THE PENNSYLVANIA STATE UNIVERSITY
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COLLEGE OF INFORMATION SCIENCES AND TECHNOLOGY

LOSING WEIGHT: WORKING BETTER TOGETHER THROUGH A TRACKING WEBSITE

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ABSTRACT

Losing weight is often a difficult task for many individuals. There have been a number of studies and attempts to understand how to improve the chances that people indeed lose weight. When individuals are struggling to lose weight, or they decide to stop trying, what methods might be used to keep them from quitting? This thesis focuses on how team-oriented weight loss, aided by a tracking website, impacted individual's accomplishments. This thesis analyzes a website used as part of a lifestyle challenge that helped users monitor their weight, exercise minutes, and goal weight to lose over the course of the challenge. A total of 274 participants participated, and 150 of them were found to have lost some weight through the twelfth week. Of those that entered a desired end weight, a significant ($r(180) = .56$, $p < .05$) relationship was found between setting a goal weight and their final weight. When comparing the team sizes with the weight lost by the team, a one-way ANOVA test yielded results that were marginally significant ($p > .05$). These results together suggest that, while the participants were split into teams, they were still acting more on their individual motivations.

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Chapter 1

Introduction

Americans are constantly attempting to lose weight and improve their fitness, whether the end goal is to enhance their appearance or to improve their overall health. Health and fitness are increasing in popularity, and people are finding numerous ways to track their fitness and health goals. With the added capabilities technology has provided, much of this data is tracked in real time. The Internet allows for online personal health management from anywhere in the world directly at their fingertips. Pedometers, Fitbits, and other fitness wearables have ushered in a new era of on-demand fitness tracking that can monitor things such as heart rate, distance traveled, stairs climbed and even meters swum. The next new fitness trend is now migrating from individual exercise to group classes, not surprisingly coinciding with the advent of social media. The question exists whether this group training is more effective than the tried-and-true methods of old.

The Avera Lifestyle Challenge was completed for the last several years in paper-based binders. In 2016, the study was performed with online support for the first time. The newly developed website contains the functionality of the original challenge, and adds some additional features. One aspect of this website that differs from the previous iterations of the challenge is the on-demand nature of the results. The original report (Hill, 2016) was a design-based research study.

This thesis attempts to reanalyze the results of the Lifestyle Challenge from a team-based perspective. I seek to explore how the new Avera website can support, or even enhance, the outcomes of the Lifestyle Challenge. Primarily, I will be analyzing whether the study participants were effective in achieving their goals of losing weight, as well as whether the team aspect of the challenge made any influences on the results.

Chapter 2

Literature Review

The literature review will cover several of the key topics that are pertinent in this study. These include team fitness, intergroup competition, health behavior change, and survival analysis. It will conclude with a summary of how these topics will influence the study.

Team Fitness

Team fitness is a key concept in this study. The millennial generation is defined as the age group 18-34. Of these individuals, 81% either exercise or would like to, as opposed to the Boomer generation, where only 61% exercise or would like to. 76% of individuals that exercise are millennials (Nielsen LLC, 2014). This age group is also found to be the most engaged in the group fitness classes, such as yoga, spin, or Pilates. Of those considering group fitness classes, 28% state that motivation is a top interest in joining the classes.

The idea of working together to better achieve a task of improved physical self has shown that it improves the chances of losing weight, keeping weight off, and not quitting. An analysis of weight loss between individual and group treatments indicated that the group treatment was more effective to the participants' weight loss (Renjilian et al., 2001). Another study by Wing and Jeffery had subjects either participate individually or among a group of three friends (1999). The conclusions by Wing and Jeffery were that the subjects that were grouped with their friends showed a significant difference between the groups that successfully maintained their weight at their follow-up. Finally, it was shown that dropout rate of individuals differed significantly when

they joined along with their spouse as opposed to joining alone (Wallace, Raglin, & Jastremski, 1995).

This data shows that team/group fitness activities are beneficial in achieving the individual fitness goals. The Lifestyle Challenge consists of several features that encourage team collaboration and fitness activities.

Intergroup Competition

Intergroup competition is another cornerstone of this particular study, as a contributor in this challenge for the individuals to lose more weight is by doing better as a team against the other teams. Tauer and Harackiewicz (2004) cite two methods of motivation in this area: intergroup competition as well as intrinsic motivation. Intrinsic motivation has value in that it targets the level of task enjoyment in the person. This aspect could have positive effects over time, as the person would be more interested in returning to the task on their own. Competition has shown to undermine this, though. Intergroup competition is based on both cooperation amongst the team and the competition between other teams. Intergroup competition also has been shown to both increase group productivity and increase the levels of the goals that groups set for themselves (Mulvey & Ribbens, 1999).

The Avera Lifestyle Challenge hopes to leverage intergroup competition by having the participants operate in teams for the duration of the challenge. The hope is that by doing so, both of these motivational aspects will affect the final results of the participants, and they will lose more weight in the end.

Health Behavior Change

The Avera Lifestyle Challenge is intended to incorporate several of the processes outlined from the Transtheoretical Model of Health Behavior Change by Prochaska and Velicer (1997). This aforementioned model seeks to outline how to influence a change in a person's health, operated across six stages of change. Within each stage, any of these ten processes may happen. These stages are presented in Table 1 below.

Table 1 Health Behavior Change Processes

Consciousness raising	Social liberation
Dramatic relief	Counterconditioning
Self-reevaluation	Stimulus control
Environmental reevaluation	Contingency management
Self-liberation	Helping relationships

Survival Analysis

Many studies have experienced participants dropping out during the course of the study. Survival analysis is a method to analyze data where the outcome variable is the time that it takes until the event of interest takes place. One particular type of survival analysis is called censoring. When a participant drops out of the study before it is completed, their data is said to be censored. Lunn (2009) collected data from men and women of Ireland to perform survival analysis on participation (start and end) in sports and exercise over the course of their lifetime. His findings determined that men appear to drop out of sports in a shorter time than women do. The impact of survival analysis on this study is to determine the behaviors of the participants. Including this aspect of the data will further demonstrate the effect on the design of the Lifestyle Challenge.

Summary

Changing health behavior patterns is at the forefront of what this study is attempting to accomplish. The methods posed in the Transtheoretical Model of Health Behavior Change are the drivers that steer the participants in that effort. Utilizing intergroup competition in a team environment, we hope to see the impact that they have against the participants' performance. These factors, as seen in other studies, should better engage the participants and influence their final results at the end of the challenge.

Chapter 3

Method

The method by which this study was achieved is based on the Design-Based research study performed by Hill (2016). The participants completed a pre-challenge questionnaire, followed by the 12-week lifestyle challenge, and concluded with a post-challenge questionnaire.

Participants

The Lifestyle Challenge was delivered at a small hospital in a small town in Iowa. The ages of the participants (n = 272) ranged from 18-75 years old. They created their own teams (m = 66) whose sizes varied between two and six. The team members most often had a connection before the Lifestyle Challenge. Many of the teams' members were related to each other, while the others were either co-workers or had another connection.

Pre-Challenge Questionnaire

The pre-challenge questionnaire was intended to determine the motivations of the challenge participants. These questions were a mix between select options and open-ended questions. The participants returning from the 2015 challenge were requested information pertaining to their challenge results from then, such as the team they were on, the team composition, and their opinion on their success. The primary goals, intentions, and foreseeable challenges were also asked of each participant.

Post-Challenge Questionnaire

The post-challenge questionnaire was available in the final weeks of the challenge and was meant to be a reflection on the participants' usage of the application over the course of the challenge. These questions were either Likert scale or open-ended responses and asked the subjects questions regarding their usage and opinions on the effectiveness of the application. The open-ended questions requested application feedback from the participants: what they liked/disliked about the application, how it could be improved, and others.

Avera Website Design

The Avera Lifestyle Challenge Website created by Hill offers several features to enhance the original Lifestyle Challenge. These include: individual goal setting and progress monitoring, a photo-based food journal, leaderboards for teams and individuals, a calendar, and other informational sections for users to get health and lifestyle tips.

The primary use of this application for users is to record their weight each week and evaluate their progress against their set goals. The goals they are able to set are weight, exercise minutes logged and Body Mass Index (BMI), among others. These goals can be tracked on the user's statistics page, as seen in Figure 1. The circle is filled according to how close the user is to completing their stated goal, and is updated to the most current data entered.

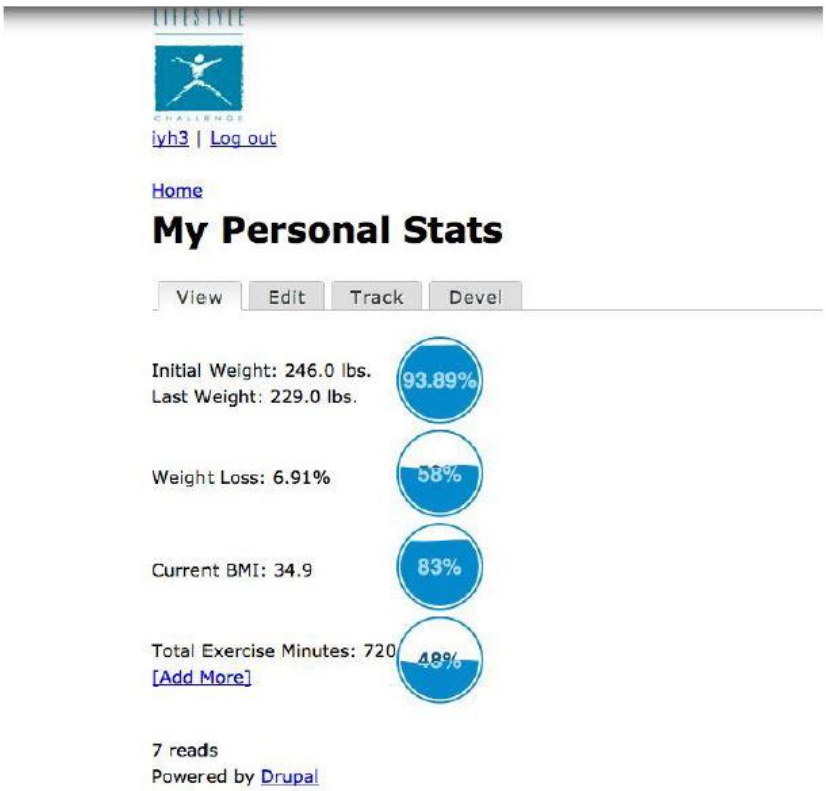

Figure 1 User Profile Statistics Page Screenshot

The food journal also allowed for users to submit pictures of their meals. Once posted, they were accessible to the user's team members and the organization's dieticians to review the entry. They could rate and add comments to the photo. This created a space for users to work on improving their diet and making healthier eating decisions.

Users also had the ability to view their progress, as well as the progress of their team, against the other participants of the study via the leaderboard page. This page gives the users access to the top team and individual performers in the challenge. In the display, though, the users are not able to see the entire list of users. The limit is designed to not discourage those users towards the bottom of the list, and therefore give up.

Procedure

The questionnaires were sent via email to the participants of the challenge from both 2015 and 2016. The pre- and post-challenge questionnaires were available for the participants to respond to during the first and last 2 weeks of the challenge, respectively. During the challenge, the users also had the ability to enter their data into the application.

Participants during the challenge were encouraged to utilize the features of the application. In addition to the weekly weigh-in entry, they were able to record their exercise minutes for the week, log their meals and receive feedback in the food journal, and use a messaging feature within the application. Further, they were able to view their lifestyle progress against their goals, view the leaderboard for both the teams and individually, and read blogs created by some of the application moderators.

Chapter 4

Results

The results presents the data collected from the questionnaires and the twelve-week challenge as captured by the website. It also summarizes the usage of the different aspects of the website.

Pre-Challenge Questionnaire Results

A total of 94 responses were received from the pre-challenge questionnaire, which amounts to a 38% response rate from the total participants (Hill, 2016). The results from this questionnaire indicated that losing weight was their first priority, with 93% of the respondents indicating that was one of their greatest motivations in this study. Following weight loss, the participants desired to increase the amount of time they exercised. Similar to losing weight, the participants' third most popular motivation was to lose body fat percentage. Also mentioned was their desire to eat better, as nearly 68% indicated and several mentions of it were made in the open-ended responses.

Individual Weight Loss Results

There were several findings regarding individual statistics that were uncovered in this lifestyle challenge. The goal of this analysis was to determine whether the participants did lose their target weight, or how close they came. Hill (2016) summarized the results of the individual participants from the initial analysis of the data. Due to the relevance of these results, they are

detailed below. There was also the concern with participants dropping out of the study, and whether they were influenced to stay by the team-based approach to this challenge.

In the beginning of the study, 274 participants entered an initial weight. Of these participants, only 180 of them set a goal weight in the website. Seven percent of these goals were met or exceeded, 26 percent were within five pounds, and 30 percent were within seven pounds of their goal weight. A Spearman correlation performed on a sample selected randomly of these 180 users resulted in a significant value of $r(180) = .56$, $p < .05$ between setting the goal weight and achieving it.

The final count of participants that completed the final weigh in was 159. Figure 2 Participant Weigh-in Count by Weekshows the number of participants that dropped off each week. The regression line for the chart has a slope of -10.30 and an $r^2 = .979$. Forty-two percent of the participants did not enter their final weigh-in.

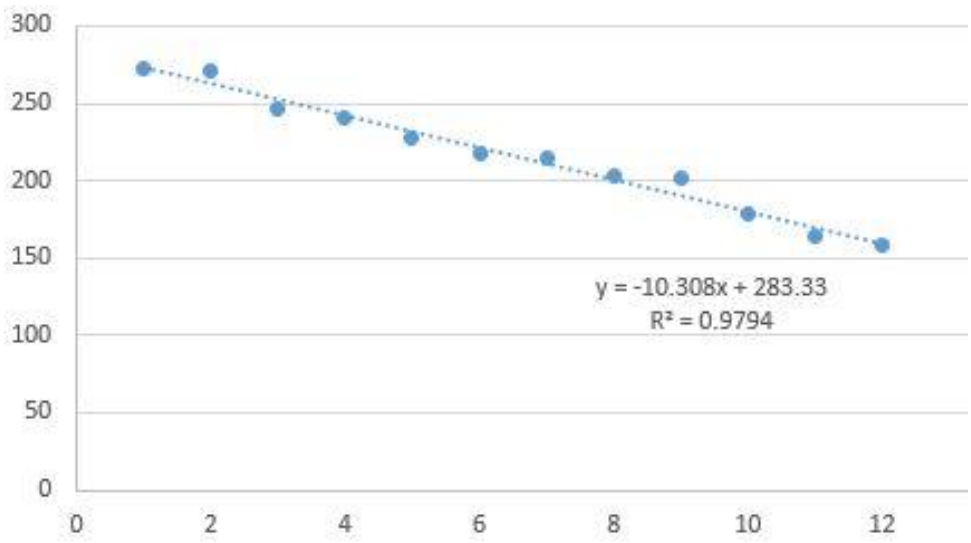

Figure 2 Participant Weigh-in Count by Week

Overall, 150 individuals ended up losing weight, even though it may not have been their desired amount. These 150 individuals were the most active participants on the website, accounting for the majority of the exercise minutes logged and the food journal entries. A Spearman correlation between the exercise minutes logged and the weight lost was found to be significant: $r(150) = .62$, $p < .05$. Further, since these individuals lost their weight, their teams also did better than the others.

Team Weight Loss Results

Team results were the second aspect of this study. Most of the 66 groups yielded weight loss results, with all but three of the teams finishing with positive net weight loss. The range in weight loss by team is 14.2%. The size of the team was considered as a factor in the teams' performance. An analysis of the weight loss by team size was performed, and the results from the SPSS output are displayed in Table 1 below. The teams of six persons performed the best, on average, by having a mean weight loss of 5.9%, where the teams of two and three had mean weight losses under 3.5%. However, a one-way ANOVA test was performed on the team results, which was shown to be marginally-significant result ($F(4,61) = 2.305$, $p = .068$). A Tukey post-hoc test revealed no significant differences between any of the team sizes, either.

Table 2 ANOVA Results

ANOVA					
Weight_Loss					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.007	4	.002	2.305	.068
Within Groups	.046	61	.001		
Total	.053	65			

Website Utilization Results

Some aspects of the website were utilized more than the others. The leaderboard, data entry, and food photo journal are among the top visited. The calendar also received interest. it provided a schedule of events that the participants could join. Some of the website features were not utilized as much, particularly the team-oriented features. The messaging feature of the website, where team members were able to communicate with each other, was not used at all. Another page that was under-used was the team mini-challenge page. This page was designed to allow teams the opportunity to challenge others and enhance the intergroup competition between teams.

Post-Challenge Questionnaire Results

For the post-challenge questionnaire, 95 responses were collected. Of those 95, 89 of them claimed to use the website for the challenge. From a 7-point Likert scale (7-strongly agree), the responses for motivating individuals via between-team competition and the desire to help their own team received mean scores of 4.38 and 5.27, respectively. As for open-ended responses, there was a majority of positive feedback on behalf of the classes offered from the website. Also, many of the participants liked the visual progress bubble and the immediacy of the statistics.

Chapter 5

Discussion and Conclusion

The results of the challenge indicate that the more the user engaged, the more likely they were to achieve their goals. The individuals with the highest levels of participation experienced the best results. The Avera website was used mostly for entering their weekly weight, as the questionnaire indicated.

From the collaborative perspective of the Lifestyle Challenge, a few conclusions can be made. First, the participants acted more like individuals rather than a team. This is evidenced by the fact that the team size had only a marginal influence on the outcome of weight lost. Also, the dropout rate achieved in this study more closely resembles that of individuals at over 40%, compared to the 6% dropout rate in paired individuals seen in the study done by Wallace (1995).

There is also a clear lack of utilization of the team-based aspects of the website. Little-to-no activity was recorded in the team messaging or the team mini-challenge pages. With regard to the messaging, there is a possibility that the team members communicated through other channels. Because most of the team members had some personal connection outside of the study, there may already have been a primary method of communication that was used and not tracked by the website. In this case, there could be a few courses of action. The Lifestyle Challenge moderators could encourage use of these aspects platform. They could remove them from the website to focus on the more visited pages, which would reduce the team-based properties of the challenge. Finally, they could see what the teams are using instead to see how to improve their web pages.

Also, it appeared that users in the post-challenge questionnaire were more motivated by their own team rather than the other teams' progress on the leaderboard. Since most of the teams were composed of relatives or friends, there would be a stronger attachment to not let them down in case you do not meet your team goal. This is also beneficial, as there would be a stronger bond and motivation to continue the progress in the long run once the challenge is over.

Limitations

This study had several limitations that should be taken into consideration when attempting to replicate. First, the study pulled primarily from a series of previous challenge participants. This has both positive and negative aspects to it, but the post-challenge survey indicates that few of the subjects were first-time contributors.

Another limitation to the study is the reliance on self-reporting. For items such as exercise minutes, the data could be erroneous depending on when the user chooses to enter their data. Other aspects of one's lifestyle that the challenge could not manage would also be out of the moderators' hands.

Future Recommendations

Several recommendations came up in the post-challenge questionnaire. These came mostly in regards to the design of the website. The most asked-for update for the next iteration was to update the exercise minutes entry. Currently, the exercise minutes do not include a date that the exercise minutes were performed.

Another consideration for the next run of the challenge is to include compatibility with fitness wearables, such as the Fitbit or Apple Watch. Utilizing the APIs for these types of devices

would avoid the user having to perform the manual entry that many users dislike. Doing so may encourage more use of the website.

Thirdly, there should be more encouragement in utilizing the collaborative features within the website. The lack of data points hinders the researcher's ability to determine the factors that affect the outcome of the study. While the lack of use may be a data point itself, there may be reason to not allow this missing data.

Finally, to better test intergroup competition, one might consider randomizing the team creation that occurs. This would allow for a better understanding of how the team dynamic functions in the challenge. With most of the participants in the teams having known each other prior to the challenge, there may be more of a connection that ties the individual to their team than one might expect on randomized teams.

Summary

The Avera Lifestyle Challenge is at a new crossroads by incorporating the Internet into this challenge to meet the new demand of always-on, always-available information. The subjects that participated in the challenge this year adapted to a new method of data entry and access. While the results show that the participants acted more on their own, more encouragement on behalf of the challenge moderators to utilize some of the collaborative features may result in a different outcome next year.

This area of team fitness and lifestyle management is a recent development. It has come up with the rise of social media, the sharing (and sometimes over-sharing) culture as well as the group fitness classes, such as yoga. This study has shown how team fitness challenges can push us to try harder and do better, not only for ourselves, but for those around us.

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