The Relation of Fitness Assessment Feedback to Intrinsic Motivation and Physical Activity Among College Students

Laura Chandler

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THE RELATION OF FITNESS ASSESSMENT FEEDBACK TO INTRINSIC
MOTIVATION AND PHYSICAL ACTIVITY AMONG COLLEGE STUDENTS

By
Laura Chandler

A Dissertation in Partial Fulfillment of the Requirements for the
Degree of Doctor of Public Health in Health Education

June 2011
Each person whose signature appears below certifies that this dissertation, in his/her opinion, is adequate in the scope and quality as a dissertation for the degree of Doctor of Public Health.

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ABSTRACT OF THE DISSERTATION

The Relation of Fitness Assessment Feedback to Intrinsic Motivation and Physical Activity Among College Students

by

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Doctor of Public Health Candidate in Health Education

Loma Linda University, Loma Linda, 2011

Jerry W. Lee, Chair

Physical inactivity is a major public health concern in the United States and is no less of a concern among college students. According to the 2000 National College Health Assessment, as cited by Kilpatrick, Herbert, and Bartholomew (2005), only 38% of college students participate in regular vigorous activity, and only 20% participate in regular moderate activity. This study focused on how fitness assessment results affect intrinsic motivation for physical activity in college students. The specific mechanism examined was that between the constructs of intrinsic motivation, competence and autonomy from the self determination theory (SDT) and cognitive evaluation theory (CET). Approximately 140 undergraduate students enrolled in a personal health course participated in a fitness assessment and were periodically surveyed to measure competency, autonomy, intrinsic motivation and physical activity. Another group of 140 students from a personal health course served as a control group; in addition a group of
140 students from a general psychology course served as an additional control. The data was analyzed by ANOVA and regression with the use of SPSS. Intrinsic motivation and competence diminished significantly in the group receiving fitness assessment results as compared to either control group.
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CHAPTER 1
INTRODUCTION

A. Statement of the Problem

It has become common knowledge that more Americans are classified as overweight and obese than just 20 years ago. In fact, we have been seeing a gradual increase in body mass index (BMI) since the 1980’s. Much attention has gone into deciphering this trend. Researchers have attributed it to, among other factors; changes in eating patterns (e.g. larger portions, more processed/fast food), and an increase in sedentary behavior.

Americans today consume, on average, approximately 300 more calories daily than they did 50 years ago and our lifestyles involve much more sitting and less activity today (Meck Higgins, 2000). In fact, compared to the 1950’s, Brownson, Boehmer and Luke (2005) provide a summary report stating work-related activity has declined, transportation activity has declined, activity in the home has declined and sedentary activity such as television viewing has increased.

Looking at youth in particular, Brownson, et al., (2005) examined data from the Youth Risk Behavior Survey (YRBS) from 1991 to 2001. The data indicated a decline in the percentage of students, from 41.6% to 32.2%, who attend daily physical education (PE) classes.

This overall decline in physical activity among the U.S. population is not only alarming in relation to overweight and obesity but also as it relates to premature death and disability from various chronic diseases including, coronary heart disease, diabetes,
and certain cancers. Of course in addition, all this equates to greater cost to the country. It is estimated that direct medical costs related to physical inactivity are about $76 billion (Pratt, Macera & Wang, 2000). This number would be even higher when considering indirect costs such as loss of productivity.

With such considerable health and fiscal impact, public health recommendations have evolved to emphasize a lifestyle that incorporates more activity. In conjunction, researchers are making efforts to explore just how active or inactive Americans are and factors that influence or contribute to a sedentary way of life.

Based on a cursory review of the recent literature it would be easy to believe that the nation’s concern with society’s declining activity is recent (within the last 20-30 years). However, back in the early-1950’s Doctors Hans Kraus and Ruth Prudden noticed Americans walking less, working less vigorously and watching more television. Armed with a fitness test Kraus had developed in previous research, the pair decided to conduct an assessment on both European and American youth. The results not only indicated American youth to be less fit than European youth but 56% of the U.S. students failed at least one component of the fitness test (1953).

The mainstream media dedicated much attention to Kraus and Prudden’s published report and before long politicians were urging then President Eisenhower to take action. In 1956, the President’s Council on Physical Fitness was developed. A month later, Eisenhower, by way of executive order, established the President’s Council on Youth Fitness. He envisioned this as a catalyst that would educate, motivate and encourage communities and individual Americans to promote and adopt active lifestyles (Sturgeon & Meer, 2006). By the late 1950’s organized fitness testing of youth in
schools had begun and almost from the start percentile-based awards were created and used (ostensibly) as motivational tools (Whitehead & Corbin, 1991). In 1966, President Johnson created the Presidential Fitness Award for those who scored at or above the 85th percentile on all of the test items.

Also during this time period of the late 1950's and early 1960's, researchers were exploring and developing theories of motivation related to fitness testing. The central theme of these emerging theories was that “changes in the perceived locus of causality of a task behavior and perceived competence at the task influence intrinsic motivation” (Whitehead & Corbin, 1991, p.229). These tenants were not formally composed until 1985 when Deci and Ryan described the theory they termed cognitive evaluation theory.

Despite the fact that for a number of years fitness assessments have been a standard of PE classes from elementary school through high school, little research has been dedicated to fitness testing or the connection between these assessments and motivation. However, research emphasis over the last few decades in the area of motivation and intrinsic motivation has continued.

To date, there is no published research on the role of fitness assessments and motivation toward physical activity with regard to college students. However, a majority of universities do have fitness facilities/labs that provide students some form of a fitness assessment either on a voluntary basis or as a requirement for a specific course.

B. Purpose of the Study

The purpose of this study was to determine if feedback from a personal fitness assessment has the ability to elicit feelings of competency and autonomy with regard to physical activity among undergraduate university students. Further, this study was to
determine if these feelings of competency and autonomy would affect intrinsic motivation toward being active which might thereby result in a change in physical activity.

C. Research Questions

- How do feedback/results from a personal fitness assessment (perceived as positive or negative) affect a person’s feeling of competency and/or autonomy with regard to physical activity?
- How does this change in feelings of competency and/or autonomy relate to changes in intrinsic motivation?
- How does a change in intrinsic motivation relate to a change in physical activity level?

D. Theoretical Framework

In order to explore these research questions, it is imperative to clarify the theoretical framework involved. Self-determination theory is founded on the principle that humans have three basic or fundamental psychological needs. These needs, the needs for competence, relatedness and autonomy, provide a basis for individuals to categorize environments as supportive or antagonistic (Deci & Ryan, 2002). Furthermore, Deci and Ryan (2002) assert that “…the healthy human psyche ongoingly strives for these nutriments [competence, relatedness and autonomy] and, when possible, gravitates toward situations that provide them” (p. 7). In order to be concise, the three needs are briefly described as follows: competence is feeling effective; relatedness is feeling connected to others; and autonomy is the perception of being the originator or source of one’s own behavior (Deci & Ryan, 2002).
Cognitive evaluation theory (CET) is a sub theory nested within the self-determination theory. The main construct of CET is intrinsic motivation, which is described by Deci and Ryan (2000) as “the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities to explore and learn” (p.70). It is important to note that this theory does not focus on factors that cause intrinsic motivation, but rather conditions that enhance versus diminish it. CET is based on two of the three basic needs mentioned above; competence and autonomy (Deci & Ryan, 2000).

To exemplify this theory we can consider a factor or event such as positive feedback that creates a sense of competence in an individual during an action, this can enhance intrinsic motivation for that action. However, these feelings must be accompanied by a sense of autonomy or a feeling that the action is self determined and not controlled by others for the enhancement to be present (Deci & Ryan, 2000). Likewise, it is important to note that negative performance feedback (Deci, 1975) as well as tangible rewards, threats, imposed goals, directives and deadlines (Deci & Ryan, 1985) can diminish intrinsic motivation.

Therefore, it is logical that receipt of perceived positive results of a fitness assessment can create a sense of competence in that individual. In addition, it seems that with a positive perception there could also be a sense of autonomy in that the actions required to be at this assessment level were self determined. Thus, intrinsic motivation would be enhanced. The reverse would likely exist if the results were perceived as negative. This is clarified in figure 1.1, here a visual theoretical model of this proposed mechanism is demonstrated.
The proposed mechanism of the CET Theory. The proposed mechanism of how fitness assessment feedback connects to physical activity by way of the constructs competency, autonomy, and intrinsic motivation, from the Cognitive Evaluation Theory.

Figure 1.1 Proposed Mechanism of the CET Theory. The proposed mechanism of how fitness assessment feedback connects to physical activity by way of the constructs competency, autonomy, and intrinsic motivation, from the Cognitive Evaluation Theory.

E. Significance to Health Education

The field of health education continues to be challenged with the task of motivating individuals toward a lifestyle that incorporates regular physical activity. Lack of physical activity contributes to an estimated 300,000 preventable deaths annually in the United States from diseases such as heart disease, stroke, obesity-related illness and diabetes (National Center for Health and Statistics, 2002).

The college years are typically a time when individuals discover and grow into their adult identity. This can be a key time period to work to create lifestyle patterns of physical activity. Physical activity behaviors established in college have a long-term impact on adult physical activity habits (Keating, Guan, Pinero, & Bridges, 2005). If these lifestyle changes are made in the college years and are maintained well into adulthood, the positive health implications (e.g., reduced risk of cardiovascular disease, obesity and diabetes) could be significant for the United States. The results from this
study will inform health education professionals in this field of the potential value, appropriateness and usefulness of fitness assessments. More specifically, it will provide colleges and universities with insights as to the key constructs of motivating their students toward physical activity.
CHAPTER 2
LITERATURE REVIEW

A. Physical Activity

Physical activity is identified as one of our nation's leading health indicators in *Healthy People 2010*. In fact, the CDC (2000) states that enhancing efforts to promote participation in physical activity and sports among young people is a critical national priority. The issue of physical inactivity is quite prevalent among college students. In fact, epidemiological data suggests a rapid reduction in physical activity during college life when students are between 18-24 years of age (Stephens, Jacobs & White, 1985).

According to the 2000 National College Health Assessment, as cited by Kilpatrick, Hebert and Bartholomew (2005), only 38% of college students participate in regular vigorous activity, and only 20% participate in regular moderate activity. Universities across the nation have found similar results. George (2000) surveyed over 1700 college students and found that the majority did not indicate a level of physical activity in line with the national recommendations. Likewise, Dinger (1999) surveyed approximately 800 college students and found that the average student failed to meet the national current recommendations for physical activity. Moreover, American College Health Association in *Healthy Campus 2010* (2002) has identified physical inactivity as one of six priority health risk behaviors for college students.

The college years are a critical time to address the issue of physical inactivity for a number of reasons. One is that for many college students this is a time for which they
have no mandated physical activity requirement, namely physical education (PE) class or regular practice for team sports. Caspersen and colleagues (2000) note there is pattern of consistent decline in ‘regular vigorous activity’ from ages 12 through 21, and that the period of young adulthood (18-29 yr) marks a continuing erosion of physical activity patterns.

Even though targeting students during their college years, with regard to physical activity, seems logical for the reasons listed above, little research has been focused in this area. In fact, after more than 30 years of dedication to address physical inactivity in the general population, only a handful of studies have been done on college students and most of these have been descriptive studies with very few focusing on intervention programs that promote physical activity or motivate students to engage in physical activity (Keating, et. al, 2005). One activity that has been frequently utilized in the field as an intervention, and thought by some to be a motivating factor for physical activity is the fitness assessment.

B. Fitness Assessments

The fitness assessment originated as a research tool to measure American youth fitness levels as compared to that of European youth in 1953; however its use became popular in the late 1950’s after the development of the President’s Council on Physical Fitness. Schools all over the country began testing students on a variety of fitness criteria from number of sit-ups performed in one minute to the number of pull-ups and push-ups one could do to how fast one could run a mile. As soon as the 1960’s, schools began to adopt a percentile-based award system rewarding those who scored in the 85th percentile
on all tests with a certificate signed by the president of the United States (Whitehead & Corbin, 1991).

While fitness testing continues to be a common practice in schools today there is much debate among professionals in the field as to its effectiveness and if it has a role in students’ motivation. The most common purposes for utilizing fitness assessments in the school setting include: collecting data to determine state and national fitness norms for comparative use (Petersmarck, 1999; Wiersma & Sherman, 2008), evaluating physical education curriculum (Hill & Miller, 1997; Petersmarck, 1999; Wiersma & Sherman, 2008), and providing parent/child information regarding current fitness level and thus data to set reasonable goals for improvement (Hill & Miller, 1997; Petersmarck, 1999; Goudas, Minardou, & Kotis, 2000; Wiersma & Sherman, 2008). The later appears to be the most debated.

State and federally mandated fitness testing of school-age children has been effective in determining state and national norms. This data (specifically BMI) has been well-utilized to highlight and monitor childhood obesity rates. Additionally, schools that choose to test their students at the beginning of the school year and then at the conclusion of the school year can effectively note improvement and draw the reasonable assumption that the physical education curriculum is doing a good job. The ambiguity lies in whether fitness assessments have a role in motivating students.

Hopple and Graham (1995) surveyed school children on what they think, feel and know about fitness testing. The authors concluded that the majority of students could not articulate the purpose of being tested and considered the test uncomfortable and lacking in meaning. Similarly, Keating and Silverman (2004) find fitness testing in general fails
to meet educational objectives. Dr. Kenneth Cooper, founder of the Cooper Institute which developed the Fitnessgram test (a widely used, school-based fitness assessment) stated in a recent interview with Pamela Kufahl (2008) that testing is not enough. Cooper notes that in California fitness testing was conducted year after year since 1999 and year after year students continued to score poorly. Cooper believes that more educational curriculum needs to accompany fitness assessments for better outcomes. Wiersma and Sherman agree, “fitness testing can be a positive and enjoyable experience and a useful tool to motivate youth to be physically active if used in a developmentally appropriate manner as one aspect of a comprehensive physical education curriculum and if delivered in a positive and supportive environment” (p. 168).

It appears from the literature that fitness testing on its own may not be effective in motivating school-aged students. However, as mentioned above a number of researchers believe that despite its lack of success as a stand-alone tool, fitness assessments utilized in a specific manner and delivered in a particular fashion, may have a role in motivating students. Thus, there is a small body of research examining fitness testing with regard to other determining factors such as goal-setting/goal achievement, use of rewards, and the use of positive/negative feedback. One theory that is often involved in the discussion of these factors and motivation is the self-determination theory (SDT) and a sub theory of SDT, cognitive evaluation theory (CET). A popular construct of these theories is that of intrinsic motivation.
C. Intrinsic Motivation

1. Positive vs. Negative Feedback

Whitehead and Corbin (1991) conducted a study to evaluate the effect feedback from a fitness test would have on junior high school students’ motivation. More specifically, they wanted to test the cognitive evaluation theory construct of perceived competence; in that an increase or decrease in perceived competence would elicit an enhancement or diminishment of intrinsic motivation.

The researchers worked with 105 seventh and eighth grade students having them complete the Illinois Agility Run as the fitness test. The students were randomly assigned to three groups; positive feedback, negative feedback and no feedback. Prior to the fitness assessment (run), the students completed an adapted version of the Intrinsic Motivation Inventory (IMI). This paper and pencil survey measures four elements of intrinsic motivation; interest-enjoyment, perceived competence, effort-importance, and pressure tension.

To respect their privacy, students were taken out of class individually to complete the assessments. They were told the purpose of the test was to gather normative data for a new fitness assessment. After the run, students would look at a bogus computer device that would tell them how they did. The positive feedback group was shown a reading stating, “Compared to other junior high school boys/girls your score is in the top 20% range”. Similarly, the negative feedback group was shown a reading stating, “Compared to other junior high school boys/girls your score is in the bottom 20% range”. The no feedback group was told that there was a mechanical error and shown a screen that read “timing switch error”.

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The statistically significant results of the study supported the cognitive evaluation theory in a youth fitness testing situation. The students in the positive feedback group correlated (positively) with higher competency scores and higher intrinsic motivation scores. The design of this experiment appears strong. The only issue of question is the selection of the subjects. The researchers describe them as “volunteers”. This provides a possible issue of bias in that individuals most interested in fitness tests may have volunteered and thus may have some inherent or cognitive difference in how they evaluate feedback.

2. Goal Achievement

With the findings from the above study, Goudas, Minardou and Kotis (2000) looked beyond the variable of feedback and added goal achievement in the form of positive or negative feedback. They did this by having the participants (two groups) engage in a reaction time task. After the first trial, subjects were given their scores and then completed a questionnaire assessing intrinsic motivation. Additionally, they were asked to set a specific personal goal for themselves for the next trial. Upon completion of Trial 2, Group 1 was given positive feedback from the apparatus that stated “You achieved your goal”, in contrast Group 2 was given negative feedback that stated “You did not achieve your goal.” Once again, all subjects completed the questionnaire.

The findings were similar to Whitehead and Corbin (1991), but not on all accounts. Positive feedback regarding the achievement of the set goal did predict subjects rated competence; however it did not influence intrinsic motivation. The authors of this research note past research with conflicting findings. For example, Manderlink and Harackiewicz (1984) found that difficult goals diminished participants’ intrinsic
motivation while Anshel, Weinberg, and Jackson (1992) found that participants who were assigned difficult goals showed an enhancement of intrinsic motivation irrespective of success or failure of the goal. Perhaps there is a confounding factor mediating the relationship of competence and intrinsic motivation. More research is needed in this area.

3. Reward

Another experiment examined the role of not just feedback, but also financial reward on subjects' intrinsic motivation. Prong and Rutherford (1992) conducted a study to look at the practice of utilizing monetary rewards for fitness test performance and the effect these rewards have on intrinsic motivation to participate in future physical activity. They also looked at the variable, performance feedback and its interaction with rewards on intrinsic motivation.

Sixty-four men were recruited from liberal arts courses in a southwestern university. The men were randomly assigned to one of four treatment groups. Group one received the reward ($5) and positive feedback (verbal praise), group two received the reward and negative feedback, group three received no reward and positive feedback and the fourth group received no reward and negative feedback. Each group first completed a bicycle fitness test, received the appropriate feedback and reward or lack thereof and then completed a 60 second sit-up test. Before the results of the second fitness test was revealed the participants completed the Intrinsic Motivation Inventory (IMI).

There were no statistically significant main effects for rewards on any of the four subscales. Significant main effects were observed for feedback on the perceived competence, effort-importance and pressure-tension subscales. Therefore, the authors concluded that the reward had no effect on the motivation of the participant and “the use
of positive feedback, whether a reward was possible or not, produced higher levels of perceived competence and effort-importance, and lower levels of pressure-tension than did negative feedback” (p. 50). One major limitation in this study is that when participants were recruited they were told the research study entailed fitness performance tests. This self-selection bias greatly reduces the ability for this study to generalize to other college students as some students may have not opted to be in the study due to reluctance or lack of motivation to exercise. In addition, this study had a small sample size, no control group and is limited in that it only examines males.

Despite the minor flaws in the experimental design of the two studies above and the additional variables, the results continue to indicate feedback (positive or negative) with regard to fitness performance is a key determining factor with regard to intrinsic motivation.

With basic knowledge of gender differences we can speculate that motivation for physical activity may be different for men and women. In addition, the type of physical activity (sports or exercise) may be a factor. A recent study by Kilpatrick, Hebert and Bartholomew (2005) found just that.

4. Exercise vs. Sport

Kilpatrick and colleagues (2005) examined college students’ motivation for physical activity as they differentiated between men and women. They also looked at motives for participation in sports versus exercise. This was not an experimental design, but rather a cross-sectional descriptive study. The investigators surveyed students enrolled in seven lower division health content courses. The scale they utilized is not a scale that is commonly used to assess intrinsic motivation however their research
conclusions refer to and draw upon SDT and intrinsic motivation. Instead of measuring the constructs of SDT, their scale is based on 14 factors that represent a wide range of motivations for engaging in physical activity, including stress management, ill-health avoidance, revitalization, enjoyment, challenge, social recognition, positive health, weight management, appearance, strength and endurance, affiliation, competition, health pressures and nimbleness. They state that a number of these factors are difficult to categorize clearly as intrinsic or extrinsic, but feel that a sufficient number can be categorized clearly. They do not state if they base this categorization on previous research or simply intuition. For each item of the survey, the participant responds once with regard to sport participation and then again with regard to exercise behavior.

In general, the results of the study are that subjects’ motivations to participate in sports differed from motivations to participate in exercise. The motives that were associated with sports participation include competition, challenge, affiliation and enjoyment. In contrast, the motives associated with exercise behaviors were appearance-related motives. The authors conclude that this “may indicate that sport participation is more closely linked to intrinsic motives’ (p. 92). In fact, this relationship is found in research that has investigated sport participation, specifically the motive of competition, and found that sport-based competitiveness was positively associated with higher levels of intrinsic motivation (Deci, Betley, Kahle, Abrams & Porac, 1981; Deci & Olson, 1989; Deci & Reeve, 1996).

Additionally, this study by Kilpatrick and colleagues (2005) had findings related to gender. These findings indicated that regardless of activity type, men compared to women were more highly motivated by performance and ego-related factors. Examples
they give of these include challenge, strength and endurance, competition and social recognition. The authors conclude, based on their research and previous research, that men are more motivated by activity that includes performance orientation (Ashford, Biddle & Goudas, 1993) and ego-related goal outcomes (Deci & Ryan, 2002). According to the introduction of the Handbook of Self Determination by Deci and Ryan (2002) this orientation is associated with diminished intrinsic motivation as it involves more of a focus on performance evaluations. Although Kilpatrick et al., do not comment on it, what is interesting is that epidemiological data indicates that in general men are more active than women (U.S. Department of Health and Human Services, 2005).

5. Lasting Effect

One other facet of interest when looking at intrinsic motivation for physical activity is its lasting effect. In her dissertation, Mary Ann Portis (1989) examined just this as she compared groups of 4th graders exposed to a 10-week, intrinsic oriented physical education curriculum or a 10-week, extrinsic oriented physical education curriculum. The intrinsic groups were encouraged with positive verbal feedback and unannounced awards. When the intrinsic group completed fitness assessments they were not told if their measurement was “good” or “bad” but instead told just to use the number for self comparison at the end of the program. The extrinsic group on the other hand, was monitored by visual charts where stars were given for achievement and X’s for non achievement. When assessed for fitness scores they were told how their score compared to others. This group was also based on a fair amount of competition as awards were announced as possible for the highest scorers. This type of
competition is considered controlled, and different than the sport-based competitiveness discussed in the previous study.

Portis discovered that while both groups experienced similar levels of fitness improvement, the intrinsic groups experienced higher levels of perceived competence toward physical activity and increased perceptions of exercise as fun. What is most fascinating and unique to other research on this topic is the lasting effect the intrinsic curriculum had on the group. Ten weeks after the curriculum concluded, Portis returned to the school unannounced and based on assessments given at that time determined the intrinsic group kept their fitness levels, their competence levels, and their perceptions of exercise as fun compared to the extrinsic group, statistically significant findings. This meant that the intrinsic groups had participated in more extracurricular physical activity. This study is a good example of SDT and CET utilized in practical application with results that can greatly contribute to the need of increasing physical activity in young people.

D. Conclusion

While work has been done in the areas of fitness assessments, physical activity, self determination theory and cognitive evaluation theory constructs (e.g. competency and intrinsic motivation); there has been little to no research that examines these aspects together with regard to college students. Additionally, the research that has been conducted with other populations, such as school-aged youth, has left speculation as to the exact role fitness assessments play in an individual’s motivation.

Professionals that work with college students who have completed a fitness assessment, believe based on observation, student-written essays and verbal comments
from students, that the fitness assessment feedback process has an impact on students’
motivation. Further research, using strong designs, is needed to clarify if, in fact, it is the
feedback that creates a change in motivation and/or an increase in physical activity or if
there are other factors at play.
A. Design

The purpose of this study was to determine if feedback (in a computer-generated report form) from a personal fitness assessment will influence feelings of competency and autonomy with regard to physical activity in a college sample. Further, this study was to determine if these feelings of competency and autonomy will affect intrinsic motivation toward being active which may thereby result in a change in physical activity.

Following are the research questions that guided the study:

- How do the feedback/results from a personal fitness assessment (perceived as positive or negative) affect a person's feeling of competency and/or autonomy with regard to physical activity?

- How does this change in feelings of competency and/or autonomy relate to changes in intrinsic motivation?

- How does a change in intrinsic motivation relate to a change in physical activity level?

The proposed study is a non-equivalent control group design. The students involved in this study were selected from 10 sections of Personal Health (HESC 101) classes in spring 2009 from a large public university in the south-western region of the United States. Of the 10 sections, 6 were randomly selected. Then, three sections were randomly assigned to the experimental group and three to the control group. On average, HESC 101 sections contain 28 students.
Because many students who choose Personal Health to meet a general education requirement may be more likely to be health conscious or more physically active, another control group was formed by matching as discussed above and then randomly selecting 3 sections from the 10 sections of General Psychology (another general education option) offered this same semester. Any individual that happened to be in more than one group (e.g. Personal Health and General Psychology) was eliminated from the study.

B. Demographics

The university utilized in this study enrolled 36,018 students in spring 2008 (28,826 full-time equivalents). Fifty-eight percent are female and 42% male. The average age of the student body is 24 years (22 years median age). The ethnic breakdown is as follows: 32% White, 28% Hispanic, 22% Asian/Pacific Islander, 4% Black, 4% International Students, 1% American Indian and 10% unknown.

C. Variables and Measurement Procedures

As part of the Personal Health curriculum, each student in the experimental group participated in a fitness assessment (independent variable). The fitness assessment was conducted by trained Kinesiology graduate students in the physical performance laboratory. The students were assessed in the following seven areas: aerobic fitness, body composition, flexibility, muscular strength, pulmonary function, resting blood pressure, and total coronary heart disease (CHD) risk score (as determined by health behavior and family history questionnaire). The results or feedback were given via a 3-page, computer-generated document (see appendices).

Competency, autonomy and intrinsic motivation (dependent variables) were measured by self report utilizing three specific subscales from the Intrinsic Motivation
Inventory (IMI) (Whitehead & Corbin, 1991) at different intervals before and after the fitness assessment. According to the University of Rochester, Self Determination Theory website, “The Intrinsic Motivation Inventory is a multidimensional measurement device intended to assess participants’ subjective experience related to a target activity in laboratory experiments. It has been used in several experiments related to intrinsic motivation and self regulation.” In addition, it is stated that the scale has been “shown to be factor analytically coherent and stable across a variety of tasks, conditions, and settings.”

Physical activity levels (dependent variable) were assessed by self report through the use of a questionnaire adapted from the National College Health Risk Behavior Survey (NCHRBS), also at different intervals before and after the fitness assessment. At each point in time competency, autonomy, intrinsic motivation and physical activity level were assessed. In addition, participants’ perceptions of the results were measured on week seven once the results of the fitness assessment have been reviewed by the participant.

Intrinsic Motivation Inventory (IMI) assessed intrinsic motivation as well as competency and autonomy. National College Health Risk Behavior Survey (NCHRBS), physical activity subscale was utilized to assess physical activity level. Four items created specifically for this study, measured subjects’ perception of their feedback assessment results.

The survey instrument was administered four times throughout a sixteen-week semester. Survey 1 was administered as a baseline collection of the intrinsic motivation constructs and physical activity levels. Survey 2 (same items as survey 1) was
administered three weeks later as this allowed enough time for the fitness assessments to be completed on each student, but the results had not yet been given to the students. This measurement was useful in determining if the act of the assessment itself was responsible for any changes. Next, survey 3 was administered approximately four weeks later upon students receiving their fitness assessment results. This survey contained all the original items plus the five additional items to assess the students’ perception of their results. It is important to note that this survey was administered immediately after the fitness results were distributed to the students so as not to give them time to talk with nor be influenced by their peers. Finally, survey 4 was administered during the last week of the semester to note if any changes seen in the constructs remained or diminished.

Incentive items (five dollar eatery gift certificates) were given to all student participants at the end of the semester. The course instructors were given ten dollar gift certificates to a local eatery, however they were given these incentives at the beginning of the semester.

*Personal Health* students in the control group that were not given the opportunity to participate in the fitness assessment were given a voucher allowing them to take the fitness assessment in a subsequent semester.

**D. Data Analysis**

For research question 1 a 2 x 3 Repeated measures, analysis of variance (ANOVA) (time of assessment by group—personal health classes with fitness test, personal health classes without fitness test, and general sociology classes) was utilized to analyze the data. The independent variables were the time of assessment and the three groups. The dependent variables were competency, autonomy, intrinsic motivation and
physical activity level. The intervention (fitness assessment) group was also divided into those who perceived their results of the test as positive and those who perceived their results as negative. Then a 2 x 2 repeated measures ANOVA (time of assessment by perception—positive or negative) was implemented.

Regression was also utilized to assess a relationship between competency/autonomy and intrinsic motivation (research question 2), as well as to assess a relationship between intrinsic motivation and physical activity (research question 3).

E. Power Analysis

According to Cohen (1992), statistical power analysis examines the relationship among sample size, significance criterion (alpha), population effect size and statistical power. He notes that for research planning, the analysis “...is most useful to determine the sample size necessary to have a specified power for a given alpha and effect size” (p.156).

With the use of ANOVA in the data analyses and considering this is an experimental study, a medium effect size was estimated. With a desired power of .80 and an alpha of .05, at least 52 participants were needed in each of the three groups based on Cohen (1992). Due to a likely rate of 10% for attrition, group sizes of at least 58 participants were sought; however with an average of 35-40 per class, we were able to secure approximately 140 students per group.

F. Research Ethics

Application was submitted to the Institutional Review Board (IRB) of two universities; the study university and university the principle investigator is representing.
Students were not coerced or forced into participating in the study, and their grade in the class was in no way tied to participation in the study. They were informed of this in writing. The principle investigator of the study did not serve as an instructor for any sections of HESC 101 during the semester of data collection. There were no students under 18 years of age. Students were only identified by an assigned number.

Care was given to ensure that no harm was done to participants; therefore vouchers were created to allow control group students a chance to participate in the fitness assessment after the semester concludes. All participants and control sections were selected randomly to ensure justice for all students.

Completed surveys are being kept in a locked file cabinet in the office of the principal investigator. Only the principle investigator and research assistant have access to the data. Once data is recorded, analyzed, reported and kept for 5 years it will be destroyed by shredding.
CHAPTER 4
FIRST PUBLISHABLE PAPER

Title:
Feedback Lowers Intrinsic Motivation for Physical Activity among College Students

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ABSTRACT

Objective: Fitness assessments are commonly used as a motivational tool in fitness classes and fitness training. However, there is little research on their actual effect. The purpose of this study was to explore how fitness assessment results may affect intrinsic motivation for physical activity in college students. Participants: A total of 430 college students were sampled from a university located in the south-western region of the United States. Methods: The study utilized a quasi-experimental design with three groups (intervention and two controls) being surveyed at four time points during a semester. Results: Intrinsic motivation and competence diminished significantly in the group receiving fitness assessment results as compared to either control group. Conclusion: The implementation of fitness assessments and distribution of the results may actually hinder intrinsic motivation toward physical activity at least among those dissatisfied with the feedback.
It has become common knowledge that more Americans are classified as overweight and obese than just 20 years ago. In fact, there has been a gradual increase in body mass index (BMI) since the 1980’s. Much attention has gone into deciphering this trend. Researchers have attributed it to, among other factors, an increase in sedentary behavior.

This overall decline in physical activity among the U.S. population is not only alarming in relation to overweight and obesity but also as it relates to premature death and disability from various chronic diseases including coronary heart disease, diabetes, and certain cancers. It is estimated that direct medical costs related to physical inactivity are about $76 billion (Pratt, Macera & Wang, 2000). This cost would be even higher if indirect costs such as loss of productivity were considered.

Youth, in particular, have experienced considerable decline in physical activity as schools eliminate non-essential course work to reduce their budgets. Brownson, Boehmer, & Luke (2005), examining data from the Youth Risk Behavior Survey (YRBS) from 1991 to 2001 found a decline in the percentage of students, from 41.6% to 32.2%, who attend daily physical education classes. Research indicates an additional decline in physical activity as youth become young adults. According to Calfas, Sallis, Lovato, & Campbell, (1994) following graduation from college, almost half of all students report a decrease in physical activity.

With a cursory glance of the research literature one may believe that the nation’s concern with society’s declining activity is recent (within the last 20-30 years). However, with a deeper look we find that in the early-1950’s Drs. Hans Kraus and Ruth Prudden (1953) noticed Americans walking less, working less vigorously and watching more
televisi9on. Armed with a fitness test Kraus developed in previous research, the pair decided to conduct an assessment on both European and American youth. The results not only indicated American youth to be less fit than European youth but 56% of the U.S. students failed at least one component of the fitness test.

By the late 1950's organized fitness testing of youth in schools began and almost from the start, percentile-based awards were created and used (ostensibly) as motivational tools (Whitehead & Corbin, 1991). In 1966, President Johnson created the Presidential Fitness Award for those who scored at or above the 85th percentile on all of the test items.

Since this early use, fitness assessments have become a standard of physical education classes from elementary school through high school. The California Department of Education (2009) requires all students to participate in fitness testing in grades 5, 7, and 9. The U.S. Department of Education reports that nearly all states mandate use of fitness assessments as a requirement of all students annually or biannually. It is surprising with so much use there has been very little research dedicated to fitness testing or the connection between these assessments and motivation toward physical activity. In contrast, over the last few decades research has been strong in the area of physical activity motivation and intrinsic motivation.

Deci and Ryan (1985) have been at the forefront of this research, as the creators of self-determination theory (SDT) and its offspring cognitive evaluation theory (CET). The main construct of both SDT and CET is intrinsic motivation, which is described by Deci and Ryan (2000) as “the inherent tendency to seek out novelty and challenges, to extend and exercise one’s capacities to explore and learn” (p.70). It is important to note that these theories do not focus on factors that cause intrinsic motivation, but rather
conditions that enhance versus diminish it. CET is based on two basic needs or constructs; competency and autonomy that relate to intrinsic motivation (Deci & Ryan, 2000).

For example, an event, such as positive feedback, that creates a sense of competence in an individual during an action can enhance intrinsic motivation for that action. Wiersma and Sherman (2008) state, “competence can be derived through one’s own assessment of performance or through the feedback provided by others, most notably teachers, coaches or peers” (p. 171). In addition, it is important to note that negative performance feedback (Deci, 1975) as well as tangible rewards, threats, imposed goals, directives and deadlines (Deci & Ryan, 1985) can diminish intrinsic motivation.

For intrinsic motivation to be enhanced these feelings of competency must be accompanied by a sense of autonomy—a feeling that the action is self-determined and not controlled by others (Deci & Ryan, 2000). Frederick-Recascino (2002) in an article reviewing SDT and CET in a number of domains including sports, education, and health care states, “across studies in all these domains, research results clearly indicate that the degree of autonomy does influence affect and behavior within each domain” (p. 281).

Based on the above, it is logical that receipt of perceived positive results of a fitness assessment can create a sense of competence in that individual. In addition, it seems that with a positive perception there could also be a sense of autonomy in that the actions required to be at this assessment level were self-determined. Thus, intrinsic motivation would be enhanced. The reverse would likely occur if the fitness assessment results were perceived as negative. This is illustrated in a study by Whitehead and Corbin
(1991) where individuals given bogus positive fitness test feedback enhanced intrinsic motivation and bogus negative fitness test feedback diminished intrinsic motivation.

To date, there is no published research on the role of legitimate fitness assessment feedback and its influence on motivation toward physical activity. However, a majority of community and university fitness facilities/labs provide individuals with some form of a fitness assessment either on a voluntary basis or as a requirement for a specific course. In this study, our primary purpose was to explore the impact of the results of a fitness assessment with regard to one’s intrinsic motivation toward physical activity and physical activity levels. Further, we conducted this exploration based on the cognitive evaluation theory constructs of competency, autonomy, and intrinsic motivation.

**METHODS**

**Participants**

The participants in this study were undergraduate students from a large public university, with an enrollment of approximately 34,000 students, located in the southwestern region of the United States. The students surveyed were enrolled in either *Personal Health* (HESC 101) or *Introduction to Sociology* (SOCI 101). Eleven classes were involved in this study, eight HESC 101 classes and three SOCI 101 classes, each with 40 to 50 students. These courses are often taken as electives to meet general education requirements; therefore the students represent a variety of academic majors.

A total of 430 students were sampled, 156 males and 274 females, aged from 18-29 (M = 19.54, SD = 1.71). The sample was 37% Caucasian, 26% Hispanic, 23% Asian/Pacific Islander, 5% Black/African American, less than 1% American Indian and 8% other. These ethnic breakdowns closely mimicked those of the university (32%
Caucasian, 28% Hispanic, 22% Asian/Pacific Islander, 4% Black/African American, 1% American Indian and 10% other). Prior to data collection, the study was explained to the students in accordance with institutional review guidelines; students signed a form to verify consent. Table 4.1 shows the demographic distribution in the experimental and control groups for gender and ethnicity. There were no significant differences among the groups on gender [$\chi^2(N = 430, 2) = .02, p = .988$] or ethnicity [$\chi^2(N = 430, 2) = 9.45, p = .306$]. There was a significant difference in age, however $F(2, 427) = 14.09, p < .001$.

The SOCI control group was younger than the intervention or HESC control group (Mean age = 18.87, 19.78, and 19.85 respectively).

**Procedures**

The eight Personal Health classes were randomly assigned to either a control group ($n=150$) or intervention group ($n=157$). Four classes were assigned to each group. The intervention group students participated in a fitness assessment as part of their course curriculum; the control group participants did not participate in the fitness assessment; however they were given a voucher to participate in the assessment the following semester if they wished. Because students who choose to enroll in the Personal Health class may be more health conscious or more physically active, the three sections of Introduction to Sociology served as an additional control group ($n=123$).

Surveys were administered to students in each of the eleven classes to assess all variables, four times during the 16-week semester. Data collection followed this schedule: week 1-2 of the class (baseline); week 6-8 after fitness assessment had been performed in the intervention group; week 9-12 immediately after student receipt and review of written results of the fitness assessment; and week 15-16, end of the semester.
The control groups followed the same data collection schedule even though they did not participate in the fitness assessment. Student confidentiality and anonymity were preserved by use of a code containing birthday, gender, and section of the course to which the student was enrolled.

**Variables**

The fitness assessment (independent variable) done in the experimental group was performed by four trained kinesiology graduate students in the physical performance laboratory. Participants were assessed in the following seven areas: aerobic fitness, body composition, flexibility, muscular strength, pulmonary function, resting blood pressure, and total coronary heart disease (CHD) risk score (as determined by a health behavior and family history questionnaire). The results (feedback) was given via a 3-page, computer-generated document, from a programmed Microsoft Excel spreadsheet which was developed by the university exercise physiology lab director.

Competency, autonomy and intrinsic motivation (the primary dependent variables) were measured by self-report utilizing three specific subscales from Intrinsic Motivation Inventory (Ryan, 1982). Each of the scales consisted of 5-7 items all utilized a 7-point scale ranging from 1 to 7, with 1 representing *not at all true*, 4 representing *somewhat true* and 7 representing *very true*. A sample item for each of the constructs follows: Competency, "I think I am pretty good at exercise/physical activity"; Autonomy, "I feel that it is my choice to engage in exercise/physical activity" and Intrinsic Motivation, "I find exercise/physical activity very interesting." Cronbach’s alphas in our baseline data were .87, .74, and .94 for Competency, Autonomy, and Intrinsic Motivation respectively.
According to the University of Rochester, Self-determination Theory website which cites a number of researchers work, "The Intrinsic Motivation Inventory is a multidimensional measurement device intended to assess participants' subjective experience related to a target activity in laboratory experiments. It has been used in several experiments related to intrinsic motivation and self-regulation." In addition studies done by McAuley, Duncan, and Tammen (1989) and Tsigilis and Theodosiou (2003) have found strong support for the validity and reliability of the Intrinsic Motivation Inventory.

Physical activity levels (dependent variable) were assessed by self-report on six items adapted from the National College Health Risk Behavior Survey. These items included wording to address aerobic activity, muscle strengthening, and flexibility. Cronbach's alpha in our baseline data was .69; this lower alpha is expected as this construct represents a variety of types of physical activity. In addition to the above variables, intervention participants' perceptions of their physical fitness assessment results were also measured at data collection time three immediately after they had received and reviewed the written results. Four items created specifically for this study measured these perceptions. Participants indicated their perception on a 7-point scale with descriptive words in accordance to each item. For example: "Overall my fitness results are:" 1 representing discouraging and 7 representing encouraging. Cronbach's alpha for this variable scale was .92.

Students who participated in three of the four surveys received a five-dollar gift certificate to the university food court. The course instructors were given ten-dollar gift certificates to a local restaurant.
Data Management

Data were double entered, cleaned and analyzed with SPSS 16.0. Since this study was based on four different data collection assessments throughout the semester, students who only took one survey were deleted as there would be no data for comparison (82 cases). Of the 430 cases left, 230 completed all four surveys. For the remaining 200 cases that were missing 1 or 2 surveys, missing value analysis was performed and expectation maximization missing data imputation was done with SPSS 16. The repeated measures general linear model was then utilized. All data were examined for gender and ethnicity differences among the three groups; no such differences were discovered (see table 4.1).

RESULTS

Competency and Intrinsic Motivation

We compared the three groups (group 1, intervention; group 2, Personal Health control and group 3, Sociology control) over each of the four time periods utilizing the General Linear Model for analysis and found interesting, although not completely anticipated, results.

There were changes among the three groups for the constructs of competency and intrinsic motivation (see Figure 4.1). The intervention group had a significant decrease in competency from time two to time three compared to the control groups, $F(6, 848)=3.81$, $p=0.001$. Time three was when the results of the fitness assessments were returned to students; surveys were handed out immediately after students received their feedback report and allowed to go over it.
Given the relationship of competency and intrinsic motivation in SDT and CET, and based on the changes in competency among the groups over time we expected to see similar changes in intrinsic motivation, and we did. Figure 4.1 clearly illustrates this. Both control groups remain fairly consistent in the intrinsic motivation scale, however in the intervention group we see a decline in intrinsic motivation relative to the two control groups once the intervention students received and reviewed their fitness results, 

\[ F(6, 848) = 2.33 \, p = .031 \]

It is important to note that the intervention group appears to experience some recovery from time to three to time four with regard to both competency and intrinsic motivation; however neither the improvement in intrinsic motivation, 

\[ F(1, 154) = 0.02, \, p = .888 \]

nor the improvement in competence, 

\[ F(1, 154) = 0.002, \, p = .961 \]

were significant. Therefore an assessment beyond the time of the semester would be needed to see if recovery continues to a significant level.

**Student Perception of Fitness Results**

Examination of the *perception-fitness-results scale* indicated that 32% of the intervention students scored below four (on a 7-point scale, with one being the lowest) we equate this as a negative or low perception and 68% scored above four, we equate this as a positive or high perception. Therefore, if we were trying to explain the significant drop in intrinsic motivation by simply a larger number of students who viewed their results as negative, this would not be a valid argument as more students actually perceived their fitness assessment results as positive.

One other point worth noting with regard to competence and intrinsic motivation is that even though we see a decrease in both constructs this decrease was significantly greater in those that perceived their results negatively or as we labeled it, *low (Intrinsic*
Motivation $F(1, 155)=6.41, p=.012$; Competence $F(1,155)=15.59, p=.000$; Physical Activity $F(1,155)=7.46, p=.007$). This is illustrated in figure 4.2. Upon closer examination of the low group we conducted paired t-tests to note the significance of the change between time 2 and time 3 for intrinsic motivation ($t(59)=4.01, p<.0005$), competence ($t(59)=3.89, p<.0005$) and physical activity ($t(59)=2.95, p=.005$). There was no significant difference between time 2 and time 3 for the high groups in any of the constructs.

Therefore, as we would expect based on the SDT theory, as competence decreases, intrinsic motivation is diminished and thereby physical activity decreases. What is telling from this study is that receipt and review of one’s fitness results which one perceives as negative (identified as low in figure 4.2) predicts this decrease but there was no corresponding increase in competence, intrinsic motivation or physical activity for those who perceived the results of their fitness test as positive (high).

Physical Activity

With a significant diminishing of intrinsic motivation toward physical activity at time three, we would expect to also see a decrease in physical activity levels among these students. Physical activity levels did not change significantly at any of the time points for any group (see Figure 4.1). However, as mentioned in the previous section, those who perceived their feedback as negative had a significant decrease in reported physical activity after reviewing their assessment results—$t(59)=2.95, p=.005$. On the other hand those who perceived their results as positive did not change physical activity levels significantly, $t(96)=.763, p=.303$ (see Figure 4.2).
Autonomy

One other construct that was examined was that of autonomy. SDT refers to autonomy as actions that are self-determined. It was hypothesized that autonomy would remain constant as the intervention did not include any force or pressure for students to engage in physical activity. However, as is evident in Figure 4.1 autonomy decreased, not only for the intervention group, but for all three groups $F(3,423)=4.25, p=.006$.

COMMENT

These results regarding competency and intrinsic motivation indicate that even though we intuitively believe a fitness assessment feedback can be the sort of feedback that enhances one's feelings of competency and intrinsic motivation toward physical activity, perhaps it is not. Apparently, the feedback in some way made at least some students feel less competent. We can speculate that just the act of performing the fitness test may have diminished competency; however we surveyed the students at time two (right after they took the fitness test) and did not see a significant change from time one to two.

These results are of this study are similar to Whitehead and Corbin's (1991) findings where negative feedback (theirs was bogus) decreased the constructs of SDT and CET. However, our results differ from their study in that with positive feedback (also bogus) they saw an enhancement of the constructs and we in contrast saw no significant change at all. This lack of change in the positive group may have been due to a possible ceiling effect, as our scale had a maximum range of seven. If certain individuals felt early on very competent and highly intrinsically motivated toward physical activity there may
have just not been any higher ranking to express their additionally feelings of competence and intrinsic motivation after viewing their fitness assessment results.

Or perhaps the fitness assessment did not relate to physical activity as we thought. For example if we observed a student playing soccer and we gave him feedback of his soccer skills we would expect this feedback to effect his perceived competency regarding how he plays soccer and then also effect his intrinsic motivation toward soccer and how often he engages in soccer; however, in this study we are providing feedback on fitness and then measuring competency and intrinsic motivation toward physical activity. We know fitness and physical activity are related in general, but it may not be as we speculated with regard to applying the self-determination theory.

In addition the term fitness, for many people, equates to something we are supposed to have to be healthy and therefore for many can be categorized as extrinsic motivation rather than intrinsic motivation or something we have to achieve rather than something we want to achieve. Thus focusing on the results or the feedback of a fitness assessment may diminish intrinsic motivation because it is a cue that physical activity is not to be done just for itself but to obtain an extrinsic reward—fitness. According to Buckworth, Lee, Regan, Schneider and DiClemente (2007) even though extrinsic motivation can be a behavior change tool, intrinsic motivational techniques are generally preferred as “extrinsic rewards may encourage a more external locus of control and decrease autonomy and intrinsic motivation” (p.443).

As for the decrease in the autonomy construct, had only the Personal Health students indicated a decrease in autonomy we may have concluded that the course instruction or content may have made students feel pressured by the course instructor to
be physical active to aid in their health. But since we see a drop in all three groups, clearly this line of thinking cannot be used to explain the decrease in autonomy.

Recall that autonomy is described as actions that are self-determined. Perhaps the decrease in autonomy was due to a heavier student workload as the semester progressed and students feeling a lack of self-determination in many aspects of their life. Might it be that physical activity is just one of the facets of life where these students sense a loss of autonomy? Further research focusing of this construct with another population such as working, young adults would be interesting to determine any link to the semester timeline and the similar timing of events among college students (e.g. midterms, finals). Clearly much more research is needed with regard to this construct.

Limitations

The ability to generalize these findings is limited by the sample of college students with an average age of 19.54 years. In addition, even though we utilized a control group outside of health science courses, it would have strengthened the design to gather subjects from a variety of other general education courses.

Conclusions

The results of this study have major implications for the field of college health and health promotion. As mentioned previously fitness assessments are a common tool used in junior high and high schools as well as on college campuses (although in the college setting they are often optional). What seems more influential than the actual performance of the fitness assessment is the delivery of the results. Would we have seen the expected increase of competency and enhancement of intrinsic motivation if the results were delivered by a person such as a teacher or coach? Or perhaps the formatting
or presentation of the report itself is somehow conducive to the decrease of these constructs.

Recall that Wiersma and Sherman (2009) state “fitness testing can be a positive and enjoyable experience and a useful tool to motivate youth to be physically active if used in a developmentally appropriate manner as one aspect of a comprehensive physical education curriculum and if delivered in a positive and supportive environment” (p. 168). The findings from this study force us to focus our practice of utilizing fitness assessments more on the issue of using them in a developmentally appropriate manner. Fitness assessments may be a worthy instrument, but we must continue to explore exactly how best to use them in order to optimize participants’ feelings and motivation with regard to physical activity.

Further research also needs to focus not only on the delivery method of feedback but also on examining groups based on the perception of their results. Perhaps for those that considered their feedback negative, an additional intervention addressing ways to increase competency toward physical activity could be explored. We may be able to engage these groups of students in a session of interpreting their results that would focus more on the positive aspects of their results and then utilize goal setting practices on the areas where improvement is needed. Of course additional follow-up would then be needed in order for participants to track their progress.

Another area of related research is on the use of health risk appraisals. This is a logical next step in this research realm as these assessment tools are used in numerous health promotion settings much like fitness assessments. With that said, most of the existing research on health risk appraisals focus more on the efficacy of the tool for
behavior change, rather than the effect the tool has regarding motivation for the activity or for a change of the behavior.

Clearly, more research is needed but on the basis of this study, which so far is the only one we have found that evaluated the effects of fitness testing on intrinsic motivation, the use of fitness testing in an attempt to increase intrinsic motivation for physical activity cannot be justified.
REFERENCES


Table 4.1. Gender and Ethnicity Breakdown among the Three Groups

<table>
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Figure 4.1 Self-Determination Theory Constructs in Intervention and Control Groups across Four Time Points.
Figure 4.2 The Low and High Perception Groups at Time 2 (6-8 Weeks) and Time 3 (9-12 Weeks)
CHAPTER 5
SECOND PUBLISHABLE PAPER

Title:
Gender and Ethnicity Differences among College Students With Regard to Competence, Intrinsic Motivation and Physical Activity

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Abstract

Objective: Previous research indicates minorities engage in less physical activity than non-minorities. However, there is little research on the factors that may influence this disparity. The purpose of this study was to explore ethnicity and gender with regard to physical activity and the constructs related to motivation for physical activity.

Participants: A total of 430 college students were sampled from a university located in the south-western region of the United States. Methods: Ethnic and gender differences in competence, intrinsic motivation toward physical activity, and perceived physical activity were examined using general linear model ANOVA. Results: Hispanics and Asians had lower perceived competence and physical activity than Caucasians. Men were higher than women on competence and intrinsic motivation for exercise and weakly higher on self-reported physical activity. Conclusion: Lower levels of competency among Hispanics and Asians may contribute to lower physical activity levels in these groups.
LITERATURE REVIEW/BACKGROUND

One of the overarching goals of Healthy People 2020 is to "achieve health equity, eliminate disparities, and improve the health of all groups" (U.S. Department of Health and Human Services, 2010). This goal is a focus of our nation over the next decade due to the prevalence of health disparities in our country. According to the Office of Minority Health (2008), despite our continued advances in medical technology and advanced health care, racial and ethnic minorities continue to have higher rates of disease, disability and premature death than non-minorities. In fact, African Americans, Hispanics/Latinos, American Indians and Alaska Natives, Asian Americans, Native Hawaiians and Pacific Islanders, have higher rates of infant mortality, cardiovascular disease, diabetes, HIV infection/AIDS, cancer and lower rates of immunizations and cancer screening than Caucasians (Office of Minority Health and Health Disparities, 2008).

Health disparities negatively impact groups of people who have historically experienced greater obstacles to health based on their race or ethnic identity. These obstacles can include: limited access to education, low socioeconomic status, discrimination, racism, cultural insensitivity, physical environment, legislative policy, and others. These obstacles often translate into behaviors or a lifestyle that contributes to poor health. One such example is the obesity epidemic plaguing our nation. It has become well known that obesity rates are higher among certain minority groups. Specifically, African Americans and Mexican Americans suffer the highest prevalence of obesity (Flegal, Carroll, & Ogden, 2010). Researchers focusing on lifestyle factors find that in
addition to poor eating habits, lack of physical activity is a major contributing factor to this condition.

A number of studies have examined ethnicity as it relates to physical activity and have found that African Americans, Hispanics and Asian Americans are less active than Caucasians. Specifically, Wolf, and her colleagues (1993) examined activity, inactivity, race and ethnicity among schoolgirls. They found Asians and Hispanics reported fewer activity units than Caucasians and less than one fifth of either Asians or Hispanics met the Healthy People goal for physical activity. Gordon-Larsen, McMurray and Popkin (1999) found that minority adolescents report higher levels of inactivity and that females of each of the minority groups were significantly less active than males, with female Asians being the least active.

Suminski, Petosa, Utter and Zhang (2002) reiterate these findings. They report 28.1% Asians, 23.5% African American, and 20.3% Hispanic females indicated no physical activity within the last month compared to 17.4% Caucasian females. In males, Asians reported significantly lower levels of youth physical activity than both Caucasians and Hispanics. One final study worth noting examined the type of physical activity performed, leisure and non-leisure, with leisure being described as exercise and recreation and non-leisure being described as activity exerted for occupation, housework or transportation. Asian American men and women of all ages were significantly less likely to meet the recommended levels of leisure physical activity than US-born non-Asians (Kandula & Lauderdale, 2005).
Reading the above, we would believe that research in the area of minorities and physical activity is comprehensive. Especially among Asians as research findings deem them least active. However, much of this literature notes the shortage of studies focusing on Asians and physical activity. Kandula and Lauderdale (2005), for instance, state that data on physical activity among Asians are lacking and the CDC states “data on physical activity participation rates among Asians in the United States are limited” (MMWR, 2004, p.256).

When examining the research regarding physical activity involvement we often encounter a focus on motivation toward physical activity. This body of research is often based on self-determination theory (SDT) and its offspring, cognitive evaluation theory (CET). The main construct of both SDT and CET is intrinsic motivation, which is described by Deci and Ryan (2000) as “the inherent tendency to seek out novelty and challenges, to extend and exercise one’s capacities to explore and learn” (p.70). It is important to note that these theories do not focus on factors that cause intrinsic motivation, but rather conditions that enhance versus diminish it. CET is based on two basic needs that relate to intrinsic motivation: competency and autonomy (Deci & Ryan, 2000).

Competency is basically one’s feelings of confidence toward an activity. Wiersma and Sherman (2008) state, “competence can be derived through one’s own assessment of performance or through the feedback provided by others, most notably teachers, coaches or peers” (p. 171). Autonomy is a feeling that the action is self-determined and not controlled by others (Deci & Ryan, 2000). “Both feelings of autonomy and competence
are necessary conditions for intrinsically motivated behavior” (Ryan, Williams, Patrick & Deci, 2009, p.113)

Previous research has examined minority physical activity levels and compared them to other ethnic groups. In addition, previous research has focused on various social factors that influence motivation toward physical activity. However, there are currently no known studies that look at the constructs of intrinsic motivation, competency and autonomy with regard to physical activity levels among specific ethnic groups. This gap in the literature is illustrated by Shifflett and her colleagues (1991) as they note that “given the growing diversity of populations, [we] might strengthen physical education programs if efforts were made to study and identify the interests and motivations of minority students with respect to physical activity” (p.147).

In this study, we worked to add to this limited body of research by not only examining physical activity levels among ethnic groups but also by exploring ethnicity and gender with regard to the constructs related to motivation toward physical activity: competency, autonomy and intrinsic motivation.

METHODS

Participants

The participants in this study were undergraduate students from a large public university, with an enrollment of approximately 34,000 students, located in the southwestern region of the United States. The students surveyed were enrolled in either Personal Health (HESC 101) or Introduction to Sociology (SOCI 101) in spring, 2009. Eleven classes were involved in this study, eight HESC 101 classes and three SOCI 101
classes, each with 40 to 50 students. These courses are often taken as electives to meet
general education requirements; therefore the students represent a variety of academic
majors.

A total of 430 students were sampled, 156 males and 274 females, aged from 18-
29 (M = 19.54, SD = 1.71). The sample was 37% Caucasian, 26% Hispanic, 23% Asian/Pacific Islander, 5% African American, less than 1% American Indian and 8% other. These ethnic breakdowns closely mimicked those of the university (32% Caucasian, 28% Hispanic, 22% Asian/Pacific Islander, 4% African American, 1% American Indian and 10% other). Prior to data collection, the study was explained to the students in accordance with institutional review board guidelines; students signed a form to verify consent.

Procedures

This study was part of a larger experimental study assessing the effects of fitness assessment feedback on intrinsic motivation toward physical activity therefore the procedures and study design are reflective of the larger study (Chandler, Lee, Herring & Lesniak, 2011). The data analyzed in this study are the baseline measurements of that larger study.

Surveys were administered to students in the first couple weeks of a spring semester in undergraduate courses of Personal Health and General Sociology. The survey contained 32 items and took approximately 10-12 minutes for each student to complete (n=430). Student confidentiality and anonymity were preserved by use of a code containing birthday, gender, and section of the course to which the student was enrolled.
Variables

Assessed demographics included gender, age and ethnicity. Ethnic options were listed as; White/Caucasian, Black/African American, Hispanic/Latino, Asian/Pacific Islander, American Indian, and other. In addition, the main constructs of CET were assessed, these include; intrinsic motivation, competence, autonomy. We also measured physical activity levels.

Competency, autonomy and intrinsic motivation were measured by self-report utilizing three specific subscales from Intrinsic Motivation Inventory (Ryan, 1982). Each of the scales consisted of 5-7 items all utilized a 7-point scale ranging from 1 to 7, with 1 representing not at all true, 4 representing somewhat true and 7 representing very true. A sample item for each of the constructs follows: Competency, “I think I am pretty good at exercise/physical activity”; Autonomy, “I feel that it is my choice to engage in exercise/physical activity” and Intrinsic Motivation, “I find exercise/physical activity very interesting.” Cronbach’s alphas were .87, .74, and .94 for Competency, Autonomy, and Intrinsic Motivation respectively.

According to the University of Rochester, Self-determination Theory website which cites a number of researchers work, “The Intrinsic Motivation Inventory is a multidimensional measurement device intended to assess participants’ subjective experience related to a target activity in laboratory experiments. It has been used in several experiments related to intrinsic motivation and self-regulation.” In addition McAuley, Duncan, and Tammen (1989) and Tsigilis and Theodosiou (2003) have found strong support for the validity and reliability of the Intrinsic Motivation Inventory.
Physical activity levels were assessed by self-report on six items adapted from the National College Health Risk Behavior Survey. These items included wording to address aerobic activity, muscle strengthening, and flexibility. Cronbach’s alpha in our baseline data was .69; this lower alpha is expected as this construct represents a variety of different types of physical activity. Data were double entered, cleaned and analyzed with SPSS 16.0.

RESULTS

The general linear model was used to analyze ethnicity and gender in relation to the variables; intrinsic motivation, competence, autonomy, and physical activity. Table 5.1 shows the results of this analysis. There were significant overall effects for gender and ethnicity. Specifically the significant ethnicity effect comes from competency and physical activity and the significant gender effect comes from competency, intrinsic motivation, and physical activity. There were no significant effects for autonomy for either gender or ethnicity nor was there a significant interaction between gender and ethnicity. Based on the means shown in table 5.2 for the particular ethnic groups, there was a significant difference between the Asian and Caucasian ethnic groups as well as the Hispanic and Caucasian groups. Hispanics scored lower than Caucasians on competence and physical activity; however the differences from Caucasians with regard to these two variables were even stronger for Asians.

An analysis of gender and the construct variables also indicated significant differences between males and females. Men were significantly higher on intrinsic motivation, competence, and self-reported physical activity (see table 5.1).
DISCUSSION

Researchers examining the relationships of ethnicity and gender with regard to physical activity have found in general that minorities exhibit lower physical activity levels than Caucasians (Kandula & Lauderdale; Wolf, et al.; CDC) and females often exhibit lower activity levels than males (Unger, et al., 2004; Wolf, et al., 1993; Suminski, Petosa, Utter & Zhang, 2002; Allen, et al., 2007; Gordon-Larsen, McMurray & Popkin, 1999). Asians have been found, in multiple studies, to be less physically active than African Americans, Hispanics and Asians, (Unger, et al., 2004; Wolf, et al., 1993; Suminski, Petosa, Utter & Zhang, 2002; Allen, et al., 2007). Our study contributes to this limited body of research with further evidence of the disparity between Asians, Hispanics and Caucasians with regard to physical activity levels. In addition, we find that Asians and Hispanics also have significantly lower scores of their feelings of competency toward physical activity than Caucasians.

Ryan, Williams, Patick and Deci (2009) state that lowered competence toward an activity could be because individuals “lack certain skills or knowledge necessary to act” (p. 117). In addition, they explain that not only is competence based on individuals’ skills and history of the domain of behavior in focus (physical activity), but also on the aspects of the social environment. Meaning that people around the individual; parents, teachers, coaches, or peers, that provide positive feedback, can thereby enhance feelings of competence. This leaves us wondering what may be missing among these ethnic groups to contribute to the lower feelings of competency toward physical activity. Is there a cultural factor that places little value on physical activity thereby giving these individuals...
less encouragement to engage in practice to develop skill and/or little to no positive feedback on the behavior of physical activity?

More research in this area exploring culture as it relates to physical activity is needed. Specifically, we need more research to understand the relationship of competency toward physical activity in specific cultures. It may also be beneficial to take a more detailed look at the Asian and Hispanic ethnic groups by breaking them into specific sub-ethnic groups (e.g. Pacific Inlanders, Eastern Asians, etc) with regard to these variables.
REFERENCES


Centers for Disease Control and Prevention, Office of Minority Health and Health Disparities homepage retrieved at http://www.cdc.gov/omhd/AMH/AMH.htm


Table 5.1 Analysis of Variance Results for Ethnicity, Gender and their Interaction for all Variables

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Ethnicity</th>
<th>Gender</th>
<th>Ethnicity * Gender</th>
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<td>Sig.</td>
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<tr>
<td>Competence</td>
<td>3</td>
<td>6.20</td>
<td>.000</td>
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<tr>
<td>Autonomy</td>
<td>3</td>
<td>0.51</td>
<td>.675</td>
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<tr>
<td>Intrinsic Motivation</td>
<td>3</td>
<td>2.16</td>
<td>.093</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>3</td>
<td>6.01</td>
<td>.001</td>
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</table>

Note: Error degrees of freedom = 422 in each variable
Table 5.2 General Linear Model Results for Ethnicity and Variables

<table>
<thead>
<tr>
<th></th>
<th>Caucasian</th>
<th>Hispanic</th>
<th>Asian</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td>Competence</td>
<td>4.99&lt;sub&gt;a&lt;/sub&gt;</td>
<td>4.58&lt;sub&gt;b,c&lt;/sub&gt;</td>
<td>4.44&lt;sub&gt;b&lt;/sub&gt;</td>
<td>5.05&lt;sub&gt;a,c&lt;/sub&gt;</td>
</tr>
<tr>
<td>Autonomy</td>
<td>6.28&lt;sub&gt;a&lt;/sub&gt;</td>
<td>6.34&lt;sub&gt;a&lt;/sub&gt;</td>
<td>6.22&lt;sub&gt;a&lt;/sub&gt;</td>
<td>6.21&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Intrinsic Motivation</td>
<td>5.21&lt;sub&gt;a&lt;/sub&gt;</td>
<td>5.02&lt;sub&gt;a&lt;/sub&gt;</td>
<td>4.88&lt;sub&gt;a&lt;/sub&gt;</td>
<td>5.32&lt;sub&gt;a&lt;/sub&gt;</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>3.09&lt;sub&gt;a&lt;/sub&gt;</td>
<td>2.69&lt;sub&gt;b,c&lt;/sub&gt;</td>
<td>2.56&lt;sub&gt;b&lt;/sub&gt;</td>
<td>3.04&lt;sub&gt;a,c&lt;/sub&gt;</td>
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</table>

Note: Values in the same row not sharing the same subscript are significantly different at \( p<0.05 \) in the two-sided test of equality for column means. Tests assume equal variances. Tests are adjusted for all pairwise comparisons within a row using the Bonferroni correction.
CHAPTER 6
CONCLUSIONS AND SIGNIFICANCE

The purpose of this research was to examine how the results from a fitness test or assessment affect a person’s feeling of competency and/or autonomy with regard to physical activity. Our findings indicate that after reviewing the results from their fitness assessment, the intervention group experienced a significant decrease in competency toward physical activity although the change is primarily among those who perceived their fitness results as negative. We did not, however, see this same outcome with regard to autonomy. All groups (control and intervention) experienced some decrease in autonomy over each of the four time points, our research also set out to discover how a change in competency and autonomy relate to changes in intrinsic motivation. Interestingly, we saw a significant decrease in intrinsic motivation much like competency. This diminishment of intrinsic motivation occurred after subjects reviewed their fitness results as was the case with competency. It is worth noting that data on these constructs gathered at the final time point (4-6 weeks after the fitness test results had been reviewed), indicated some recovery of both competency and intrinsic motivation.

The final research question we posed was would a change in intrinsic motivation relate to a change in physical activity level. Unlike the decrease in competency and intrinsic motivation that was noted after subjects reviewed their assessment results, there was not a significant decrease in physical activity as we would expect based on SDT and CET. Because of these unanticipated results we conducted further analysis and found that
once we broke the intervention group down by their perception of their assessment results (negative or positive) we saw a significant change in physical activity levels, but only in the group with negative perception of their results. This group experienced a significant decrease in not only physical activity but in all the other constructs as well; competency, autonomy and intrinsic motivation. The group that perceived their results as positive indicated no change or very slight changes in competency, intrinsic motivation and physical activity.

Going beyond the original research questions we decided to take a more detailed look at gender and ethnicity with regard to the CET constructs and physical activity. We found there were significant overall effects for gender and ethnicity. Specifically, for ethnicity we found a significant effect for competency, and physical activity. When comparing the means we note that Hispanics scored lower than Caucasians on competence and physical activity, however the difference with regard to these two variables is even more pronounced when comparing Asians to Caucasians.

For gender, we also saw a significant effect for competency and physical activity, but unlike ethnicity we also saw a significant effect with regard to intrinsic motivation. Men were significantly higher on all of these variables: competency, intrinsic motivation and self-reported physical activity.

A. Conclusions

To conclude, the study results only partially support the theories of self-determination and cognitive evaluation. We would expect to see an enhancement of competency and intrinsic motivation in those that felt positive about their results. With
this enhancement we would then expect to see an increase in physical activity level. However, we did not see the positive group perform this way at all. Instead their competency, intrinsic motivation and physical activity level all stayed about the same. In contrast the theories are supported with the group who perceived their results negatively. We would expect this group to experience a diminishment of competency and intrinsic motivation and then a decrease in physical activity and this is exactly what we saw with statistical significance in each area.

**B. Limitations**

The ability to generalize these findings is limited by the sample of college students with an average age of 19.54 years. In addition, even though we utilized a control group outside of health science courses, it would have strengthened the design to gather subjects from a variety of other general education courses.

With regard to the additional examination of ethnicity, we are limited by the categories of ethnic groups assessed. For example, subjects could choose the option of Asian, but there was no option for specifics such a Pacific Islander or a specific Eastern Asian ethnic group.

**C. Significance to Health Education**

Assessments are commonly used in the field of health education. We are taught very early on the value of a *needs* assessment, the value of a *health* assessment or health risk appraisal and the value of assessments with regard to theory constructs. We utilize these assessments to tell us where to focus our efforts in a community, what individual behaviors need our attention and even how ready one is to change their unhealthy
lifestyle. We are aware of their limitations; however, our practice relies upon assessments heavily.

Therefore the use of fitness assessments in the field of health education, specifically in the area of physical activity, seems logical. It is common practice to assess one’s weight, BMI and percent body fat when entering a weight loss program. It is also common to assess an individual’s physical ability when entering an exercise program. We conduct these assessments largely to establish baseline data and facilitate measurement of change. However, do we consider what effect these assessments may have on individuals? Do we think how one’s motivation or self efficacy may be influenced? We are so in practice of gathering the information necessary for measurement, we rarely; if ever consider the consequences to the person.

The results of this study give us reason to explore the effect of conducting an assessment and the effect on individuals upon the delivery of the results of that assessment.

Would we have seen the expected increase of competency and enhancement of intrinsic motivation if the results were delivered by a person such as a teacher or coach? Or perhaps the formatting or presentation of the report itself is somehow conducive to the decrease of these constructs. Further research which focuses on the method of feedback from a fitness assessment would be the next step. Clearly, more research is needed but on the basis of this study, which so far is the only one we have found that evaluated the effects of authentic fitness testing results on intrinsic motivation, the use of fitness testing in an attempt to increase intrinsic motivation for exercise cannot be justified.
The field of health education can benefit from this study considerably as assessments are a major component of various aspects of our core functions. This study should first draw awareness to the possible impact of the delivery of assessment results. With awareness then should come more in-depth research and procedural changes that consider individual feelings and motivation. It is likely these procedures will become more complex as we must address individuals differently based on their specific results and their perception of these results. With these efforts we may begin to unlock a very small part of the intricate understanding of human behavior change.

In addition, our research also facilitates an awareness of gender and ethnicity differences with regard to some of the constructs related to motivation toward physical activity. Previous research may have reported certain groups are less physically active than others, but with our findings we now have more information to ponder and begin to speculate an explanation for the differences. As health educators, it is critical to be aware of and responsive to any determinants that may be related to health behaviors and health disparities. This body of research provides findings to base future health education practice as well as direction for future research.
REFERENCES


APPENDIX A

IRB APPROVAL

INSTITUTIONAL REVIEW BOARD
Initial Approval Notice - Expedited Review
OFFICE OF SPONSORED RESEARCH • 11188 Anderson Street • Loma Linda, CA 92350
(909) 558-4531 (voice) • (909) 558-5131 (fax)

To: Lee, Jerry W
Department: Health Promotion & Education
Protocol: The relation of fitness assessment feedback to intrinsic motivation and physical activity among college students

This study was reviewed and approved administratively on behalf of the IRB. This decision includes the following determinations:

- Risk to research subjects: Minimal
- Approval period begins: 17-Feb-2009 and ends 16-Feb-2010
- Stipulations of approval:

Consent Form
Unless IRB has given a specific waiver of informed consent (as documented in the approval stipulations above) the IRB-approved and stamped consent form accompanies this letter. This now becomes the official master consent form for making copies to provide to study participants.

Adverse Events / Protocol Changes
The IRB should be notified in writing of any modifications to the approved research protocol. Adverse effects must be reported to the IRB in accordance with institutional policy. If sponsor or contractual adverse event reporting requirements differ from requirements for reporting to IRB, all reporting requirements must still be met.

Protocol Review
Your protocol is tentatively scheduled for review and renewal at least two weeks prior to the approval end-date indicated above. To assure uninterrupted approval of this project, you will be sent a report form to request renewal by completing and timely returning, to Office of Sponsored Research, the approval expiration so your study does not lapse; contact IRB for assistance if necessary. In addition to reporting the requested renewal status information, you may also use the form to close the study at that time, if applicable.

Records
All records relating to this project, including signed consent forms, must be kept on file for three years following completion of the study. Please note the PI’s name and the IRB number assigned to this IRB protocol (as indicated above) on any future communications with the IRB. Direct all communications to the IRB at the Office of Sponsored Research. Thank you for your cooperation in LLU’s shared responsibility for the ethical use of human subjects in research.

Signature of IRB Chair/Designee:

Loma Linda University Adventist Health Sciences Center holds Federalwide Assurance (FWA) No. 5447 with the U.S. Office for Human Research Protections, and the registration no. is IRG0226. This Assurance applies to the following institutions: Loma Linda University, Loma Linda University Medical Center (including Loma Linda University Children’s Hospital, LLU Community Medical Center), Loma Linda University Behavioral Medicine, and affiliated medical practices groups.

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Rhodie L. Pigeon, M.D.
Department of Medicine
(909) 558-2441, mrgsb@llu.edu

IRB Administrator:
Linda G. Halstead, M.A., Director
Office of Sponsored Research
Ext 43570, Fax 80131, thalstead@llu.edu

IRB Specialist:
Mark Testerman
Office of Sponsored Research
Ext 43842, Fax 80131, mtesterman@llu.edu

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APPENDIX B

STUDENT QUESTIONNAIRE

Demographics

1. Gender (circle)  Male  Female

2. Birth date (print)  ___ ___  ___ ___  ___ ___  ___ Year
   Month  Day

3. Ethnicity (circle)
   White/Caucasian  Black/African American
   Hispanic/Latino  Asian/Pacific Islander
   Amer. Indian  Other ____________________________

Please circle the course you are in while taking this survey.

HESC 101 MW 8:30am  HESC 101 TTH 2:30pm  HESC 101
TTH 1:00

HESC 101 MW 10:00am  HESC 101 TTH 8:30am  HESC 101
MW 1:00

HESC 101 MW 11:30  HESC 101 TTH 11:30am

How would you rate your current overall fitness level (check one)

____ Below Average  ____ Average  ____ Above Average

For each of the following statements, please indicate how true it is for you, using the following scale (circle the appropriate number):

1  2  3  4  5  6  7
not at all  somewhat  very
true  true  true

1. While I am doing exercise/physical activity I think about how much I enjoy it.

   1  2  3  4  5  6  7
not at all  somewhat  very
2. I do not feel nervous at all about doing exercise/physical activity.

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3. I feel that it is my choice to engage in exercise/physical activity.

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4. I think I am pretty good at exercise/physical activity.

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5. I find exercise/physical activity very interesting.

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6. I feel tense while engaging in exercise/physical activity.

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7. I think I do pretty well at exercise/physical activity, compared to other students.

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8. Exercise/physical activity is fun.

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</tbody>
</table>
9. I feel relaxed while doing exercise/physical activity.

<table>
<thead>
<tr>
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<th>6</th>
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<tr>
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</table>

10. I enjoy doing exercise/physical activity very much.

<table>
<thead>
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<th></th>
<th>1</th>
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<tbody>
<tr>
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</tbody>
</table>

11. I don’t really have a choice about doing exercise/physical activity.

<table>
<thead>
<tr>
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<tbody>
<tr>
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</tbody>
</table>

12. I am satisfied with my current exercise/physical activity performance.

<table>
<thead>
<tr>
<th></th>
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<th>5</th>
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<th>7</th>
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<tbody>
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<td></td>
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</tr>
</tbody>
</table>

13. I am anxious while doing exercise/physical activity.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>5</th>
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<tr>
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</tr>
</tbody>
</table>

14. I think exercise/physical activity is very boring.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>4</th>
<th>5</th>
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<th>7</th>
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<td></td>
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<td></td>
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</tr>
</tbody>
</table>

15. I feel like I am doing what I want to do while I am doing exercise/physical activity.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>somewhat</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>very true</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

79
16. I felt pretty skilled at exercise/physical activity.

1 2 3 4 5 6 7
not at all somewhat very
true true true

17. I think exercise/physical activity is very interesting.

1 2 3 4 5 6 7
not at all somewhat very
true true true

18. I feel pressure while doing exercise/physical activity.

1 2 3 4 5 6 7
not at all somewhat very
true true true

19. I feel like I have to do exercise/physical activity.

1 2 3 4 5 6 7
not at all somewhat very
true true true

20. I would describe exercise/physical activity as very enjoyable.

1 2 3 4 5 6 7
not at all somewhat very
true true true

21. I do exercise/physical activity because I have no choice.

1 2 3 4 5 6 7
not at all somewhat very
true true true

22. After doing exercise/physical activity for awhile, I feel pretty competent at it.

1 2 3 4 5 6 7
not at all somewhat very
true true true
23. On how many of the past 7 days did you exercise or participate in physical activities for at least 30 minutes that made you sweat and breathe hard, such as basketball, jogging, swimming laps, tennis, fast bicycling, or similar aerobic activities?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>0 days</td>
</tr>
<tr>
<td>2</td>
<td>1 day</td>
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<td>4</td>
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<td>5</td>
<td>4 days</td>
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<td>6</td>
<td>5 days</td>
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<tr>
<td>7</td>
<td>6 days</td>
</tr>
<tr>
<td>8</td>
<td>7 days</td>
</tr>
</tbody>
</table>

24. On how many of the past 7 days did you do stretching exercises, such as toe touching, knee bending, or leg stretching?

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 days</td>
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<tr>
<td>2</td>
<td>1 day</td>
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<td>3</td>
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<td>4 days</td>
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<tr>
<td>6</td>
<td>5 days</td>
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<tr>
<td>7</td>
<td>6 days</td>
</tr>
<tr>
<td>8</td>
<td>7 days</td>
</tr>
</tbody>
</table>

25. On how many of the past 7 days did you do exercises to strengthen or tone your muscles, such as push-ups, sit-ups, or weight lifting?

<p>| | |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 days</td>
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<tr>
<td>2</td>
<td>1 day</td>
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<tr>
<td>3</td>
<td>2 days</td>
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<td>3 days</td>
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<td>4 days</td>
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<tr>
<td>6</td>
<td>5 days</td>
</tr>
<tr>
<td>7</td>
<td>6 days</td>
</tr>
<tr>
<td>8</td>
<td>7 days</td>
</tr>
</tbody>
</table>
26. On how many of the past 7 days did you walk or bicycle for at least 30 minutes at a time? (Include walking or bicycling to or from class or work.)

1. 0 days
2. 1 day
3. 2 days
4. 3 days
5. 4 days
6. 5 days
7. 6 days
8. 7 days

27. During this school year, have you enrolled in a physical education/activity class?

1. yes
2. no

28. During this school year, on how many college sports teams (intramural or extramural) did you participate?

1. 0 teams
2. 1 team
3. 2 teams
4. 3 or more teams

Perception

After viewing your fitness assessment results, including your Total Fitness Score, please circle the number that best indicates your perception of your results.

29. Overall, my fitness results were:

   1  2  3  4  5  6  7
Worse than I thought they would be
Better than I thought they would be

30. Overall, my fitness results are:

   1  2  3  4  5  6  7
Discouraging
Encouraging
31. Viewing my fitness results makes me feel:

1 2 3 4 5 6 7
Very bad

32. Overall, I consider my fitness results:

1 2 3 4 5 6 7
Negative

Positive
APPENDIX C

PARTICIPANT CONSENT FORM (CONTROL GROUP)

Dear Student;

You are invited to participate in a research study that will explore the relation of fitness-assessment feedback and motivation for physical activity. This study is being conducted by a doctoral student (Laura Chandler) as part of her degree requirement at Loma Linda University. Please read and sign this form indicating that the procedures have been explained to you and that you understand what is required by your participation.

WHAT WILL I BE ASKED TO DO? As part of this research project you will be asked to complete a survey 4 different times throughout the semester. The questions on the surveys will address your physical activity levels and how you feel about physical activity. Your participation will involve approximately 15 minutes of class time to complete the survey each time. Your participation is voluntary and you are free to withdraw from the study at any time without suffering penalty or loss of benefits or services you may otherwise be entitled to.

RISKS AND BENEFITS: The risks of the study are minimal. The benefits of the study will help professionals in the field better understand how the feedback from a fitness assessment relates to motivation toward physical activity.

CONFIDENTIALITY AND USE OF THIS INFORMATION: Results of this study may be published but no names or identifying information will be included for publication; results will be reported in group format. The confidentiality of information you provide will be ensured as only assigned numbers will be used to identify participants. Data will be kept confidential to the extent allowed by law. Completed surveys and computer-based data will be kept under lock and key in a secured building. Only the researcher and one research assistant will have access to the data. Once the data are recorded, analyzed, reported and kept for 3 years they will be destroyed.

COMPENSATION: Upon the completion of the last survey, you will be given a $5 dollar gift certificate to the TSU food court, as compensation for your time. After the study is over, you will be given a coupon to receive a fitness assessment, if you wish.

CONSENT: By signing below, you agree that you are voluntarily participating in this study. Your signature also confirms that you are at least 18 years of age and that you have carefully read and/or have had the terms used in this consent form and their significance explained to you.

If you have additional questions or concerns please feel free to contact Laura Chandler at Lchandler@fullerton.edu or 714 278-7995. For questions about your rights as a research participant you may contact the CSUF Regulatory Compliance Coordinator at (714) 278-2327.

Student Investigator: Laura Chandler
Signature: ____________________________ Date: ____________

I have carefully read the above, and have had this study and the terms used in this Consent Form and their significance explained to me. I am at least 18 years old and I agree to participate in this study.

Participant's Name: ____________________________ Participant's Signature: ________________________ Date: ____________
APPENDIX D

PARTICIPANT CONSENT FORM (ASSESSMENT GROUP)

Dear Student,

You are invited to participate in a research study that will explore the relation of fitness-assessment feedback and motivation for physical activity. This study is being conducted by a doctoral student (Laura Chandler) as part of her degree requirement at Loma Linda University. Please read and sign this form indicating that the procedures have been explained to you and that you understand what is required by your participation.

WHAT WILL I BE ASKED TO DO? As part of this course (Personal Health, HESC 101) you will be involved in a fitness assessment. As part of this research project you will be asked to complete a survey 4 different times throughout the semester. The questions on the surveys will address your physical activity levels and how you feel about physical activity. On one of the surveys you will also be asked about your perceptions of your fitness assessment results. Your participation will involve approximately 15 minutes of class time to complete the survey each time. Your participation is voluntary and you are free to withdraw from the study at any time without suffering penalty or loss of benefits or services you may otherwise be entitled to.

RISKS AND BENEFITS: The risks of the study are minimal. The benefits of the study will help professionals in the field better understand how the feedback from a fitness assessment relates to motivation toward physical activity.

CONFIDENTIALITY AND USE OF THIS INFORMATION: Results of this study may be published but no names or identifying information will be included for publication; results will be reported in group format. The confidentiality of information you provide will be ensured as only assigned numbers will be used to identify participants. Data will be kept confidential to the extent allowed by law. Completed surveys and computer-based data will be kept under lock and key in a secured building. Only the researcher and one research assistant will have access to the data. Once the data are recorded, analyzed, reported and kept for 3 years they will be destroyed.

COMPENSATION: Upon the completion of the last survey, you will be given a $5 dollar gift certificate to the TSU food court, as compensation for your time.

CONSENT: By signing below, you agree that you are voluntarily participating in this study. Your signature also confirms that you are at least 18 years of age and that you have carefully read and/or have had the terms used in this consent form and their significance explained to you.

If you have additional questions or concerns please feel free to contact Laura Chandler at Lchandler@fullerton.edu or 714 278-7995. For questions about your rights as a research participant you may contact the CSUF Regulatory Compliance Coordinator at (714) 278-2327.

Student Investigator: Laura Chandler
Signature: ____________________________ Date: ____________

I have carefully read the above, and have had this study and the terms used in this Consent Form and their significance explained to me. I am at least 18 years old and I agree to participate in this study.

Participant’s Name: ___________________________ Participant’s Signature: ____________________________ Date: ____________
APPENDIX E

FITNESS ASSESSMENT FEEDBACK REPORT

<table>
<thead>
<tr>
<th>Health-Related Fitness Assessment</th>
<th>Physical Performance Program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cal State Fullerton</td>
</tr>
<tr>
<td></td>
<td>KHS-004 (657) 278-3276</td>
</tr>
</tbody>
</table>

- **Student Name:** Sample, Jane
- **Instructor Name:** Abbott
- **Age:** 21
- **Height (in):** 66.0
- **Gender:** F

### Aerobic Fitness

- **VO2max (liters/min):** 2.24
- **VO2max (mI/kg/min):** 32.6

### CHD Risk Factor Profile

- **RF1 Age:** 1 / 7
- **RF2 Gender:** 1 / 5
- **RF3 Family History:** 1 / 6
- **RF4 Stress:** 3 / 4
- **RF5 Smoking:** 0 / 10
- **RF6 Systolic BP:** 1 / 5
- **RF7 Diastolic BP:** 0 / 5
- **RF8 Inactivity:** 0 / 5
- **RF9 Body Comp:** 0 / 5

### Body Composition

- **Percent Fat (%):** 24
- **Fat Weight (lb):** 36
- **Lean Weight (lb):** 116
- **Body Weight (lb):** 152
- **Est'd Weight 1:** 148 / 22%
- **Est'd Weight 2:** 141 / 18%
- **Est'd Weight 3:** 136 / 15%

### Total Risk Score: 7 / 52

### Physical Fitness Profile

- **FF1 Aerobic Fitness:** 9 / 18
- **FF2 Body Comp:** 8 / 12
- **FF3 Flexibility:** 8 / 12
- **FF4 Strength:** 7 / 12
- **FF5 Lung Function:** 8 / 8

### Total Fitness Score: 40 / 62

### Flexibility

- **Forward Flexion (in):** 5.0

### Muscular Strength

- **Right Grip Max (kg):** 34.0
- **Left Grip Max (kg):** 32.0
- **Grip Sum/Wt Ratio:** 0.96

### Lung Function

- **Vital Capacity (liters):** 4.08
- **Predicted VC (liters):** 4.23
- **Actual/Predicted Ratio:** 0.96

### Resting Blood Pressure

- **Systolic BP (mmHg):** 118
- **Diastolic BP (mmHg):** 68

### Exercise Heart Rates

- **Relative Intensity**
  - 60 - 65% max (bpm): 148 - 155
  - 70 - 75% max (bpm): 161 - 167
  - 80 - 85% max (bpm): 174 - 180

### Exercise Energy Expended

- **Relative Intensity**
  - 60 - 65% (kcal/min): 6.0 - 6.5
  - 70 - 75% (kcal/min): 7.0 - 7.5
  - 80 - 85% (kcal/min): 8.0 - 8.5
### Health-Related Fitness Assessment

#### Female Comparative Data

<table>
<thead>
<tr>
<th>Student Name: Sample, Jane</th>
</tr>
</thead>
</table>

#### Physical Performance Program

<table>
<thead>
<tr>
<th>Cal State Fullerton</th>
</tr>
</thead>
</table>

#### Below Average 5% 20% 35% 50% 65% 80% 95%  
#### Average  
#### Above Average

| VO2max (ml/kg/min) | 32.6  
|--------------------|-------|
| Percent Fat (%)    | 24    
| Forward Flexion (in) | 5.0  
| Grip Strength Max (kg) | 34.0  
| Grip Sum/Wt Ratio  | 0.96  
| Vital Capacity (liters) | 4.08  
| VC Actual/Pred Ratio | 0.96  
| Systolic BP (mmHg)  | 118   
| Diastolic BP (mmHg) | 68    |
| Total CHD Risk Score | 7    |
| Total Fitness Score | 40   |

<table>
<thead>
<tr>
<th>Poor</th>
<th>Fair</th>
<th>Average</th>
<th>Good</th>
<th>Excellent</th>
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<tr>
<td>14</td>
<td>13</td>
<td>11</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>14</td>
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<tr>
<td>47</td>
<td>52</td>
<td>57</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The student’s VO2max is 32.6 ml/kg/min
- Percent Fat is 24%
- Forward Flexion is 5.0 inches
- Grip Strength Max is 34.0 kg
- Grip Sum/Wt Ratio is 0.96
- Vital Capacity is 4.08 liters
- VC Actual/Pred Ratio is 0.96
- Systolic BP is 118 mmHg
- Diastolic BP is 68 mmHg
- Total CHD Risk Score is 7
- Total Fitness Score is 40

---

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## Comparative Physical Fitness Data

(Health-Related Physical Fitness)

### Aerobic Fitness: $V_{O2 \text{ max}}$ (mL·kg$^{-1}$·min$^{-1}$)

<table>
<thead>
<tr>
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<th>Males</th>
<th>Females</th>
<th>Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>54.5</td>
<td>42.7</td>
<td>18</td>
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<tr>
<td>High</td>
<td>49.8</td>
<td>38.4 - 42.6</td>
<td>15</td>
</tr>
<tr>
<td>Good</td>
<td>45.1</td>
<td>34.1 - 38.3</td>
<td>12</td>
</tr>
<tr>
<td>Average</td>
<td>40.4</td>
<td>29.8 - 34.0</td>
<td>9</td>
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<tr>
<td>Fair</td>
<td>35.7</td>
<td>25.5 - 29.7</td>
<td>6</td>
</tr>
<tr>
<td>Poor</td>
<td>35.8</td>
<td>25.4</td>
<td>3</td>
</tr>
</tbody>
</table>

### Body Composition: Percent Body Fat (%)

<table>
<thead>
<tr>
<th>Category</th>
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<th>Females</th>
<th>Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Lean</td>
<td>7.9</td>
<td>18.2</td>
<td>12</td>
</tr>
<tr>
<td>Lean</td>
<td>8.0 - 11.4</td>
<td>18.3 - 21.5</td>
<td>10</td>
</tr>
<tr>
<td>Good</td>
<td>11.5 - 14.9</td>
<td>21.6 - 24.8</td>
<td>8</td>
</tr>
<tr>
<td>Average</td>
<td>15.0 - 18.4</td>
<td>24.9 - 28.1</td>
<td>6</td>
</tr>
<tr>
<td>Fair</td>
<td>18.5 - 21.9</td>
<td>28.2 - 31.4</td>
<td>4</td>
</tr>
<tr>
<td>Poor</td>
<td>22.0</td>
<td>31.5</td>
<td>2</td>
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</tbody>
</table>

### Flexibility: Forward Sit & Reach (in)

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>Females</th>
<th>Pts</th>
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</thead>
<tbody>
<tr>
<td>Very Flexible</td>
<td>5.7</td>
<td>7.8</td>
<td>12</td>
</tr>
<tr>
<td>Flexible</td>
<td>4.0 - 5.6</td>
<td>6.1 - 7.7</td>
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<tr>
<td>Good</td>
<td>2.3 - 3.9</td>
<td>4.4 - 6.0</td>
<td>8</td>
</tr>
<tr>
<td>Average</td>
<td>0.6 - 2.2</td>
<td>2.7 - 4.3</td>
<td>6</td>
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<tr>
<td>Fair</td>
<td>-1.1 - 0.5</td>
<td>1.0 - 2.6</td>
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<tr>
<td>Poor</td>
<td>-1.2</td>
<td>0.9</td>
<td>2</td>
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</table>

### Grip Strength: Absolute Maximum Grip (kg)

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<th>Category</th>
<th>Males</th>
<th>Females</th>
<th>Pts</th>
</tr>
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<tbody>
<tr>
<td>Very Strong</td>
<td>60.6</td>
<td>37.3</td>
<td>6</td>
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<tr>
<td>Strong</td>
<td>56.1 - 60.5</td>
<td>34.5 - 37.2</td>
<td>5</td>
</tr>
<tr>
<td>Good</td>
<td>51.6 - 56.0</td>
<td>31.7 - 34.4</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td>47.1 - 51.5</td>
<td>28.9 - 31.6</td>
<td>3</td>
</tr>
<tr>
<td>Fair</td>
<td>42.6 - 47.0</td>
<td>25.1 - 28.8</td>
<td>2</td>
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<tr>
<td>Poor</td>
<td>42.5</td>
<td>26.0</td>
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</table>

### Grip Strength: Max / Body Weight Ratio

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>Females</th>
<th>Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Strong</td>
<td>1.60</td>
<td>1.23</td>
<td>6</td>
</tr>
<tr>
<td>Strong</td>
<td>1.46 - 1.59</td>
<td>1.12 - 1.22</td>
<td>5</td>
</tr>
<tr>
<td>Good</td>
<td>1.32 - 1.45</td>
<td>1.01 - 1.11</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td>1.18 - 1.31</td>
<td>0.90 - 1.00</td>
<td>3</td>
</tr>
<tr>
<td>Fair</td>
<td>1.04 - 1.17</td>
<td>0.79 - 0.89</td>
<td>2</td>
</tr>
<tr>
<td>Poor</td>
<td>1.03</td>
<td>0.78</td>
<td>1</td>
</tr>
</tbody>
</table>

## PHYSICAL PERFORMANCE PROGRAM

California State University, Fullerton

### Lung Function: Forced Vital Capacity (liters)

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>Females</th>
<th>Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>5.91</td>
<td>4.23</td>
<td>4</td>
</tr>
<tr>
<td>High</td>
<td>5.49 - 5.90</td>
<td>3.91 - 4.22</td>
<td>4</td>
</tr>
<tr>
<td>Good</td>
<td>5.07 - 5.48</td>
<td>3.59 - 3.90</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td>4.65 - 5.06</td>
<td>3.27 - 3.58</td>
<td>3</td>
</tr>
<tr>
<td>Fair</td>
<td>4.23 - 4.84</td>
<td>2.95 - 3.28</td>
<td>2</td>
</tr>
<tr>
<td>Poor</td>
<td>4.22</td>
<td>2.94</td>
<td>1</td>
</tr>
</tbody>
</table>

### Lung Function: Actual/Predicted FVC Ratio

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>Females</th>
<th>Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>1.05</td>
<td>1.04</td>
<td>4</td>
</tr>
<tr>
<td>High</td>
<td>0.99 - 1.04</td>
<td>0.97 - 1.03</td>
<td>4</td>
</tr>
<tr>
<td>Good</td>
<td>0.93 - 0.98</td>
<td>0.90 - 0.96</td>
<td>4</td>
</tr>
<tr>
<td>Average</td>
<td>0.87 - 0.92</td>
<td>0.83 - 0.89</td>
<td>3</td>
</tr>
<tr>
<td>Fair</td>
<td>0.81 - 0.86</td>
<td>0.76 - 0.82</td>
<td>2</td>
</tr>
<tr>
<td>Poor</td>
<td>0.80</td>
<td>0.75</td>
<td>1</td>
</tr>
</tbody>
</table>

### Systolic Blood Pressure (mm Hg)

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>Females</th>
<th>Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>112</td>
<td>103</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>113 - 119</td>
<td>104 - 108</td>
<td>108</td>
</tr>
<tr>
<td>Good</td>
<td>120 - 125</td>
<td>109 - 113</td>
<td>113</td>
</tr>
<tr>
<td>Average</td>
<td>126 - 132</td>
<td>114 - 118</td>
<td>118</td>
</tr>
<tr>
<td>Borderline</td>
<td>133 - 138</td>
<td>119 - 124</td>
<td>124</td>
</tr>
<tr>
<td>Higher</td>
<td>139</td>
<td>125</td>
<td></td>
</tr>
</tbody>
</table>

### Diastolic Blood Pressure (mm Hg)

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>Females</th>
<th>Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td>64</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>65 - 69</td>
<td>61 - 64</td>
<td>64</td>
</tr>
<tr>
<td>Good</td>
<td>70 - 74</td>
<td>65 - 69</td>
<td>69</td>
</tr>
<tr>
<td>Average</td>
<td>75 - 79</td>
<td>70 - 73</td>
<td>73</td>
</tr>
<tr>
<td>Borderline</td>
<td>80 - 84</td>
<td>74 - 78</td>
<td>78</td>
</tr>
<tr>
<td>Higher</td>
<td>85</td>
<td>79</td>
<td></td>
</tr>
</tbody>
</table>

### TOTAL PHYSICAL FITNESS SCORE

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>Females</th>
<th>Pts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>49 Pts</td>
<td>48 Pts</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>44 - 48 Pts</td>
<td>43 - 47 Pts</td>
<td>47</td>
</tr>
<tr>
<td>Good</td>
<td>39 - 43 Pts</td>
<td>39 - 42 Pts</td>
<td>42</td>
</tr>
<tr>
<td>Average</td>
<td>34 - 38 Pts</td>
<td>34 - 38 Pts</td>
<td>38</td>
</tr>
<tr>
<td>Fair</td>
<td>29 - 33 Pts</td>
<td>29 - 33 Pts</td>
<td>33</td>
</tr>
<tr>
<td>Poor</td>
<td>28 Pts</td>
<td>28 Pts</td>
<td></td>
</tr>
</tbody>
</table>

Based on 1386 male and 2412 female CSUF students, age 18-25 yr. September 2008