for first semester freshmen in a college setting. Below is an explanation of the methods and instruments used in this specific physical activity health intervention study.

Design

This study was performed over an eight week period at a small Liberal Arts college in the Midwest. All group training sessions were performed in the general fitness center at the college during regular facility hours. Participation in this study was voluntary. Approval was received from the Institutional Review Board prior to starting the study. All surveys and assessments were recorded on paper and marked with a code to ensure participant confidentiality. All participants were 18 years of age or older and signed an informed consent document prior to completing any activity or assessment for this study.

Sample

Twenty first semester freshmen were recruited from general education courses to participate in this study. All students were over the age of 18 and included 7 males and 13 females. Students participating in a varsity sport were removed from the study due to the presence of a structured physical activity plan already in place for them. This study

investigated only students in the general freshmen population at this liberal arts college and not the athletic population. A PAR-Q form, shown in Appendix A, was used to screen students who may have health conditions that contraindicate a physical activity plan. Students were informed of the study's purpose and design. Students were then randomly assigned to a control or experimental group with ten in each group.

Instruments

Both groups were given a battery of tests including; Godin Leisure-Time Exercise Questionnaire, Rodgers and Sullivan Self-Efficacy Survey, ten repetition max bench press, and ten repetition max leg press. A t-test was used to analyze the difference between the control and experimental groups. The analysis found no difference in pre-intervention activity level, self-efficacy, upper body, and lower body strength scores at a 95% confidence level between the control and experimental group.

The self-efficacy survey shown in Appendix B is from a study done by Rodgers and Sullivan. (Rodgers and Sullivan 2001) This survey asked participants to rate ten statements on a five point Likert Scale. Five refers to strongly agreeing to a statement, which in turn denotes higher self-efficacy. A rating of one refers to strongly disagreeing to a statement, which means lower self-efficacy. The survey was then totaled to determine a value out of a possible 50 points for each participant.

The self-efficacy survey included three main sections. The first section dealt with self-efficacy and emotions while exercising. The statements in this section rated self-efficacy when the individual was tired, in a bad mood, and stressed about time. These measures tell about the client's ability to block out external control factors while

attempting to change their health habits. The second section dealt with feelings of self-efficacy in performing the correct tasks and movements during exercise. Statements in this section included the clients being able to follow directions from an instructor, pace themselves during activity, perform required movements, and check how hard the activity is making them work. These measures show the level of physical coordination and ability the client perceives to be present. The third section related issues of scheduling and opportunities to exercise. Statements in this section included the ability to arrange a schedule to exercise, overcome obstacles that might come up, and make up a missed session. These measures assessed the client's ability to fit exercise into a busy schedule.

The next instrument of measurement used was the Godin Leisure-Time Exercise Questionnaire. The Godin Leisure-Time Exercise Questionnaire, shown in Appendix C, aims to measure physical activity over a normal week. Participants are asked to report how many times on average they do the strenuous, moderate, and mild kinds of exercise for more than 15 minutes. Each category is listed separately and denotes a value. 15 minutes of strenuous exercise is equal to 9 points, while moderate equals 5 and mild 3. Each of the exercise scores are then summed to find the total score. As stated in the introduction the recommended level of physical activity is disputed. The US Department of Health and Human Services recommends moderate to vigorous activity three to five times per week for thirty minutes each time (2008). This would equate to a score range of 30-90. Healthy People 2020 (2010) suggests at least thirty minutes of moderate physical activity every day, which would equal a score of 75.

The last two instruments used were muscular strength tests. Muscular strength as defined in this study is the amount of force a muscle can apply to an object. To measure

this value ten repetition max bench press and leg press tests were chosen. These tests were chosen over the one repetition max tests because they are more applicable to the general fitness population in particular, persons who have no experience lifting weights.

Procedures

Both the control and research groups were given a battery of tests including; Godin Leisure-Time Exercise Questionnaire, Rodgers and Sullivan Self-Efficacy Survey, ten repetition max bench press, and ten repetition max leg press. A t-test was used to analyze the significance of difference, if any, between the control and experimental groups before the intervention started. The investigator found no difference in pre-intervention activity level, self-efficacy, upper body, and lower body strength scores at a 95% confidence level. The experimental group participated in a resistance training fitness class that met for one hour once a week for four weeks in small groups of three to four. Each meeting consisted of 15 minutes of cardio, a health topic for the day, instruction on one lift per body part, and a cool down method. All training plans are presented in Appendix D. After the four weeks, the experimental group was given a written program, shown in Appendix E, made from exercises learned during the class to follow for an additional four weeks. At the end of the second four weeks both the experimental and control groups were asked to perform the same tests. Paired t-tests comparing pre and post intervention scores for both the experimental and control groups were then used to determine the existence of any significant differences.

Chapter Summary

Twenty first semester freshmen were recruited from general education courses at the college to participate in this study. Students were then randomly assigned to a control or experimental groups with ten in each group. Both groups were given a battery of tests including; Godin Leisure-Time Exercise Questionnaire, Rodgers and Sullivan Self-Efficacy Survey, ten repetition max bench press, and ten repetition max leg press. A t-test was used to analyze any possible difference between the control and experimental groups. The investigator found no difference in the pre-intervention physical activity level, exercise self-efficacy, upper body strength, or lower body strength of the two groups. The experimental group participated in a resistance training fitness class that met once a week for four weeks in small groups of three to four. After the four weeks, the experimental group was given a written program consisting of exercises learned during the class to follow for an additional four weeks. At the end of the second four weeks both the experimental and control groups were asked to perform the same tests.

Chapter 4

Results

Overview

The purpose of this study was to perform and evaluate a small group health intervention program for first semester freshmen in a college setting. Below is the data analysis results which will show the rejection or the acceptance of each of the four hypotheses.

Findings

Using paired t-tests comparing pre and post intervention scores for both the experimental and control groups, a statistically significant difference was found. A significant change was found for each measure in the experimental group at a 95% confidence level. Table 4 below shows the t-critical, t-values, and p-values that resulted after a paired t-test of the experimental group.

Hypothesis	Related Measure	t-critical	t-value	p-value	Accept or Reject Null
1	Physical Activity	1.86	1.95	0.044	Reject
2	Bench Press	1.86	7.16	0.00005	Reject
3	Leg Press	1.86	6.99	0.00006	Reject
4	Self-Efficacy	1.86	3.77	0.0027	Reject

On the other hand, no significant change was found in the control group at a 95% confidence level. Table 5 below shows the t-values and p-values of each measure found in the control group.

Hypothesis	Related Measure	t-critical	t-value	p-value	Significant Change
1	Physical Activity	1.89	1.86	0.052	No
2	Bench Press	1.89	0.24	0.41	No
3	Leg Press	1.89	0.14	0.45	No
4	Self-Efficacy	1.89	1.33	0.11	No

It is important to note that two control group participants and one experimental group participant did not respond to the second request for testing. This led to the difference in t-critical between the groups as it altered the degrees of freedom for the paired t-tests. Full results can be found in Appendix F.

The first null hypothesis, a four week small group training program followed by a four week written program will decrease or have no affect on a college freshman's exercise habits as measured by Godin Leisure-Time Exercise Questionnaire, was rejected at a .05 level with a p-value of 0.044. The research hypothesis was accepted that a four week small group training program followed by a four week written program will increase a college freshman's exercise habits as measured by Godin Leisure-Time Exercise Questionnaire. Figure 1 below shows average physical activity measures of pre-intervention and post-intervention for the experimental and control groups.

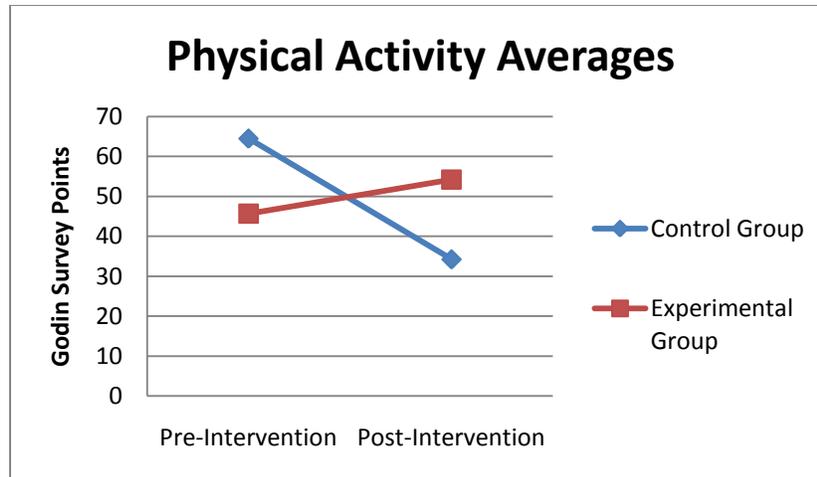


Figure 1. Physical Activity Averages

The second null hypothesis, a four week small group training program followed by a four week written program will decrease or have no affect on a college freshman's muscular strength as measured by a ten repetition max bench press test, was rejected at a .05 level with a 0.00005 p-value. The second research hypothesis was accepted that a four week small group training program followed by a four week written program will increase a college freshman's muscular strength as measured by a ten repetition max bench press test. Figure 2 below shows bench press averages during pre-intervention and post-intervention testing in control and experimental groups.

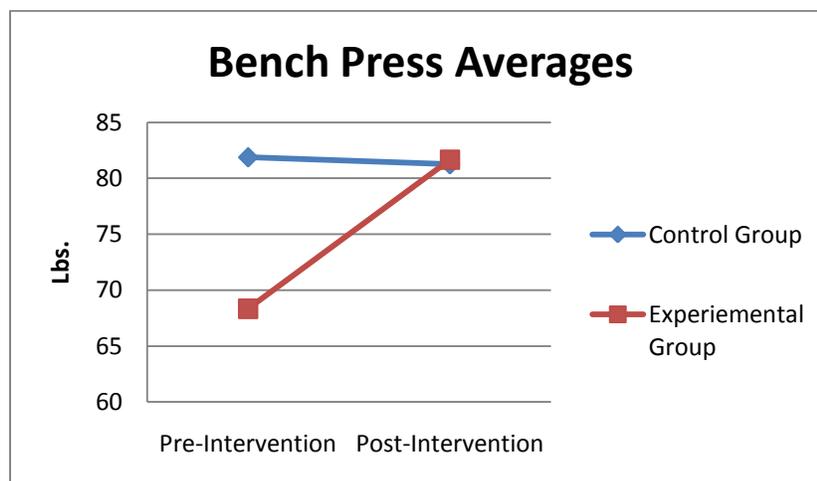


Figure 2. Bench Press Averages

The third null hypothesis, a four week small group training program followed by a four week written program will decrease or have no affect on a college freshman's muscular strength as measured by a ten repetition max leg press test, was rejected at a .05 level with a 0.00006 p-value. The third research hypothesis was accepted that a four week small group training program followed by a four week written program will increase a college freshman's muscular strength as measured by a ten repetition max leg press test. Figure 3 below shows leg press averages during pre-intervention and post-intervention testing in experimental and control groups.

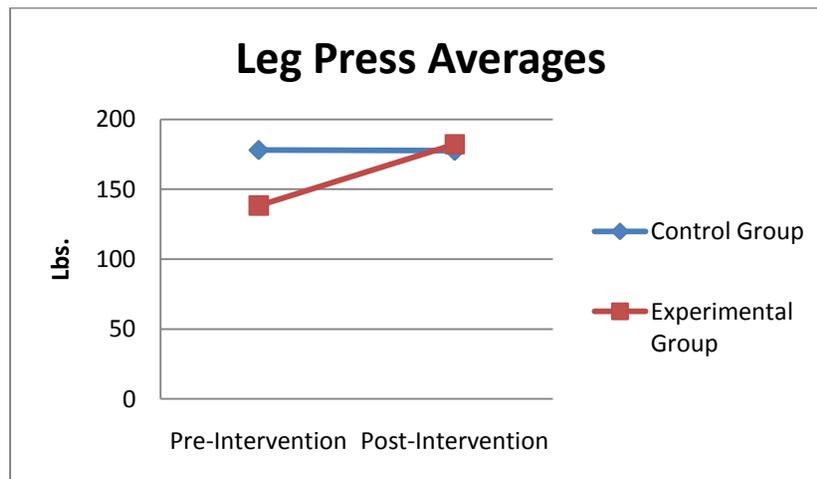


Figure 3. Leg Press Averages

The fourth null hypothesis, a four week small group training program followed by a four week written program will decrease or have no affect on a college freshman's exercise self-efficacy as measured by the self-efficacy survey used in research done by Rodgers and Sullivan (2001), was at a .05 level with a 0.0027 p-value. The fourth research hypothesis was accepted that a four week small group training program followed by a four week written program will increase a college freshman's exercise self-efficacy as measured by the self-efficacy survey used in research done by Rodgers and Sullivan

(2001). Figure 4 below shows exercise self-efficacy averages during pre-intervention and post-intervention testing for the experimental and control groups.

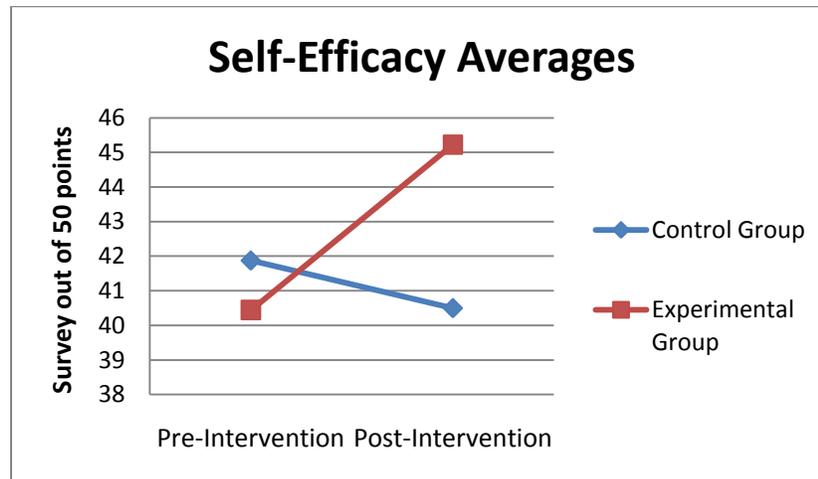


Figure 4. Exercise Self-Efficacy Averages

Chapter Summary

Using paired t-tests comparing the pre and post intervention scores for both the experimental and control groups, a significant difference was found. A significant change was found for each measure with p-values of 0.04, 0.002, 0.00004, 0.00005 in the experimental group, while no significant change was found in the control group with p-values of 0.052, 0.11, 0.40, 0.45 at a 95% confidence level.

Chapter 5

Discussion, Conclusions, Recommendations

Overview

This chapter presents the discussion of the hypotheses results, conclusions found, recommendations for future research, limitations of this study, and the implications of this study for college physical activity programs.

Discussion

The first research hypothesis that a four week small group training program followed by a four week written program will increase a college freshman's physical activity as measured by the Godin Leisure-Time Exercise Questionnaire was accepted. The experimental group could be more physically active because they would become more aware of the college's options and events to promote physical activity. Another possible explanation for the increase in physical activity could come from an increase in exercise self-efficacy which as stated in the introduction is a key determinant in physical activity adherence.

The second research hypothesis that a four week small group training program followed by a four week written program will increase a college freshman's muscular strength as measured by a ten repetition max bench press test was accepted. Bench press was part of the program so an increase in strength was to be expected. Also, since the experimental group had more practice with the exercise and were more comfortable executing the assessment, they performed significantly better.

The third research hypothesis, that a four week small group training program followed by a four week written program will increase a college freshman's muscular strength as measured by a ten repetition max leg press test, was accepted. Although the leg press was not included in the program, many leg exercises were used to develop lower body strength. Lunges, squats, step-ups, and kettlebell swings were all incorporated to increase strength and produce results. An increase in lower body strength would suggest that the experimental group performed the written workouts given during the individual portion of the intervention.

The fourth research hypothesis, that a four week small group training program followed by a four week written program will increase a college freshman's exercise self-efficacy as measured by the self-efficacy survey used in research done by Rodgers and Sullivan (2001) was accepted. This increase in exercise self-efficacy seems to be a factor in the increase in each of the other measures. An increase in exercise self-efficacy can lead to more workouts, greater intensity, and longer duration of activity.

Conclusions

As shown by the paired t-test results a significant difference occurred in measures of physical activity, exercise self-efficacy, bench press strength, and leg press strength for the experimental group. This significant statistical difference shows that the four week instructional portion led to increased activity during the four week individual portion of the study. The increases found were far above those of the control group giving evidence that the health intervention performed here can successfully and effectively create healthy physical activity habits in college freshmen. As noted in the introduction, a student's

collegiate years can mold one's health habits for many years post graduation. If strong health habits, similar to those developed and advocated here, can be formed early on in college, students will feel more comfortable and become more aware of the fitness opportunities on campus. An increase in comfort level and self-efficacy will also lead to being more physically active and adhering to a physical activity plan during and after college.

Limitations

More research needs to be done in other settings and with larger sample sizes. A different facility and trainer may produce different results. The instructor is an important variable to consider in this type of study as not all trainers may have the same ability to effect change in the participants of a study. Each trainer brings different strengths and weaknesses to the table which can skew results.

Recommendations

Participants in studies such as this one should be surveyed four and eight years after the intervention. This follow-up survey can confirm findings that college physical activity is retained through the participant's college years and into post-graduate life. The longevity of any such impact would be interesting to research in a mixed method study. Also a study comparing the intervention used in this study with other similar interventions should be done to determine the most effective health intervention techniques. This intervention was effective in showing significant results as compared to a control group but would it be proven more effective than an aerobic group fitness class or a classroom setting health intervention?

Implications

As health interventions are studied and evaluated, college's look to use the most effective and efficient ways to improve both the quality of instruction from their health professionals and the over-all health of their students. Health interventions like the one studied here can provide a very valuable service to a college's student population and can create healthier, more fulfilling lives for their students. Colleges could look to incorporate interventions such as the one used in this study for all freshmen orientation groups. Having a health intervention involved in freshmen orientation could help curb the freshmen 15, 15 pounds of weight gain by a college freshmen, and help students make healthier choices starting with their first steps on campus.

Chapter Summary

The intervention used in this initial study was proven to be effective in the areas of self-efficacy, physical activity, and muscular strength. Further research should be done to compare this intervention with other similar intervention strategies. Also more research is needed to determine long term effects of these interventions which would require testing in subsequent years during and even after college. Interventions like the one in this study can be used as an early intervention tool to help create healthier students from their first few steps on campus.

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Appendix A

PAR-Q Form

Physical Activity Readiness Questionnaire (PAR-Q)

PAR-Q is designed to help you help yourself. Many health benefits are associated with regular exercise, and the completion of PAR-Q is a sensible first step to take if you are planning to increase the amount of physical activity in your life.

For most people, physical activity should not pose any problems or hazard. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.

Common sense is your best guide in answering these few questions. Please read the carefully and check **YES** or **NO** opposite the question if it applies to you. If yes, please explain.

YES **NO**

- | | | |
|-------|-------|--|
| _____ | _____ | 1. Has your doctor ever said you have heart trouble?
Yes, _____ |
| _____ | _____ | 2. Do you frequently have pains in your heart and chest?
Yes, _____ |
| _____ | _____ | 3. Do you often feel faint or have spells of severe dizziness?
Yes, _____ |
| _____ | _____ | 4. Has a doctor ever said your blood pressure was too high?
Yes, _____ |
| _____ | _____ | 5. Has your doctor ever told you that you have a bone or joint problem(s), such as arthritis that has been aggravated by exercise, or might be made worse with exercise?
Yes, _____ |
| _____ | _____ | 6. Is there a good physical reason, not mentioned here, why you should not follow an activity program even if you wanted to?
Yes, _____ |
| _____ | _____ | 7. Are you over age 60 and not accustomed to vigorous exercise?
Yes, _____ |
| _____ | _____ | 8. Do you suffer from any problems of the lower back, i.e., chronic pain, or numbness?
Yes, _____ |
| _____ | _____ | 9. Are you currently taking any medications? If YES, please specify.
Yes, _____ |
| _____ | _____ | 10. Do you currently have a disability or a communicable disease? If YES, Please specify,
Yes, _____ |

If you answered NO to all questions above, it gives a general indication that you may participate in physical fitness activities. The fact that you answered NO to the above questions, is no guarantee that you will have a normal response to exercise. If you answered Yes to any of the above questions, then you may need written permission from a physician before participating in fitness activities at the Fitness Center at Carthage College.

Print Name

Signature

Date

Appendix B

Self-Efficacy Survey

Self-Efficacy Survey

(Rodgers Sullivan, 2001)

Please rate these statements from Strongly Agree (5) to Strongly Disagree (1)

	Strongly agree		Strongly Disagree		
	5	4	3	2	1
I am confident I can exercise when...					
I am tired	5	4	3	2	1
I am in a bad mood	5	4	3	2	1
I feel I don't have the time	5	4	3	2	1
While exercising I feel I can...					
Follow directions from an instructor	5	4	3	2	1
Pace myself during activity	5	4	3	2	1
Perform the required movements	5	4	3	2	1
Check how hard the activity is making me work	5	4	3	2	1
When planning my exercise I can...					
Arrange my schedule to exercise	5	4	3	2	1
Overcome obstacles that prevent me from participating regularly	5	4	3	2	1
Make up times when I miss a regular exercise session	5	4	3	2	1

Appendix C

Godin Leisure-Time Exercise Questionnaire

Godin Leisure-Time Exercise Questionnaire

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

Times Per Week**STRENUOUS EXERCISE****(HEART BEATS RAPIDLY)** _____

(e.g., running, jogging, hockey, football, soccer,
squash, basketball, cross country skiing, judo,
roller skating, vigorous swimming,
vigorous long distance bicycling)

MODERATE EXERCISE**(NOT EXHAUSTING)** _____

(e.g., fast walking, baseball, tennis, easy bicycling,
volleyball, badminton, easy swimming, alpine skiing,
popular and folk dancing)

MILD EXERCISE**(MINIMAL EFFORT)** _____

(e.g., yoga, archery, fishing from river bank, bowling,
horseshoes, golf, snow-mobiling, easy walking)

Appendix D

Weekly Written Programs

Learn to Lift Week 1

	Exercise	Sets	Reps	Lbs.	Notes
Cardio	Expresso Bikes	10-15 min			
Health Topic	Goal Setting				
Chest	Bench Press	3	10		
Legs	Lunge	3	10 each leg		
Back	Single Arm Row	3	10 each arm		
Shoulders	Lateral Raise	3	10		
Arms	Cable Tricep Extension	3	10		
Abs	Planks	3	20 sec		
Stretching	Stair Stretches	Hold for 20 sec			

Goals for the study:

Goals for the week:

Learn to Lift Week 2

	Exercise	Sets	Reps	Lbs.	Notes
Cardio	Elliptical	15 min			
Health Topic	Healthy Eating Tips				
Chest	Chest Fly	3	10		
Legs	Box Squat	3	10		
Back	Lat Pull Down	3	10		
Shoulders	Shoulder Press	3	10		
Arms	Single Arm Curl	3	10 each arm		
Abs	Suitcases	3	10 each side		
Stretching	Foam Rolling				

Goals for the week:

Learn to Lift Week 3

	Exercise	Sets	Reps	Lbs.	Notes
Cardio	Treadmill	15 min			
Health Topic	Eliminating Barriers				
Chest	Incline Press	3	10		
Legs	Kettlebell Swing	3	10		
Back	Double Row	3	10		
Shoulders	Face Pull	3	10		
Arms	Tricep Dip	3	10		
Abs	Belly Press	3	10 each side		
Stretching	TRX Stretches				

Goals for the week:

Learn to Lift Week 4

	Exercise	Sets	Reps	Lbs.	Notes
Cardio	Stairs	10 min			
Health Topic	Fitness Math				
Chest	Decline Press	3	10		
Legs	Step ups	3	10		
Back	Assisted Pull-up	3	10		
Shoulders	Cuban Raise	3	10		
Arms	Preacher Curl	3	10		
Abs	Low-High Chops	3	10 each side		
Stretching	Dynamic Streching				

Goals for the week:

Appendix E

Four Week Individual Written Packet

Learn to Lift

Goals

By

Tyler
Prochnow



Day 1				
Warm-up				
Expresso Bike				
		Sets	Reps	
A1	Bench Press	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
B1	Lunge	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
C1	Single Arm Row	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
D1	Lateral Raise	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
E1	Cable Tricep Extension	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
E2	Planks	3	20 sec	<input type="text"/>
		3	30 sec	<input type="text"/>
		3	30 sec	<input type="text"/>
		3	40 sec	<input type="text"/>
				
Weight	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Day 2								
Warm-up		Elliptical	10-15 min					
		Sets	Reps					
A1	Chest Fly	3	10	<input type="text"/>				
		3	12	<input type="text"/>				
		4	8	<input type="text"/>				
		3	10	<input type="text"/>				
B1	Squat	3	10	<input type="text"/>				
		3	12	<input type="text"/>				
		4	8	<input type="text"/>				
		3	10	<input type="text"/>				
C1	Lat Pull Down	3	10	<input type="text"/>				
		3	12	<input type="text"/>				
		4	8	<input type="text"/>				
		3	10	<input type="text"/>				
D1	Shoulder Press	3	10	<input type="text"/>				
		3	12	<input type="text"/>				
		4	8	<input type="text"/>				
		3	10	<input type="text"/>				
E1	Single Arm Curl	3	10	<input type="text"/>				
		3	12	<input type="text"/>				
		4	8	<input type="text"/>				
		3	10	<input type="text"/>				
E2	Suitcases	3	10	<input type="text"/>				
		3	12	<input type="text"/>				
		3	10	<input type="text"/>				
		3	12	<input type="text"/>				
								
Weight	<table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> </tr> </table>							

Day 3										
Warm-up		Treadmill	10-15 min							
		Sets	Reps							
A1	Incline Press	3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		4	8	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
B1	Kettlebell Swing	3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		4	8	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
C1	Double Row	3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		4	8	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
D1	Face Pull	3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		4	8	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
E1	Tricep Dip	3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		4	8	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
E2	Belly Press	3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	10	<input type="text"/>	<input type="text"/>	<input type="text"/>				
		3	12	<input type="text"/>	<input type="text"/>	<input type="text"/>				
Weight	<table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> <td style="width: 25%;"></td> </tr> </table>									

Day 4				
Warm-up				
	Stairs	3 Sets		
		Sets	Reps	
A1	Decline Press	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
B1	Step ups	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
C1	Assisted Pull-up	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
D1	Cuban Raise	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
E1	Preacher Curl	3	10	<input type="text"/>
		3	12	<input type="text"/>
		4	8	<input type="text"/>
		3	10	<input type="text"/>
E2	Low-High Chops	3	10	<input type="text"/>
		3	12	<input type="text"/>
		3	10	<input type="text"/>
		3	12	<input type="text"/>
				
Weight	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Appendix F
Full Results Table

Code	Group	Godin pre	Godin Post	Efficacy Pre	Efficacy Post	Bench pre	Bench post	Leg press Pre	Leg Press Post
001	control	36	49	40	44	135	120	200	200
011	control	75	22	35	30	45	45	125	125
012	control	54	42	50	50	50	55	165	175
013	control	19	6	47	45	55	55	120	120
002	control	68	37	39	37	45	45	105	105
003	control	189	56	43	44	200	210	390	360
014	control	28	28	36	32	70	65	175	185
015	control	47	34	45	42	55	55	145	150
111	ex	41	44	36	45	60	65	155	200
112	ex	49	49	46	50	45	55	65	100
113	ex	53	53	47	47	65	75	145	180
114	ex	60	92	47	48	55	75	140	225
116	ex	40	30	40	41	50	65	125	160
117	ex	58	74	40	46	55	65	140	175
101	ex	32	36	37	48	115	135	180	240
102	ex	21	45	33	40	105	115	180	200
103	ex	57	65	38	42	65	85	115	160