Data Flex
Changing the way UTK does fitness

Presented by
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Executive Summary

1.1 The Problem:

According to the Journal of the American Medical Association, 69% of Americans between the ages of 20 and 39 are overweight and obese (1). The United States government spent $190 billion dollars in 2005 on obesity-related health care expenditures. In a combined study done by professors at Columbia, Harvard and Oxford estimated that if left uncorrected, the economic costs of obesity will rise by $48-68 billion/year by 2030 (2).

1.2 Why does it matter?

Physical health has been shown to be a crucial factor in overall well-being. It has been demonstrated to have an effect on your GPA, mental health, and happiness, lowers your chance to develop diseases, and boosts energy. In effect, it is a critical part of functioning as a productive and successful individual in society. Developing regular exercising habits can have a prolific positive impact on a person’s outcome.

Prevalence of Obesity and its Leading Consequences

1.3 Solution:

Our solution is modest on cost but potentially powerful in influence. Our solution is to develop a scientific study that measures if the University of Tennessee can positively affect the health of the participants in the study over population norms. The null hypothesis will be that the University has no effect on the student’s health, and the alternate hypothesis is: with simple information treatments the University can influence health behavior and consequently their health.

To conduct this study, we will randomly choose 300 students. They will be placed into two different experimental groups. The first group will be the control. The experimental group will use information treatments to positively influence the health behavior of the participant. Throughout this process, we will take data and use this for analysis. If we can reject the null hypothesis, the goal would be to use this experiment as a template to continuously test new ways to improve the health of students and faculty that can later be implemented University-wide.

To keep this experiment relatively costless we will use the University’s existing structures. The University already has data capturing systems surrounding the TREC and the ability to analyze the data. Using the net id of the participants we will use that data, and use Qualtrics to gather the experiment specific data.
2 Problem Statement

2.1 The Growing Problem

The prevalence of obesity and being overweight has been growing rapidly over the last few decades. These two categories make up almost 70% of the United States population, and if left unchecked this rate will continue to grow. Since the 1960’s the obesity rate has more than doubled from 13.4% to 35.7% (3). Many health organizations have dubbed this sudden rise “the obesity epidemic”.

Obesity is found to be more prevalent in minorities affecting 78.8% of Hispanics and 76.7% of blacks (3). They have also been growing at faster rates in America’s youth. A youth that soon will be transitioning into college. The University needs to be properly prepared to encourage not only academic success, but success in the students physical health.

2.2 Health Consequences

Obesity does not mean just carrying a few extra pounds around. People who are overweight or obese have a higher risk of many types of diseases (4). These conditions include, but are not limited to:

- Stroke
- High Blood Pressure
- Diabetes
- Cancer
- Cardiovascular Disease

Many of these conditions are risk factors for others on the list. So obesity becomes a self-perpetuating cycle of bad health. This cycles sadly ends in a lot of deaths. Obesity is the second largest preventable death killing about 300,000 Americans every year (3). Those who do not die need increasing health care to cope with the effects of obesity and being overweight.

2.3 Economic Consequences

Being a preventable disease, it is shocking how much obesity costs the United States Government. Current estimates say that health cost related to obesity and overweight range from $147 Billion to $210 Billion per year (2). These costs can be direct; occurring from health care services, medical test, and pharmaceuticals. They can also be indirect. They can enlarge employer health cost because they are a higher risk pool, and so raises rates for their entire company.

“the IV results indicate that obesity raises annual medical costs by $2741 (in 2005 dollars). These results imply that the previous literature has underestimated the medical costs of obesity, resulting in underestimates of the economic rationale for government intervention to reduce obesity-related externalities.” (5)
3 Alternative Solutions

When looking directly at the policies related to the state of physical fitness at the University of Tennessee, the current situation is that there are no programs resembling the one we are currently proposing. The University has presented students with an excellent fitness facility but has largely left its use up to students’ individual motivations. Alternative solutions exist in the methods of motivation. For example, some economists to increase a participants’ likeliness to perform certain activities have used temptation bundling. Temptation bundling is a technique that combines a task that is undesirable (working out) with one that is (reading an addictive book). Universities could also make Physical Education a requirement for students that attend and graduate the university. The above-mentioned alternatives both have potential to increase student health and fitness but could be both expensive to test and to implement on a long-term basis.

4 Policy Solution

CREATING THE EXPERIMENT

SELECTION OF RANDOM CANDIDATES FROM POPULATION FOR EXPERIMENTAL GROUPS

The Solution

To prove that University can positively affect the health of the students we will conduct an exploratory experiment. This experiment will directly measure the results of two questions. 1) Can the University affect physical heath behaviors of the students? 2) Does this change in behavior impact the overall health of the participant?

Using two-stage-least-squares, we will measure if there is a statistically significant effect, and also to what magnitude. Having magnitude be decisive data when estimating the economic cost of the experiment weighted against their effectiveness. The experiment will be performed as followed:
4 Policy Solution

Experiment

4.1 Hypothesis Statement

\[ H_0 = \text{The University can not influence the health} \]
\[ H_a = \text{With simple information treatments the} \]
\[ \quad \text{University can influence health behavior and} \]
\[ \quad \text{consequently their health.} \]

4.2 Method

At the beginning of the semester, we will randomly choose 300 students and faculty to be a part of the experiment. We will use existing name database, and UT volmail to ask if they would like to participate in the study.

4.3 Proposition For An Exclusion Method:

Using the data from the RecSports we could identify students who visit the TREC on average less than two times a week. These test subjects would be in a “Goldilocks” zone for our experiment. It identifies students who seem interested in fitness but do not attend the gym regularly enough to be reaching their full health potential. Since it is an average two possibilities can be concluded. 1) The student either went a lot in a small amount of time. Possibly starting off the semester strong, but then dwindling. 2) The student went sparingly throughout the previous semester without any regularity. Both cases are perfect for our experiment. I suggest this solely as a proposition because they type of exclusion may not be deemed acceptable by the IRB. Also these exclusions may bias the finding, and the impact of that will need to be assessed more before including it.

After selection we will conduct entry interviews for all the participants. These will include a physical examination. The variables being captured in the interview will be:

- Age
- Sex
- BMI
- Pinch Test
- Blood Pressure
- Resting Heart Rate

For the control group, this will be the last communication we will have with them until the exit interview.

4.4 Experimental Group

For the experimental group, we will use information treatments, data, and communication to affect positively the health of the participant. This experiment will be data rich for both the Univeristy and the student.

The participants in the experimental group will take part of the entry interview, and their data will be recorded through Qualtrics. Throughout the week, we will gather information about their health, and workouts. At the end of the week, we will email them a weekly report. This will include the details of their previous week along with a suggested workout for the next week.

4.5 Data Entry

The day to day data entry will be conducted through Qualtrics (8). Qualtrics is a statistical survey service that will allow us the necessary communication with the participants. Qualtrics can use mobile technology to text the participant daily, providing a link to an easily completed mobile survey. Qualtrics stores the results in a database that would be accessible to research conductors. Along with proving dashboards and insights, Qualtrics offers the raw data in .csv form. This data will then be inputted in Stata to perform our analysis. The participants of the experiment will go through the exit interview capturing the change in health measures over the semester. The trial will end at the end of the semester.
Policy Solution

4.6 The Workouts

Workouts will be provided in the weekly email. In the entry interview we will ask the participants to choose from a list of workout regiments that best fit their fitness goals. Categories will include regimens like “Lose Weight”, “Gain Muscle”, “Get Toned”, and “Get Fit”. These workouts will be created with the assistance of physical health professionals, either from the RecSports, Sports Management Department or elsewhere.

The purpose of these workouts will be to provide the participants with clear information to reach their health goals. This will help reduce ambiguity when it comes to workouts. Creating an exercise plan for an entire semester can be a challenging and time-consuming activity. We hope by sending these workouts weekly, we can not only provide the information but size it out in more digestible pieces to not overwhelm the participant. Along with quantitative data, we will ask qualitative questions in the daily survey to measure if they are participating in the designated surveys along with their overall happiness.

5 Action Plan

First, we need a date for the start of the experiment. The date we see best fit is October 1st, 2016. This gives about six months to be able to prepare and coordinate all the moving parts of this experiment. This will also give time for the students to start the semester normally, and for us to capture that background activity before conducting the experiment.

5.1 Timeline:

1) Enlist Support

This proposal has already had great support from faculty. Sean Basso is the Assistant Director of Programming, Education, and Evaluations of the RecSports Department. Among many other responsibilities, he analyzes the data captured by the RecSports swipe in-system (10). He described his role as a gatekeeper to obtain data and liaison our communication with the RecSport facilities.

4.7 Analysis

Equation 1:
\[ \hat{\text{Ex}}_t = \gamma_0 + \gamma_1 H + \gamma_2 X + \gamma_3 x 1\{\text{Info}\} + \gamma_4 x 1\{\text{Comp}\} + \mu_t \]

Equation 2:
\[ H_t = \beta_0 + \beta_1 H + \beta_2 X + \beta_3 \hat{\text{Ex}}_t x + \varepsilon_t \]

To capture the mediating effect of exercise on health induced by our information treatments, the approach we use is akin to two-stage-least-squares. In the first stage, we regress exercise on initial health and initial exogenous characteristics and include indicators for the effects of the information treatment and competition treatment on exercise.

In the second stage, we regress health on the individual initial health screening, the exogenous characteristics and the predicted exercise value of the first stage.

Finally, we will run a separate regression to access weather participation in the experiment had an effect on health for the control group. Although our system is over-identified, we can run a Sargan Test for the validity of the exclusion restriction.
4 Policy Solution

An objective that needs to be accomplished would be obtaining an Institutional Review Board (IRB) certification to continue. Because HIPAA confidentiality will protect some of our data, and IRB will be essential to being able to view historical data and obtain new data from the participants.

I have been told that when a student is obtaining an IRB having a supporting faculty member helps. Dr. Strohacker, whose work is closely related, is a potential candidate, if we decide to coordinate our efforts.

Dr. Harris is an assistant professor in the Department of Economics and a Research Assistant Professor for the Boyd Center for Business and Economic Research in the Haslam College of Business. Dr. Harris’s field of study is related to the objectives and methods of the experiment. He was pivotal in creating the equation and mathematical model in which this experiment evaluates its effectiveness, and has expressed willingness to be a sponsor if I was able to conduct this experiment.

I would also like to reach out to the College of Nursing. I think there could be an opportunity to create a win-win situation. If there was a large group of student nurses, who needed practice with taking basic physical indicators such as we need in this experiment, it would work nicely to coordinate where it benefits both parties and reduces cost.

2) Obtain Funding

If we win this contest, we may not have the full funding needed for the experiment. The best course of action would be to write a grant proposal. The grant should provide the extra funding that we need to conduct the experiment.

3) Organize Qualtrics

The University already has a contract with Qualtrics allowing professors and graduate students the ability to use the software. We would need go through the process of obtaining access to the program. Then we would need to create the automatic quantitative and qualitative survey questions to ask during the trial.

4) Create Workouts

Working with health care professionals we will create a weekly workout that will optimize the participants chances of producing a desired health outcome. These outcomes will be determined by the goals they set in the entry interview.

5) Organize Physicals

Once Qualtrics is organized, and the end of summer is near, efforts will be made to get the physical screenings. Location, process, personnel, and data-entry method need to be finalized.

6) Obtain Participants

When school starts, we will need to get participants. For this method, we will email 1000 random people in the University’s LISTSERV. If we do get more than 300 positive replies back, then we will randomly choose 300 of those who expressed interest. If we do not get 300 positive responses back, we will expand the number of emails we send in the LISTSERV until that number is satisfied. Then we will divide the groups into their three perspective groups.

If we do include an exclusionary method, then we would first produce a list of viable experimental participants with the data provided by Sean Basso.

7) Conduct Experiment

When we perform the physical entry screening, we will have educational sessions for the two groups. We will teach them how to use the Qualtrics, and how to interpret their data. After that, we will conduct the experiment as listed above.
5 Action Plan

8) Present Findings
The success of the experiment will be evaluated by the quantitative process of two-stage-least squares. Equation 1 will evaluate the evidence of the University’s influence on workout activity. Then the second equation will evaluate if the University’s influence on exercise has had an effect the health of the participant.

9) Evaluate Continuance
After obtaining these results, we prepare a paper and publish it. We will also take a look at what the results indicate would be the best plan of action going forward. Questions like:

Should we do another experiment next semester? Should we scale the existing experiment to the population? What are other behavioral economic theories we can incorporate to influence student health?

5.2 Cost
Two components could cause a relatively small amount of funding needed for this project. We can avoid this cost by practicing versatile and creative project management.

1) Qualtrics
Although access to the Qualtrics system will be free through the University, the texts and emails will not be. They will cost one cent a piece. If we start October 1st, 2016 and do the trial until the end of classes we will have 61 days in the experiment. 61 days in the experiment, times 150 experimental participants would cost $91.50 for the daily texts. We would include the price of weekly emails along with a few other emails for rules, entry and exit interview information and some other miscellaneous emails we can estimate the cost of data will be only $100.

2) Physical Screenings
The physical screening is the other variable in which could generate a significant cost for the experiment. The RecSport Department offers Fitness Assessment for $15 for students(6). These physical assessments satisfy all our needs for our experiment, along with some extra anaerobic and strength measurements(7). If we use this process, we can expect an expense of $4,500 per session or $9,000 for the both screenings. This is not ideal and could prove itself and obstacle. This cost can be evaded as I eluded to earlier. My plan moving forward would be to approach professors and department head in Nursing and Sports Management. In their course work, there are physical screenings, and there is a possibly they could gain a learning experience while we acquire a fee free service. Win-win situations add to the social benefit of all parties involved.

Conclusion
The second half of The University of Tennessee’s statement states “As the preeminent research-based, land-grant university in the state, UT embodies the spirit of excellence in teaching, research, scholarship, creative activity, outreach, and engagement attained by the nation’s finest public research institutions.” Data Flex falls in line with all of these goals. As a research facility when we are faced with a public epidemic like obesity, the University should constantly be trying to induce a positive influence in the students. The use of the scientific method eliminates all ambiguity about the true results within measurable reason.

Data Flex provides a recyclable format that can be used continuously to improve the health and in turn the overall wealth of the students. College is positioned at a prominent time in a person’s life. Many of the habits that you form in college stick with you as you transition into adulthood. I hope that in the future many generations of students will be affected by Data Flex and the many adapted iterations of it.


6) Recsport Pricing
   http://recsports.utk.edu/fitness/personal-training/

7) Health Assessment Form

8) Qualtrics Website
   https://www.qualtrics.com/
