

36-303: Survey, Sampling, and Society

Group C:

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Final Project Proposal

A. Topic Interest and Potential Client

We intend to complete a survey of the Carnegie Mellon University (CMU) undergraduate population's use of and satisfaction with the University Center (UC) athletic facilities. The athletic facilities are located in the UC and are often seen as a central gathering place for the entire university. The athletic facilities provide a venue for recreation and physical activity for all members of the university who possess a valid CMU ID card. We live in a time where healthy living and exercise are valued, and it will be useful to find out how satisfied CMU students are with the athletic facilities in the UC. As members of the CMU undergraduate population, we would like to know how people view these facilities, and potentially take action to improve them.

A potential client for our project will be the university itself. They will be able to take our results and translate them into improvements for the athletic facilities. This will motivate and encourage more students to use the athletic facilities and stay healthy. Our results will directly pinpoint areas where students are dissatisfied, as well as what the athletic facilities should continue to do well. CMU can then use this information to improve the facilities, which will then promote a healthier campus.

B. Questions to Study

There are several questions that we would like to study to identify the use and satisfaction of the UC athletic facilities. We first want to ask questions about how frequently all of the UC athletic facilities are used. This will tell us which students utilize the athletic facilities based on specific demographic characteristics. As a result, we will know which facilities are the highest utilized ones, and identify any problems dealing with over-crowdedness on these facilities. Additionally, we want to ask questions regarding the cleanliness of facilities. Answers may tell us that the UC staff needs to focus more on cleaning the weights and equipment to make users more satisfied. After that, we want to ask respondents about the effectiveness of equipment in these facilities. By asking these questions, we will be able to identify problems with equipment and eventually improve those problems by replacing them or including more detailed instructions. We would also like to ask whether the respondents believe that check-in process and locker rooms are effective. Answers will enable us to determine the types of improvements we can make with regards to these items. We will conclude our survey by asking open-ended questions about any improvements that respondents would like to see implemented. We will also ask an open-ended question about aspects of the athletic facilities that they are satisfied with.

These questions will serve a general purpose, whether CMU students are satisfied with the UC athletic facilities and how these facilities can be improved. By identifying potential problems, we will have the potential to increase the satisfaction level of students and effectiveness of the facilities. Doing so will eventually optimize facility use and satisfaction.

C. Relevant Research

After research, it seems as though no surveys have been completed on the overall satisfaction and use of all UC athletic facilities. This presents us with a great opportunity to explore our topic, free from bias created from prior studies.

Based on research on the Carnegie Mellon University webpage, we found the following information that will enhance our study:

- 1) The first floor of the Center features a gymnasium for basketball, volleyball, and badminton, as well as two racquetball courts, two convertible racquetball/squash courts, an eight-lane, 25-yard swimming pool and a diving pool. The second floor features the fitness and exercise rooms with a Cybex weight training circuit, stationary bikes, rowers, steppers, elliptical machines, and treadmills, as well as one squash court and an activity room for aerobics classes (<http://www.cmu.edu/university-center/fitness/index.html>).
- 2) Hours of operations are Monday-Friday from 6:00 AM-2:00 AM, and Saturday and Sunday from 9:00AM-2:00AM (<http://www.cmu.edu/athletics/facilities/uc.html>).
- 3) Members of the University community have the opportunity to request athletic facilities for approved events (<http://www.cmu.edu/athletics/facilities/reservations.html>).
- 4) Holders of valid Carnegie Mellon Identification Cards may escort one guest into athletic facilities in the University Center (<http://www.cmu.edu/athletics/facilities/uc.html>).
- 5) Availability of each facility:

Weight/Cardio Room:

Cybex Weight Training Circuit
Stationary Bikes
Rowers
Ski Machines
Steppers
Treadmills

Wiegand Gym:

2 basketball courts
3 volleyball courts
1 badminton court

Recreational Swimming:

Monday - Friday
7-8 am, 11:30 am-1:30 pm,
7-9 pm

Activities Room:

Group X-ercise classes held here

Stability Balls
Steps
Indoor Cycling
Yoga / Pilates Mats
Kick Boxing

Racquetball & Squash

Two Racquetball
One Squash
Two Convertible Courts

Whirlpool & Steam Rooms

Monday through Friday
6:00 AM-2:00 AM
Saturday & Sunday

Saturday & Sunday
1:00 pm - 4:00 pm

10:00 AM-2:00 AM

(<http://www.cmu.edu/athletics/facilities/uc.html>)

Much can be learned from the survey results, especially because there was no valid research on this topic before. Not only will we see if operation of the UC athletic facilities satisfy the preferences of CMU undergraduate students, but also we will learn about specific details that can be acted upon and make the UC athletic facilities better. We will take all of our research, which is mostly presented on the UC webpage, and incorporate them into our survey. Our research presents data on operations, availability of equipment, and equipment regarding each facility in the UC. ✓

D. Population(s) to Sample

Our target population includes all CMU undergraduate students who utilize the UC athletic facilities. Specifically, since we want to improve the UC athletic facilities, the majority of our sample should include students who actually use the UC athletic facilities on a regular or occasional basis, which does not include the other athletic facilities on campus.

In order to make conclusions about our target population, we will have to obtain a representative sample from all of CMU's undergraduate students.

Our primary sampling frame is all of the students listed in the Carnegie Mellon C-book, an undergraduate student email directory. We understand that the C-book does not contain all CMU undergraduates, so some non-sampling error may be present. We will use the sampling frame to obtain a representative sample by assigning each undergrad student listed in the C-book a number, and picking our sample through a random number process. To get an equal representation from each undergraduate class year, we will execute the random number process four times (one for each year). This will be done through a random number generator, giving each student listed in the C-book an equal chance of being selected. Since we are only interested in undergraduates who use the UC athletic facilities, our sample will have to be relatively large to make up for those students chosen that do not use the UC athletic facilities. The students that are chosen by the random number generator will then be sent an email, briefly explaining our intent and including a link to an online survey through QuestionPro.com.

E. Population(s) to Make Inference

We plan to make inferences of the population that use CMU's UC athletic facilities. It is much more specific to our topic than our original sample presented. Even though we want to sample the entire CMU student population, we want to make specific inferences about those students who use the UC athletic facilities. This is our "target population" for which we want to make inferences using the sample statistics.

One error that we may encounter is non-response. For those students from our first sampling ✓

frame, we will send everyone a reminder email exactly one week after the initial email is sent. Since the survey is anonymous, even students who have completed the survey will receive a reminder through email. We will make sure to thank those who have already completed the survey in the same email.

In the event that our sample is not representative of our target population, we will make adjustments according to the specific type of students that we are lacking. For example, if we have significantly fewer freshmen in our sample than the rest of the years, we could increase our random sample among freshmen. Another approach would be to weight our sample so that it is more representative of our population.

F. Carrying out the Survey

Our primary sampling frame is all of the students listed in the Carnegie Mellon C-book, an undergraduate student email directory. We understand that the C-book does not contain all CMU undergraduates, so some non-sampling error may be present. We will use the sampling frame to obtain a representative sample by assigning each undergrad student listed in the C-book a number, and picking our sample through a random number process. To get an equal representation from each undergraduate class year, we will execute the random number process four times (one for each year). This will be done through a random number generator, giving each student listed in the C-book an equal chance of being selected. Since we are only interested in undergraduates who use the UC athletic facilities, our sample will have to be relatively large to make up for those students chosen that do not use the UC athletic facilities. The students that are chosen by the random number generator will then be sent an email, briefly explaining our intent and including a link to an online survey through QuestionPro.com.

We chose to conduct our survey via email and an online website because not only does it have a relatively higher response rate (20-30%), but it also optimizes our time. CMU students frequently receive many important notifications via email. Thus, we felt that this would be the easiest way to reach them. Additionally, we chose an online survey because our sample consists entirely of college students and therefore that is the most convenient way for them to respond. Students can complete our survey quickly and at any time before our given deadline. Another benefit of using an online survey is that students will not feel uncomfortable answering questions, if they feel that the questions are sensitive. Their answers also remain completely anonymous.

G. Variables to Measure

We plan to measure the following variables:

- 1) Simplicity of renting/reserving UC athletic facilities
- 2) Specific facilities that are utilized most
- 3) Simplicity of check-in process
- 4) Total/average number of students who use the athletic facilities
- 5) Waiting times for specific equipment/machines

- 6) Equipment ratings and ease of use
- 7) Cleanliness of facilities and locker rooms
- 8) Overall satisfaction with the UC athletic facilities

After measuring these variables, we hope to identify the use and satisfaction of the UC athletic facilities by Carnegie Mellon undergraduate students.

J. Privacy and Confidentiality

The survey website that we plan to use to administer the survey for participants is **QuestionPro.com**. This website ensures a very strict privacy policy for all participants. Specifically, it protects each user's privacy from the questions they answer. It also asks them beforehand in a privacy statement if they are willing to complete the survey. Once our data has been collected, it will remain only in the hands of our group and the professor.

K. Sampling Scheme

The sampling scheme that our group has decided on is a simple random sample without replacement. A simple random sample with replacement would not be useful to us because we do not want to double count people's responses as it would skew our data. This means that once a respondent has been randomly selected to participate in our survey, they will not have a chance of being selected again.

We considered doing a stratified random sample; however, we realized that we would not gain any useful information by stratifying our sample. We first considered stratifying our sample by class year. We then realized that knowing how the freshmen utilize the gym in comparison to the seniors does not benefit our insight of the UC gym facilities. We are more focused on those who actually attend the gym on a regular basis regardless of what year they are at CMU. We then considered stratifying our sample by men and women, but came to the same conclusion in that we want to find out overall problems and satisfaction levels from all CMU undergraduate students who utilize the UC gym.

Therefore, we have concluded that a simple random sample without replacement will be most ideal for our project. Based on what we are striving to find out, we feel that this method will give us the best sample and the most accurate results.

L. Questionnaire

Please see pages 9-14.

great. make sure you are able to download raw data in xls or similar (e.g. so you can calculate correlations between variables if you wish.)

this is fine. if you decide that the response rates will be very different across fr/so/jr/sr, it might be worth stratifying after all.

M. Sample Size

In order to calculate the sample size necessary for our project, we used a formula for sample size calculation (SRS without replacement).

$$n_0 = [z_{\alpha/2}^2 (SD)^2] / (ME)^2, \text{ where } n \geq Nn_0 / (N+n_0)$$

$$\begin{aligned} SD &= [p(1-p)]^{1/2} \\ &= [.5(1-.5)]^{1/2} \\ &= .5 \end{aligned}$$

Let ME = .055 or 5.5%


$$[(1.96)^2 (.5)^2] / (.055)^2 = 317.4876$$

$$\begin{aligned} n &\geq (N * n_0) / (N + n_0) \\ &\geq (5951 * 317.4876) / (5951 + 317.4876) \\ &\geq 301.407 \end{aligned}$$

Assumptions for sample size calculation:

In order to calculate our standard deviation, we let our p value be .5 because we are estimating p and are not sure what the value is. Thus, we choose .5 because that is the worst-case guess for p.

We are using 5.5% as our margin of error. After analysis, the 5.5% margin of error accounts for any random sampling error that we may encounter through our survey.

Since we expect a response rate of approximately 25%, and we want a sample size of 301 students, we will randomly sample $(301/.25) = 1,204$ undergraduate students at the Carnegie Mellon Pittsburgh campus. By sampling 1,204 students, we will compensate for any non-response that we may encounter through our sampling. 

Informed Consent

This is a survey about Carnegie Mellon undergraduate students' satisfaction with the University Center athletic facilities. Your participation in this study is completely voluntary. The probability and magnitude of harm or discomfort anticipated in the following survey are not greater, in and of themselves, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examination tests. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point or refrain from answering that specific question.

Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential. If you have questions at any time about the survey or the procedures, you may contact Swetha Reddy by email at swethar@andrew.cmu.edu.

All respondents must be 18 years of age or older to participate in this survey. Please check the box below, if appropriate, and click Continue. By checking the box below, you agree to the terms and conditions stated above.

Thank you very much for your time and support!

Email Drafts

Initial Email:

these look good. have you considered adding the topic of the survey to the subject line of the email? how might that help, or hurt?

Subject: Please participate in a 5-minute survey!

Dear First Name,

We are a group of students currently enrolled in 36-303: Sampling, Survey, and Society. As a part of this course, we are conducting a study on CMU students' satisfaction with and utilization of the UC athletic facilities.

You have been selected to participate in our study! We would greatly appreciate if you could take our online survey at the link below by deadline. It will only take approximately 5 minutes and would help us immensely!!

Survey Link: <http://questionpro.com/t/ADsdBZHFjq>

Thank you in advance for helping us with this. We greatly appreciate your time and effort!

Regards,
Siddhartha Gupta, Christopher Lee, Jung Yub Lee, Sonam Rajpal, and Swetha Reddy

Follow-up Email:

Subject: Reminder: Please help by answering a quick survey!

Dear First Name,

We recently emailed you about a study that we are conducting a study on CMU students' satisfaction with and utilization of the UC athletic facilities. If you have already completed the survey, thank you very much for doing so!

If you have not yet received the opportunity to participate in our quick 5-minute survey, please click on the link below and complete the survey by deadline.

Survey Link: <http://questionpro.com/t/ADsdBZHFjq>

Thank you again for helping us with this! We greatly appreciate your time and effort!

Regards,
Siddhartha Gupta, Christopher Lee, Jung Yub Lee, Sonam Rajpal, and Swetha Reddy

L. Questionnaire

1) Are you a current full-time undergraduate student on the Pittsburgh campus?

_____ Yes

_____ No

2) What undergraduate year are you?

_____ Freshman

_____ Sophomore

_____ Junior

_____ Senior

_____ 5th Year Scholar

3) What is your age?

_____ < 18

_____ 18

_____ 19

_____ 20

_____ 21

_____ 22

_____ > 22

4) What academic department are you in? Select all that apply.

_____ H&SS (Humanities and Social Sciences)

_____ MCS (Mellon College of Science)

_____ CIT (Carnegie Institute of Technology)

_____ SCS (School of Computer Science)

_____ CFA (College of Fine Arts)

_____ TSB (Tepper School of Business)

_____ SHS (Science and Humanities Scholar)

_____ Other. Please list: _____

5) What is your gender?

☐ Male

☐ Female

6) Where do you live?

☐ On Campus

☐ Off Campus

7) What is your ethnicity? Please select all that apply.

☐ American Indian or Alaskan Native

☐ Hawaiian or Other Pacific Islander

☐ Asian or Asian American (includes South Asian subcontinent)

☐ Black or African American

☐ Hispanic or Latino

☐ Non-Hispanic White

☐ Other

8) How would you describe your physical activity level? (This includes playing sports, lifting weights, jogging, etc.)

☐ Inactive (do not work out at all)

☐ Very Low (work out less than 1 hour per week)

☐ Low (work out 1-2 hours per week)

☐ Moderate (work out 3-5 hours per week)

☐ High (work out 5-7 hours per week)

☐ Very High (work out 7+ hours per week)

9) The following is a list of the UC athletic facilities. Please select all that you have used in the past semester thus far.

- ☐ Weight/Treadmill Rooms
- ☐ Racquetball/Squash Courts
- ☐ Basketball Gymnasium
- ☐ Pool/Diving Board
- ☐ Activities/Dance Room
- ☐ Other. Please list: _____

10) In the past week, how many times did you use a UC athletic facility (including courts and gyms)?

- ☐ 0 – 1 Time
- ☐ 2 – 4 Times
- ☐ 4 – 6 Times
- ☐ More Than 6 Times

11) Is the response in the previous question typical of how many times you use a UC athletic facility on a weekly basis?

- ☐ Yes
- ☐ No
- ☐ N/A

12) Please select the answer that you feel is best:

The facility(ies) that you use are clean.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree
- ☐ N/A

13) Have you spent time waiting to use any of the following machines or facilities? Or have you been unable to use any of the following machines or facilities because they were already being used? Please select all that apply.

- ☐ Weights
- ☐ Treadmill
- ☐ Elliptical
- ☐ Racquetball/Squash Courts
- ☐ Basketball Gymnasium
- ☐ Pool/Diving Board
- ☐ Activities Room
- ☐ Have never had to wait
- ☐ Other. Please list: _____

14) The equipment available in the facility(ies) that you use are effective and serve their purpose.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree
- ☐ N/A

15) Machines or equipment that you do not use often or have never used are well explained by instructions and easy to use.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree
- ☐ N/A

16) Have you ever rented/reserved a specific facility space in the UC?

_____ Yes

_____ No

17) How easy was the process to rent/reserve a specific facility in the UC?

_____ Very Easy

_____ Easy

_____ Neutral

_____ Difficult

_____ Very Difficult

_____ N/A

18) The check-in process is efficient (wristband/card swipe).

_____ Strongly Agree

_____ Agree

_____ Neutral

_____ Disagree

_____ Strongly Disagree

_____ N/A

19) Would you make changes to the check-in process?

_____ Yes

_____ No

If yes, please specify

20) Have you used the locker room in the past?

_____ Yes

_____ No

21) The locker room is satisfactory.

- ☐ Strongly Agree
- ☐ Agree
- ☐ Neutral
- ☐ Disagree
- ☐ Strongly Disagree
- ☐ N/A

22) Please list 3 things that you like about the UC athletic facilities.

23) Please list 3 changes that would improve the UC athletic facilities for you.
