Analyzing Social Media Weight Loss Interventions at UMMS

A Major Qualifying Project Report

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Abstract

The goal of this project is to determine the success rate of weight loss interventions through Facebook done by UMMS. Dr. Sherry Pagoto and the staff at UMMS conducted Facebook weight loss interventions through two different groups. Each group was using a different strategy for the intervention. Through our analysis of data provided from both groups, we determined which types of intervention strategies and topics were more successful at engaging the attention of the participants.

1. Introduction

Social media is a trend that has taken over the Internet and people's lives over the past 10 years. It refers to social networking websites such as Facebook, Twitter, blogs, and messaging boards. The popularity of social media can be mainly attributed to the opportunity it gives users to engage with each other and generate their own content. Statistics have shown that the most effective way to reach adults in the 21st century is through Facebook. People use Facebook to not only stay in touch with friends and family, but also share and seek information about a wide variety of topics including health (Pagoto et al., 2015).

The prevalence of obesity has significantly increased over the past 30 years, making it one of the major public health concerns in the United States. More than a third of the U.S. population is considered obese, with one of six children and teenagers being overweight (Ogden et al., 2014). In the 21st century, the rate of obesity overall has been continuously increasing. New options and solutions need to be considered and implemented in order to reverse the growth of this negative trend (Institute of, Food and Nutrition, & Roundtable on Obesity, 2014).

The University of Massachusetts Medical School (UMMS) researchers conducted an experiment through a social media platform called Facebook as part of their online weight loss treatment program. The experiment was conducted in order to observe how Facebook can assist behavioral changes in patients. Two Facebook weight loss groups were established. For both groups, the research team posted regularly: twice throughout the day while the regular participants could post any time as they desired. The difference was that in the treatment group, users among regular users were selected as super users and were incentivized to post in the group on a regular basis to help facilitate participation. The experiment was conducted for 12 weeks and the Facebook use data has been collected from both groups. The purpose of this project is to analyze the Facebook use data from the experiment and identify which factors may correlate with weight loss by investigating the levels of engagement users had with various post types.

2. Background

2.1 Healthcare Industry

Healthcare in the United States is currently a $2.8 trillion industry and growing. It stands as the eighth largest economy in the world, right behind France, and is larger than the entire economy of Italy (Sultz, 2013). The industry is divided into two main sectors: (1) healthcare equipment and services and (2) pharmaceuticals and biotechnology (Morris, 2015). Healthcare equipment and services are composed of healthcare providers such as corporations, hospitals, dentists etc., manufacturers and distributors of medical equipment, and companies selling disposable medical supplies. Pharmaceuticals are manufacturers of over the counter drugs and prescriptions, while biotechnology is focused on advancement of drugs (Industry Structure and Definitions, 2012). These sectors of healthcare combined accounted for 17.7% of the U.S. Gross Domestic Product (GDP) in 2013 and are expected to grow at an average rate of 4.9% per year (Morris, 2015).

The United States healthcare industry spends the most money on healthcare in the world and in turn "has the most advanced and responsive health care system, spends the most on research, and has the most highly trained medical workforce" (Vitalari, 2010). However, the U.S. is ranked 38th in health outcomes out of all the developed countries in the world and currently has 49 million people who are not insured (Vitalari, 2010). The Affordable Care Act (ACA), enacted in 2010 by President Obama, sought to fix this problem by increasing the affordability and coverage of health insurance from 85% of the population to 95% by 2019 (Morris, 2015). Although 10 million people have been insured since this statute, it is engulfed in complexities. Companies are finding new ways to expose the system while leaving the consumers as the ones who have to pay for it.

2.2 UMMS

The University of Massachusetts (UMass) was established in 1863 as an agricultural institution in Amherst, MA. It was originally named the Massachusetts State College but in 1947 that name was changed to what it is known as today: The University of Massachusetts (UMass Medical School, 2014). UMass began to expand to different sectors of the commonwealth and in 1962 it founded UMass Medical School (UMMS) which was moved to Worcester, MA in 1965.

UMass Boston, UMass Lowell and UMass Dartmouth were the next additions to the university's structure which is currently known as the UMass system.

The UMMS was founded on the basic principles of providing "affordable, high-quality medical education to state residents and increasing the number of primary care physicians practicing in underserved areas of the state" (UMass Medical School, 2014). The UMMS stayed true to these principles by ranking "in the top 10% for primary care training" while also being ranked as a leading medical school for primary care education by the *U.S. News & World Report* (UMass Medical School, 2014).

2.3 Technology-Based Behavioral Interventions

Behavioral interventions are a way to help change individual's health behaviors and then attitudes towards their health. The spectrum of health interventions is very broad and can range from HIV/AIDs consulting to encouraging weight loss or cessation from smoking. Interventions can be focused at an individual, communal or national level. Individual interventions focus at the individual taking actions themselves with support from a psychiatrist, doctor or other specialists. Community based interventions focus at changing the behaviors of a community, rather than a single individual, through the use of social media, organizations, advertisements and more. The final level of intervention is focused at the national level where the government or an organization takes action against a certain issue that is seen detrimental to the health of a large population of people throughout the country. Of these three levels, community-based and national-based interventions have been the most successful in changing the behaviors of individuals (Anderson, 2004).

There are several theories as to why behavioral interventions have greater impact when done at a larger scale. One theory is that an individual might feel obligated to change their health related behavior if they are somehow associated with a group of people who are making those changes (Anderson 2004). Another theory is that an individual will change his/her behaviors if it has the potential to cause serious harm to others (i.e., drunk driving). The first theory is important because it brings up the fact that individuals can be motivated by social change around them.

With social media and technology being a crucial part in people's social lives, studies on behavioral interventions have turned to them. One such study was conducted by the University of British Columbia to help people quit smoking (Struik & Baskerville, 2014). The researchers developed an application that was targeted towards young adults to help them quit smoking. The application was then integrated into Facebook to determine if this social media site could help reach and motivate young adults to quit smoking. Facebook has been used in cessation interventions prior but little research has been done to determine if it has had any positive effects. After completing their analysis, researchers determined that Facebook gave these users the chance to express themselves and receive support during their cessation process (Struik & Baskerville, 2014).

2.4 Use of Social Media

Social media is a popular example of Web 2.0 (Internet). In the past 10 years, social media has become a key part of the Internet and many people's lives. Social media refers to online social networking sites such as Facebook, Twitter, Reddit, Pinterest, Instagram, blogs and messaging boards. These tools facilitate the engagement of users with each other and user generation of their own content (Pagoto et al., 2015).

In this paper, the focus will mainly be on Facebook and how that has affected people's lives, although other social media platforms will be discussed as well. As of September 2014, 71% of adults use Facebook, 23% use Twitter, 26% use Instagram, 28% use Pinterest, and 28% use LinkedIn. The clear takeaway from these statistics is that Facebook is the most effective social media platform to reach adults (Duggan & Fox, 2013).

While Facebook supports many different types and lengths of communication, Twitter, Instagram, Pinterest, and LinkedIn do not have that kind of functionality. Twitter specifically is limited to 140 characters per post, and while interaction is a big part of the posts, it is difficult to get a big message across with such a limited number of characters. Instagram is used mostly for posting pictures and allowing others to comment on them. This is another situation where interaction is a big part of the platform, but the message is limited to pictures with captions. This means that it would be tough to run an intervention strictly through Instagram. Pinterest lacks the communication aspect and is mostly used for an individual to pick their interests and find related sites. Finally, LinkedIn is strictly a professional environment and is used to connect person-to-

person in the working world. It is not used for much communication but mostly just to act as a supplement to a resume (Center, 2014).

Facebook is the best choice for a social media intervention not only because the greatest percentage of adults use it, but also because it is a better environment for communicating messages. Facebook supports the creation of groups where the security can be set anywhere from public to completely secret, where the other social media sites do not allow any group creation at all. It is also a better environment because there is no limit to what can be posted. Pictures can be attached to text and the text can be as long as it needs to be. Not only do the posts not have many restrictions, but also people who want to comment on or "like" those posts are able to do so. In a behavioral intervention, it is important for people to have some peer support, and that is what is great about Facebook: people can share their goals and communicate in different ways to reach those goals. The interactions on Facebook are much more in-depth than those on other social media sites, and that is why Facebook is the best possible social media platform for any sort of intervention (Fox, 2013).

2.5 Weight Loss Social Media Interventions

Obesity is considered a major health problem in the United States. It is associated with lower quality of life, higher healthcare costs, and medical complications. In spite of the spread of public awareness and attention, the prevalence of obesity continues to rise, partially because diverse domains such as medical, social and behavioral underlie its management.

Over half of the adults in the US use social media platforms such as Facebook, Twitter and LinkedIn. The success and growth of these platforms can be attributed to the feelings of support and interconnectedness users experience when using them. These feelings can also be relevant to online weight-management interventions. Social media has properties that make it a very promising resource in combating obesity: it provides constant communication and 24/7 access, factors such as distance and transportation do not affect it, and it provides relative anonymity for users which is helpful when discussing sensitive topics. Although there are so many beneficial factors to using social media, precisely how weight-loss intervention can be implemented through it and its effects are still unknown.

A systematic review of literature related to online weight-management interventions and their use of social media for improved weight-related outcomes selected 20 studies out of 517 conducted all around the world involving adult populations to review in detail. Diet, physical activity, diet and physical activity, and weight maintenance interventions were studied. Only a combined few of the studies used social media in a way that could help assess and measure its impact. Social media in weight-management interventions is largely incorporated through message boards and chat rooms. The study concluded that although social media might potentially be very useful in future weight-management interventions, further studies need to be conducted to understand how it could be used to do so (Chang, Chopra, Zhang, & Woolford, 2013).

Although many programs have been developed, it is still a challenge to keep people engaged in a weight loss program through social media. Qualitative research studies have shown that participants are willing to receive motivating, planning, and prompting self-monitoring posts in an intervention. Nutrition news and recipes are most preferred among participants of the programs but do not promote high rates of responses. Posts which involved poll votes were the most engaging post types, followed by suggestions for tips and weight-related posts (Hales, Davidson, & Turner-McGrievy, 2014).

A study was conducted to determine if supportive features and personalization during a 12-week web-based intervention with no in-person contact affects weight loss (Brindal et al., 2012). The effects of different features of a web-based weight loss intervention over a 12-week span were assessed using 7 sites and 3 conditions: information-based, supportive, or personalized-supportive. The study was conducted in Australia, where national mass media promotion was used to attract overweight (based on body mass index) adults (Williams, 2012). The supportive sites included various tools such as a meal planner, weight tracker, and social networking platform. The personalized-supportive site also included personalized dietary recommendations that were determined by the user's preferences for particular foods. All of the sites had information about diet and activity based on existing and tested 12-week weight loss programs. All data collection and screening was conducted online without any face-to-face contact.

For all three of the sites the attrition rate was around 40% during the first week, add 20% of the remaining participants for each week after. Compared to the information-based sites, the retention rate for the supportive sites was higher. Although the usage rate per day varied greatly amongst the sites, it was higher for the supportive sites relative to the information-based one. At the end of the 12 weeks, all of the participants provided a valid final weight. The differences in weight amongst the groups were minimal. The inclusion of meal planning recommendations and social networking features in a web-based weight loss program did not demonstrate to have any significant positive effects on the weight loss of the user. However, these features did increase the average user engagement with the system. Greater weight loss was associated with the use of the weight tracker tool amongst users of the supportive sites (Brindal et al., 2012).

Another study was done about social media weight loss interventions with overweight young adults from three Southern California universities during a clinical trial over the course of two years. The study of using social media for weight loss intervention amongst college students was named SMART: Social Mobile Approaches to Reduce Weight. The SMART intervention used Facebook, SMS, mobile apps, and the Internet (Patrick et al., 2014). The intervention was based on behavioral theory. It integrated elements from various social media aspects such as text messages, Facebook, smartphone applications, emails and blogs. They were to self-monitor their weekly weight loss progress, post to Facebook their health behaviors and email their health coach with their progress and concerns. Seeking social support was encouraged amongst the participants (Gold et al., 2012).

3. Methodology

This chapter focuses on the specific steps our group took to analyze the data from the UMMS weight loss experiment. Our main goal was to categorize the posts and analyze their interaction levels to determine which topics attracted the participants the most. For the purpose of this project, in the following chapters, the regular user group will be referred to as the RU group and the regular user and super user group will be the RUSU group.

The first step of the project was preparing the data and making sure that it is all easily comprehensible. Once the data was prepared, our team began the categorization process. For this step to be done, post dimensions were established for both coach and participant posts and inter-rater reliability between our coders was calculated. Afterwards, the interaction levels for each of our categorized posts were measured. All of our steps are explained in detail in the following sections of the Methodology chapter.

3.1 Data Description

The first phase of our analysis process focused around the retrieval of the data itself. Our sponsors provided our team with 6 excel spreadsheets, RU Likes, RU Posts, RU Comments, RUSU Likes, RUSU Posts, and RUSU Comments, which included all of the Facebook use data from both the RU and RUSU groups. The Facebook use data contained the posts, likes, and comments that were affiliated with each group. Our team also received 12 files, one for each week of the study, containing weekly posts made by the research team themselves called Coach Posts. The Coach Posts were established before the start of the 12-week project and served as a guideline for the coaches when they were writing the posts.

After retrieving all of the necessary data, our team then focused on asking questions in order to get a better understanding of the data. The first question our team posed focused on defining what a user interaction was, in relation to this project. We came to define a user interaction as the number of likes and comments in response to a post. But what is a post? Our team defined a post as a message that is delivered on a Facebook page that can contain a text, picture, video and/or other media link. We defined “Like” as a button that a user can click on when they might be agreeing with or are reacting in a supporting way to a particular post. “Comment” we defined as a user’s response to a post by writing or adding something in the

comments section of a particular post. Defining these words might seem trivial but it was important for the planning phase of our data analysis. Our team determined that the best way to analyze the data is by the characteristics of a post.

The next task for our team was to understand who was writing the posts for the two groups. We found that the posts were being written by the coaches from the research team, the super users and the regular users. The research team posted multiple times on a daily basis in both of the RU and RUSU groups. The super users only existed in the incentivized treatment condition and were posting on a weekly basis. In contrast to the SU, the RU had the ability to post upon their desire.

Another objective our team focused on during the data analysis phase was to define what each and every data label signified while also making sure that they were used consistently throughout all of the files given to us. To organize these definitions, we created a table that summarized them by field names, definitions and location. Table 1 also includes the context in which the fields were used. From all the fields, StudyID and PostID were used as unique key identifiers during our analysis process.

Table 1. Summary of Data Identifiers and Terms

Field Name	Definition	Location
CommentID	Unique identifier assigned to each individual comment	RU Comments, RUSU Comments, Coach Comments, RU Likes, RUSU Likes, Coach Likes
Comments	Number of comments the user posted	RU Comments, RUSU Comments, Coach Comments
CreatedTime	The time that a post, comment, or like was made	RU Posts, RUSU Posts, Coach Posts, RU Comments, RUSU Comments, Coach Comments
Group	Regular User (RU) group or Regular User and Super User (RUSU) group	Coach Post, Coach Comments, Coach Likes, ID Status
Likes	Number of likes the user made (posts and comments)	RU Likes, RUSU Likes, Coach Likes
Link	Picture with link that has a preview	RU Posts, RUSU Posts, Coach Posts
Message	The content of the post	RU Posts, RUSU Posts, Coach Posts
Picture	Link to an actual picture outside of Facebook	RU Posts, RUSU Posts, Coach Posts
PostID	Unique identifier assigned to each individual post, comment, or like	RU Posts, RUSU Posts, Coach Posts, RU Comments, RUSU Comments, Coach Comments, RU Likes, RUSU Likes, Coach Likes
Posts	Number of posts the users posted	RU Posts, RUSU Posts, Coach Posts
StatusType	Added photos or shared stories	RU Posts, RUSU Posts, Coach Posts
Story	Posts users shared	RU Posts, RUSU Posts, Coach Posts
StudyID	Unique identifier assigned to each individual user	RU Posts, RUSU Posts, RU Comments, RUSU Comments, RU Likes, RUSU Likes
Super Users	Either 0 or 1, where 1 stands for Super User	RUSU Posts, RUSU Comments, RUSU Likes
UserName	Name of coach	Coach Posts, Coach Comments, Coach Likes

For the purpose of this project, the categorization and initial analysis of the data was completed in Microsoft Excel. All the data was provided to our team by the sponsors in both Excel and SAS files. The Excel files were carefully split up and organized in order to make the data presentable and easier to analyze. For further statistical analysis, our team used SAS (Statistical Analysis System) to analyze the data. SAS allows users to view and analyze data to produce results of various ranges of complexity. SAS is typically used for advanced analytics, predictive analytics, and data management (SAS® 9.2 Language Reference, n.d.).

3.2 Data Preparation

Once the definition of user interactions and what statistical software we are going to use have been established, we began looking through the weight loss intervention data. The original data required modification in order to be used for further analytics. It was spread out and unorganized. Our team numbered all of the posts and ordered them. The first posts which our group analyzed were the coach posts for the RU and RUSU groups. We sorted the posts by created time. The PostID's for the corresponding posts in both groups were collected in order to ensure that the posts analyzed for both of the groups were the same. As a result, all of the personal posts made by the coaches were deleted for analysis purposes. Personal posts were made by the coaches spontaneously throughout the experiment which could skew the results of the data analysis.

For the posts remaining for analysis, our team in collaboration with the sponsors at UMMS, established coding dimensions (discussed in section 3.3). With the coding dimensions established, the number of posts for each dimension were calculated. For each dimension we calculated the number of likes per post and comments per post as well as the standard deviation for both. Standard deviation is used to indicate the extent of deviation for each group as a whole. These analytics were done separately for both the RU and RUSU groups.

3.3 Data Analysis: Post Categorization

Our team categorized the posts, for both groups, into different dimensions and sub-dimensions. This categorization allowed our team to sort through the hundreds of posts in an effective manner so that we could summarize the posts into statistics and provide more meaningful information. With the help from our sponsors and advisors, our team created three

main dimensions: Format, Media and Content, as the foundation to our categorization process. These three dimensions were split into dimensions and sub-dimensions for the posts depending on the content of each post.

The Format dimension had two main sub-dimensions, Question and Information. All general information posts and rhetorical questions went under the Information sub-dimension. Because most of the posts were Question posts, multiple sub-dimensions were derived for it. Five sub-dimensions were derived: (1) soliciting thoughts, (2) soliciting progress reports, (3) soliciting challenges, problems and barriers (4) asking for goals, plans and commitment and (5) weight reports. The differences between these posts were at times subtle. When soliciting thoughts, the posts specifically requested participant feedback on an idea presented. Soliciting progress reports asked for participants to express their achievements to the whole group for any specific task or goal described. Soliciting challenges, problems and barriers asked participants to report or identify any obstacles they might be having trouble overcoming. The asking for goals, plans and commitment posts presented a new challenge or plan to the group and were phrased in a way that highly encouraged the participants to take it on and commit to it. A separate sub-dimension was also the Weight Report which was only for the Friday weigh-in posts which asked the users what their weight change for the week was. All of the participants were highly encouraged to respond to the Weight Report posts and track the progress of their weight loss through it for the duration of the program.

The Media dimension was split into four sub-dimensions: Link, Video, Image and Text Only. This dimension solely focused on the structural elements of the posts. The Link sub-dimension was for all posts that included a link that led to an external website. The Video sub-dimension included all of the posts that had a video embedded in them or had a link to a video. The image sub-dimension included most of the posts because all of the posts had some sort of image in them. Some of the images came from external sources and some were previews generated from links by Facebook. The only posts which did not have an image went under the Text Only sub-dimension, which as its name suggests, included posts with no content other than text.

The third and last dimension was Content. The Content dimension was split into three sub-dimensions: Nutrition, Exercise and Behavioral. The Nutrition sub-dimension encompassed

all posts related to recipes, food lists, ingredients, and nutrients. The majority of posts would either have an external link to a recipe, or a list of nutrients or ingredients which the participants were highly encouraged to consume (or stay away from). The Exercise sub-dimension included all posts that mentioned specific exercises or topics related to physical activity overall. A lot of the exercise posts focused on topics such as cardio, strength and yoga. The Behavioral sub-dimension encompassed posts that included a strategy to help people make significant lifestyle changes. The strategies could be either motivational, behavioral or psychosocial. Essentially, all posts that would not specifically fit under Nutrition or Exercise would go under this sub-dimension. Table 2 provides a summary of all of the above listed dimensions, dimensions and sub-dimensions for the coach posts. Table 3 lists examples of coach posts for all of the sub-dimensions under the Format and Content dimensions. When analyzing the posts for all the participants, the team grouped the data analysis into three parts: RU group data, RUSU group data without the super users and super user data. This way the participant involvement was determined without the super users skewing the data.

Table 2. Coach Post Categorization Key

Coach Post Categorization		
Coding Dimension	**Field Name**	**Definition**
Format	Information	A post that simply provides information on a topic with no effort to start a conversation. Only exceptions are rhetorical questions.
Format, Question	Soliciting Thoughts	Posts asking people for their thoughts, feelings, and/or opinions on a topic.
Format, Question	Soliciting Progress Report	Posts asking people to report progress on a goal or how something is going.
Format, Question	Asking for Goals/Plans/Commitment	Posts asking people what they are planning to do on a particular topic, what their goals are, or to make a commitment on something.
Format, Question	Soliciting Challenges/Problems/Barriers	Posts asking people about a problem or challenge they might be encountering in a specific area or in general.

Format, Question	Weight Report	The Friday AM posts that ask people to report their weight change for the week.
Media	Link	Posts that include a link.
Media	Video	Posts that include a video.
Media	Image	Posts that include an image.
Media	Text Only	Posts that involve only text (no videos, images, or links).
Content	Nutrition	Posts that refer to macronutrients (carbohydrates, fiber, protein, fats, etc), recipes, or food lists.
Content	Exercise	Posts that refer to specific exercises or aspects of physical activity such as intensity, target heart rate, etc.
Content	Behavioral	Posts that refer to a motivational, behavioral, or psychosocial strategy to help people make lifestyle changes.

Table 3. Examples of Categorized Coach Posts

Field Name	Example
Information	"Mark woke up one day and decided that he need to make a change so he started a journey to lose 100 pounds. Read his story and how exercise was instrumental to his success: http://www.fudiet.com/2011/11/whats-next-for-this-real-life-biggest-loser-bungee-jumping/"
Soliciting Thoughts	"Don't forget to weigh in tomorrow morning! How are you feeling about the first weigh in?"
Soliciting Progress Report	"The most effective weight loss strategy is diet tracking. How is it going so far with My Fitness Pal?? Check out this article on why diet tracking is so darn important: http://www.fudiet.com/2014/02/why-do-i-need-to-track-calories-to-lose-weight/"
Asking for Goals/Plans/Commitment	"Today's challenge: Eliminate ONE food item from your home (and grocery list) that you habitually overeat. Which food will get the boot?"
Soliciting Challenges/Problems/Barriers	"Weekends are the toughest for staying on calorie goal! What do you think will be your biggest challenge this weekend?"
Weight Report	"Hellllooooo Friday! Time to weigh in! How did it go this week?"

Nutrition	"How do you deal with hunger? Check out which foods (hint: fiber and lean protein) curb hunger: http://www.webmd.com/diet/foods-that-curb-hunger?page=1"
Exercise	"Moderate intensity exercise is the most effective for health and weight loss. See these guidelines for how to figure out if you are working out at moderate intensity. How intense is your workout? http://www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/exercise-intensity/art-20046887?pg=2"
Behavioral	"Work is another place we encounter temptation. What unhealthy temptation can you remove from (or healthy temptation can you add to) your work environment to make it a safer zone?"

Our team also analyzed and categorized participant posts. These posts, however, had less structure and content when compared to the coach posts so new sub-dimensions were established for them with help from our sponsors. The finalized dimensions for the participant posts were the same: Format, Media, and Content. The only dimension that was modified was Format. The new sub-dimensions under Format were: (1) asking for help or input, (2) reporting a challenge or problem, (3) reporting an accomplishment, (4) motivational memes, (5) information and (6) other. This is the first time the "other" sub-dimension has been established because not all of the participant posts fit into a designated sub-dimension, as the coach posts did. Participants would often ask for help or advice and report their accomplishments such as running a race or losing a significant amount of weight. It was also common for them to report any struggles they were having along with asking for suggestions on improving techniques. A summary of all of the new sub-dimensions, their definitions and examples can be found in Table 4. All of the posts can only be coded under one sub-dimension. A post cannot be in multiple sub-dimensions.

Table 4. New Sub-Dimensions for Participant Post Categorization

Participant Post Categorization		
Coding Dimension	**Field Name**	**Definition and Example**
Format	Ask for help or input	The participant asking the group and/or coaches a question for input or advice about a problem. "Does anyone know how to use the social function on My Fitness Pal?"
Format	Reporting a challenge or problem	The participant is sharing something they are having a hard time with. "I soooo overate at Thanksgiving! Back to the drawing board!"

Format	Report a victory or accomplishment of a goal	The participant is reporting accomplishing something positive/healthy. "I just completed a 5k! How fun!"
Format	Motivational meme	The participant is posting a pic with a motivational quote or message.
Format	Information	The participant is sharing of a link to information about a topic, a recipe, or video. "Check out these awesome crockpot recipes!"
Format	Other	Participant post that does not fit any of above sub-dimensions.

3.4 Data Analysis: Inter-rater Reliability

To assess the reliability of the team's post coding, we computed inter-rater reliability. Inter-rater reliability is a statistical term which refers to the degree of agreement among the coders (Hallgren, 2012). It is the assessment of consistency in the coding provided by multiple coders. Inconsistent coding has the capability of affecting and skewing the results. In our case, the inter-rater reliability was the degree of agreement between the two members of our team who were coding the posts. To determine their coding consistency, we had both of the coders code the coach posts from the first two weeks of the weight loss experiment, a total of 28 posts. Each post was split into its three main dimensions and evaluated on accuracy for all of them separately. For example, if one dimension did not match up and the other two did, the post coding would still not be considered reliable. All three dimensions of each of the posts had to be coded exactly the same way by both coders for them to be considered as reliable. Table 5 summarizes the 28 coach posts coded under all three dimensions. A "Y" stands for a match within that dimension and an "N" stands for not a match.

Table 5. Coder Inter-reliability Post Categorization Summary

Post	Content	Media	Type	Not Reliable
1	Y	Y	Y	
2	Y	Y	Y	
3	Y	Y	Y	
4	Y	Y	Y	
5	Y	Y	Y	
6	Y	Y	Y	
7	Y	Y	Y	
8	Y	Y	Y	
9	Y	Y	N	X
10	Y	Y	Y	
11	Y	Y	Y	

12	Y	Y	Y	
13	Y	Y	Y	
14	Y	Y	N	X
15	Y	Y	Y	
16	Y	Y	Y	
17	Y	Y	Y	
18	Y	Y	Y	
19	Y	Y	Y	
20	Y	Y	Y	
21	Y	Y	Y	
22	Y	Y	Y	
23	N	Y	Y	X
24	Y	Y	Y	
25	Y	Y	Y	
26	N	Y	Y	X
27	Y	Y	Y	
28	Y	Y	Y	

Overall, a very high inter-rater reliability was established with a total percentage of **95.24%** between the two coders. This percentage was high enough for our team to continue coding the rest of the posts without the concern of the results being skewed.

3.5 Data Analysis: Coach Evaluation

An additional part of our project was determining the criteria that defined what a good coach should be like. Mainly, where did the coaches perform most effectively and what can be considered as a job well done on their part? To answer these questions, our team calculated the involvement of each of the coaches in their groups. The more involved the coach and the more discussion they facilitated, the better a coach they could be considered. Particular importance was given to the coaches' involvement in the Weight Report sub-dimension. This particular sub-dimension required users to post their weight every Friday. The coaches had to motivate the users to post their weight every week by being involved and facilitating further discussion. The coach likes and comments were calculated for all of the Weight Report sub-dimension and afterwards for all of the sub-dimensions in the Format, Media, and Content dimensions. The highest significance was given to the Weight Report findings. The more involved the coaches were, the better they were considered.

4. Results

As mentioned in the previous chapter, our team divided the posts into three different coding dimensions: Format, Media and Content. The purpose of these dimensions was to put all the experiment data into perspective and see how it could be meaningful. This section shows the results from categorizing the data into the respected dimensions. This section will also discuss the importance of the findings and the next steps of our results.

The results of our data analysis are presented through three different tables. Each table summarizes the data for one of the dimensions. The three tables are similar to each other because they all list statistics for the posts, likes and comments for each of the sub-dimensions within the dimension, including the number of posts, the likes-per-post and the comments-per-post. Also the percentage for posts, likes and comments was calculated as well. Below the likes/post and comments/post are numbers wrapped in parenthesis which represent the standard deviation for the likes and comments in the different sub-dimensions.

The posts, likes and comments show the raw data that our group categorized into the different dimensions. The percentage of the posts, likes, and comments help us measure how well each post sub-dimensions was performing in comparison to the other sub-dimensions within the same dimension. The standard deviation help us to see how far the comments and posts have strayed away from the overall average. These measures also show how the interactions differed between post sub-dimensions in the different dimensions. None of the post sub-dimensions cross over in the Content and Format tables. The only crossovers are possible in the Media table because for instance, a post can have a link and a photo which will get it categorized under both sub-dimensions. Media is also the only dimension for which we will not include the totals for the likes/post, comments/post, percentage posts, percentage likes, and percentage comments. This is because the posts have been counted under multiple sub-dimensions in the Media dimension which skewed the calculations for the totals.

4.1 Post Categorization: Regular User Group

This section presents our results for regular user responses to coach posts. Table 6 shows the results of the RU group data categorization for the format dimension. The table is divided into two main post sub-dimensions: Information and Questions. The Questions sub-dimension is

separated further into sub-dimensions. The results of this table show that posts pertaining to the Weight Report sub-dimension had the highest interactions on average with **1.83** likes/post and **10.75** comments/post. The Soliciting Challenges/Problems and Soliciting Progress Report sub-dimensions had the most interactions in terms of comments, with the Soliciting Progress Report sub-dimension having higher comments/post.

Table 6. Format Dimension Results Summary

Post Dimension	Information	Questions					
		Soliciting Thoughts	Soliciting Progress Report	Asking for Goals/Plans	Soliciting Challenges/ Problems	Weight Report	Totals
Posts	56	34	14	20	35	12	171
Likes	73	38	12	28	55	22	228
Comments	68	117	70	65	131	129	580
Likes/Post	1.3 (1.17)	1.12 (1.23)	.85 (1.24)	1.4 (1.53)	1.57 (1.44)	1.83 (1.25)	1.3
Comments/ Post	1.2 (1.48)	3.44 (4.19)	5 (4.69)	3.25 (3.45)	3.74 (3.97)	10.75 (3.56)	3.4
Percentage Posts	33%	20%	8%	12%	20%	7%	100%
Percentage Likes	32%	17%	5%	12%	24%	10%	100%
Percentage Comments	12%	20%	12%	11%	23%	22%	100%

The Weight Report sub-dimension results might have been slightly skewed because participants were regularly encouraged to post their weight. Every Friday participants were reminded and strongly encouraged to report their weight in order to monitor their progress. This is one of the main reasons why the Weight Report sub-dimension had the highest of both likes/post and comments/post. The RU group participants felt entitled to like and/or comment when they saw the weigh-in posts every Friday. Table 6 also shows that the Information sub-dimension had the most posts but the least interactions in terms of comments/post. This might indicate that the participants did not find the posts in the sub-dimension useful. The Soliciting Progress Report sub-dimension was interesting because it had the highest comments/post with the lowest number of posts of all the dimensions. This could mean that this dimension enticed

some people in the RU group to comment when asked this question and the high standard deviation can support this claim.

Table 7. Media Dimension Results Summary

Post Dimension	Link	Video	Image	Text Only	Totals
Posts	79	18	121	3	171
Likes	111	27	175	2	315
Comments	289	32	448	7	756
Likes/Post	1.41 (1.35)	1.5 (1.05)	1.45 (1.37)	.67 (1.88)	
Comments/Post	3.66 (1.87)	1.78 (1.61)	3.7 (4.52)	2.33 (3.29)	
Percentage Posts	46%	10%	71%	2%	
Percentage Likes	35%	8%	56%	1%	
Percentage Comments	37%	3%	59%	1%	

Table 7 shows the results of the Media dimension. The Media dimension is split into four post sub-dimensions: Link, Video, Image and Text Only. This dimension focuses on the structure of the coach posts. The first most noticeable part about this table is that the total percentages of the posts do not add up. As mentioned above, this is because Media is the only dimension which has posts double counted in more than one sub-dimension.

The sub-dimension that stands out the most in this table is Image. It has the most posts and interactions (i.e., comments and likes), with the Link sub-dimension coming in at a close second. Video came in first for Likes/Post but it also had the second lowest interaction levels, with text only being the one with the lowest out of all. Comments/Post was the highest in the Image sub-dimension, however it also had the highest standard deviation due to the large number of comments in comparison to the other posts in that dimension. One of the main reasons that the Image sub-dimension has the highest interaction is because the majority of all the posts include an image. The Video and Text only sub-dimensions had very few interactions as they have fewer posts overall. Table 7 shows that the coaches focused on adding an image or link to a majority of their posts to generate interest and in return were rewarded with high interactions. One

explanation can be that these images and links offered some sort of visual meaning or purpose to the participants who then felt intrigued enough to explore the post further. It seems that for the purpose of this 12-week study, the coaches felt best to only post visual material that would entice the most feedback. This might explain why the interactions for the text and video posts were so low in comparison to links and images.

Table 8. Content Dimension Results Summary

Post Dimension	Nutrition	Exercise	Behavioral	Totals
Posts	31	37	103	171
Likes	44	36	146	226
Comments	162	100	385	647
Likes/Post	1.42 (1.35)	.97 (1.34)	1.42 (1.3)	1.3
Comments/Post	5.23 (3.4)	2.7 (4.14)	3.74 (4.48)	3.8
Percentage Posts	18%	22%	60%	100%
Percentage Likes	19%	16%	65%	100%
Percentage Comments	25%	15%	60%	100%

Table 8 shows the results of the last dimension: Content. This table displays the three different sub-dimensions associated with the Content dimension which are Nutrition, Exercise, and Behavioral. The results from this dimension were the most significant from all of the data analyzed. The Behavioral sub-dimension had the most posts and interactions, however, the Nutrition sub-dimension came in first with comment interaction with an average of **5.23** comments/post. Table 8 also shows that the Exercise sub-dimension received the lowest interaction while having more posts than the Nutrition sub-dimension.

The main reason why the Behavioral posts received so much interaction is because they included the "Weight Report" posts. As mentioned previously, the Weight Report posts had many interactions because people were heavily encouraged to post once a week. Also, Behavioral posts were a major focus for the coaches and the experiment overall because this

particular post type was the most dedicated to helping the participants change their habits and behavior.

Overall, the tables show that certain sub-dimensions in each dimension are more important when it comes to the user interacting with the posts. With these tables we can infer that formatted questions (i.e., Soliciting Progress Report) with a media link or image along with a nutritional or behavioral based content obtain the highest interactions.

4.2 Post Categorization: Super User Group

The RUSU group results were calculated in a similar manner to the RU group results. Shown below are the results for the RUSU group, for regular participants only, acquired through the same methods as before and put into the same three dimensions of Content, Media and Format. None of the post sub-dimensions cross over in the Content and Format tables. The only crossovers are possible in the Media table because for instance, a post can have a link and a photo which will get it categorized under both sub-dimensions. Results for SU participation in the RUSU group can be found in section 4.3.

Table 9. Format Dimension Data for RUSU Group

Post Dimension	Information	Questions					
		Soliciting Thoughts	Soliciting Progress Report	Asking for Goals/Plans	Soliciting Challenges/ Problems	Weight Report	Totals
Posts	56	34	14	20	35	12	171
Likes	191	90	33	57	94	30	495
Comments	92	108	84	111	166	227	788
Likes/Post	3.41 (1.64)	2.65 (1.03)	2.36 (1.54)	2.85 (1.55)	2.69 (1.28)	2.5 (1.25)	2.9
Comments/ Post	1.64 (2.51)	3.18 (3.82)	6 (3.67)	5.55 (4.18)	4.74 (4.56)	18.9 (4.19)	4.6
Percentage Posts	33%	20%	8%	12%	20%	7%	100%
Percentage Likes	39%	18%	7%	11%	20%	5%	100%
Percentage Comments	12%	14%	11%	14%	21%	28%	100%

As shown in the table for the Format dimension (Table 9), informational type posts received the most interaction in terms of likes/post. However, overall the Information sub-dimension came in last for comments/post in comparison to the Question sub-dimensions. The most interesting number of all is the one for the Weight Report sub-dimension, with **18.9** comments per post. The second in terms of comments per post was the Soliciting Progress Report sub-dimension with a number of **7.64**. In comparison to the RU group Format dimension, the RUSU group had higher likes and comments for all of the sub-dimensions except for Soliciting Thoughts. For that sub-dimension, the RU group had a higher number of comments (117:108).

The standard deviation of the RUSU group comments in the Weight Report sub-dimension was much lower than that of the RU group. Overall, all of the standard deviations for the RUSU group and RU group varied in comparison to the Information sub-dimension. The Information sub-dimension stayed below 2 in both groups but it varied much more between the questions. This shows that the number of comments had a high variation depending on the post.

Table 10. Media Dimension Data for RUSU Group

Post Dimension	Link	Video	Image	Text Only	Totals
Posts	79	18	121	3	171
Likes	248	50	351	13	662
Comments	186	32	682	28	928
Likes/Post	3.14 (1.41)	2.78 (1.51)	2.9 (1.39)	4.33 (2.05)	
Comments/Post	2.35 (2.65)	1.78 (3.85)	5.63 (6.11)	9.33 (1.88)	
Percentage Posts	36%	8%	55%	1%	
Percentage Likes	37%	8%	53%	2%	
Percentage Comments	20%	3%	73%	4%	

Table 10 shows the results for the Media dimension. The Text Only sub-dimension seems to have the most interaction based on of the likes/post and comments/posts. This result is slightly skewed because there were only three total posts, which was far less than in the other sub-dimensions. If we omit the results of the Text Only sub-dimension, we can see that the Image

sub-dimension had the most interaction in terms of comments per post and the second most interactions for likes per post. The Link sub-dimension had the highest likes per post but was second to Image in terms of comments per post. Both the Image and Link sub-dimensions had a high number of posts and were relatively close to one another in terms of results. The exceptions were the comments per post and their standard deviations, for which the Image sub-dimension has much higher numbers.

Compared to the Media dimension of the RU group, the RUSU group Media dimension had much more interaction in terms of the likes received. The RU group Media dimension had higher interactions in the comments of the Link sub-dimension (289:186) and the RUSU group Media dimension had more comments in the Image sub-dimension (682:448). The RUSU group Media dimension did, however, have higher comments and likes for both the Video and Text Only sub-dimensions. This may be because in the RUSU group, super users were incentivized to post and interact more with the weight loss program and group, but these results exclude the SU posts and interactions.

Table 11. Content Dimension Data for RUSU Group

Post Dimension	Nutrition	Exercise	Behavioral	Totals
Posts	31	37	103	171
Likes	108	105	298	511
Comments	82	126	599	807
Likes/Post	3.48 (1.76)	2.84 (1.38)	2.89 (1.38)	3
Comments/Post	2.64 (2.84)	3.41 (4.69)	5.81 (6.32)	4.7
Percentage Posts	18%	22%	60%	100%
Percentage Likes	21%	21%	58%	100%
Percentage Comments	10%	16%	74%	100%

Table 11 shows the results for the Content dimension of the RUSU group. We can infer from this table that behavioral content has the most interactions, with an average of **5.81** comments per post. The table shows that behavioral content has more than triple the amount of

posts and likes than each of the other two sub-dimensions. It also has three times more comments than both the Nutrition and Exercise sub-dimensions combined. From this it can be seen that the Behavioral sub-dimension received the most interactions. This could be because the coaches mainly focused on frequently posting about behavioral changes because those types of posts best reflected the purpose of the project.

The standard deviation of comments for the Nutrition sub-dimension is much lower than for the other two sub-dimensions which shows that it is much closer to the mean. The case is the same for the Nutrition sub-dimension in the RU group as well. This shows that in both groups the sub-dimension has the same consistent level of interactions. The RUSU group sub-dimensions received much higher interactions overall in comparison to the RU group sub-dimensions. However, the Nutrition sub-dimension in the RUSU group has fewer comments than the same sub-dimension in the RU group. Further analysis needs to be conducted in order to determine the cause for this difference.

4.3 Post Categorization: Super User Posts

The super users were encouraged to actively interact with the weight loss program, so their participation data could skew the RUSU group results. For this reason, the super user participant data was excluded from the overall RUSU group data analysis results. The super user data was categorized and analyzed separately, with the results presented in this section. These tables include the posts made by the super users in the RUSU group separated into dimensions and a summary of how the participants interacted with those posts. In all of the following tables, the likes/post and comments/post cells include the average number at the top and the standard deviation in parentheses at the bottom. The percentage rows show the amount of the total that sub-dimension accounted for in posts, likes, and comments separately.

The first dimension, Format, is summarized in Table 12. The highest interactions are recorded under the Question sub-dimension. The Motivational Meme sub-dimension had the highest interaction in terms of likes/post, with Report Victory or Accomplishment of a Goal following closely behind. The Reporting a Challenge or Problem sub-dimension had the most comments/post with a significantly higher average than the other sub-dimensions. This shows

that participants were willing to interact with the super user posts and share or help with any problems they were having.

Table 12. Format Dimension Data Summary for Super User Posts

Post Dimension	Information	Questions					
		Reporting a Challenge or Problem	Report Victory or Accomplishment of a Goal	Other	Motivational Meme	Ask for Help or Input	Totals
Posts	39	5	14	21	14	7	100
Likes	83	13	48	59	52	14	269
Comments	27	18	19	35	27	14	140
Likes/Post	2.13 (1.26)	2.6 (1.74)	3.43 (2.38)	2.81 (1.5)	3.71 (1.91)	2 (.92)	2.7
Comments/ Post	.69 (1.2)	3.6 (2.72)	1.36 (2.64)	1.67 (1.96)	1.93 (3.77)	2 (1.69)	1.4
Percentage Posts	39%	5%	14%	21%	14%	7%	100%
Percentage Likes	31%	5%	18%	22%	19%	5%	100%
Percentage Comments	19%	13%	13%	25%	19%	11%	100%

Table 13 summarizes the results of the Media dimension for the super user posts. The posts by the super users vary significantly from the coach posts in both RU and RUSU groups because the super users used significantly fewer images and videos in comparison to the coaches. The coaches made sure to include at least an image or link in the vast majority of their posts so that they are more interesting to the participants. The super users did not follow the same plan when making their posts, which is why 35% of their total posts are text only. The Image sub-dimension had the most interaction in terms of likes/post and the Text Only sub-dimension had the highest interaction in terms of comments/post. The Video sub-dimension had the least amount of posts, only 5% of the total. However, the lowest interaction is with the second largest, Link, sub-dimension in terms of both the likes/post and comments/post.

Table 13. Media Dimension Data Summary for Super User Posts

Post Dimension	Link	Video	Image	Text Only	Total
Posts	34	5	26	35	100
Likes	68	15	83	103	269
Comments	22	5	29	84	140
Likes/Post	2 (1.26)	3 (.89)	3.19 (2.04)	2.94 (1.75)	
Comments/Post	.65 (1.21)	1 (1.09)	1.12 (2.93)	2.4 (2.42)	
Percentage Posts	34%	5%	26%	35%	
Percentage Likes	25%	5%	31%	39%	
Percentage Comments	16%	4%	21%	59%	

Table 14 summarizes the data analysis results for the Content dimension of the super user posts. The Nutrition sub-dimension had the most posts in amount, however, both the Exercise and Behavioral sub-dimensions had more interaction in terms of comments/post and likes/post. Half of the posts belonged to the Nutrition sub-dimension. The Exercise sub-dimension had the highest number of both likes/post and comments/post with the least amount of posts, 15% of the total. As demonstrated by the results of the overall RU and RUSU groups, the Exercise and Behavioral sub-dimensions attracted the most interaction.

Table 14. Content Dimension Data Summary for Super User Posts

Post Dimension	Nutrition	Exercise	Behavioral	Total
Posts	44	13	31	100
Likes	113	43	85	241
Comments	62	21	46	129
Likes/Post	2.56 (1.65)	3.31 (2.05)	2.74 (1.7)	2.4
Comments/Post	1.41 (2.51)	1.62 (2.27)	1.48 (2.25)	1.3
Percentage Posts	50%	15%	35%	100%
Percentage Likes	47%	18%	35%	100%
Percentage Comments	48%	16%	36%	100%

Overall, the main difference between the super user results and the RU and RUSU groups, is that in both of those groups, there were significantly more posts in the Behavioral sub-dimension. The super user post results are significantly different because the posts did not follow the same script and structure as coach posts. They were thought of entirely by the super users to help facilitate regular participant interaction within the RUSU group. A summary of the data analysis of all three dimensions in graphical form can be found in Appendix A.

4.4 Weight Report Coach Interactions

As mentioned in previous sections, interaction levels for weight report were the highest and most consistent due to the fact that users were encouraged to post by the coaches on a weekly basis (every Friday). Our group wanted to analyze the coaches themselves to see how they interacted with the participants on a coach by coach basis. This form of analysis is different than the others because it will show a comparison between the four different coaches and their interactions with the weight report posts.

Table 15. Weight Report sub-dimension coach interactions

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	12	12	12	12	12	12
Likes	22	30	7	4	8	2
Comments	129	227	56	27	47	14
Likes/Post	1.83 (1.25)	2.5 (1.25)	.58 (.49)	.33 (.47)	.67 (.47)	.16 (.37)
Comments/Post	10.75 (3.56)	18.9 (4.19)	4.67 (3.39)	2.25 (1.69)	3.91 (1.66)	1.17 (1.67)

Table 15 shows the interaction levels of the four coaches, which follows a similar layout as the participant tables. Likes/Post and Comments/Post are both average calculations for likes and comments with respect to the posts. The standard deviation was calculated as well and is presented in parenthesis below the averages. The first two columns show the overall interaction levels for the RU and SU participants. The last four columns represent each of the individual coaches.

The reason there are 12 posts in each column is because there are 12 total Weight Report coach posts from the experiment (one each week). It is listed in each column to serve as a reference point for the likes/post and comments/post numbers. Also the RU and SU participants were added to this chart to show how much each coach interacted in comparison to how much the participants interacted with the posts.

In general terms, we can see that the RU coaches interacted more on the weight report posts than the SU coaches in both Likes (11:10) and Comments (83:61). A more definitive look shows that female coaches interacted more with the posts then their male colleagues. Coach 1 and Coach 3 had more than double the Likes (15:6) and Comments (103:41) than Coach 2 and Coach 4 combined. This is also shown through the averages of both female coaches which are much higher than the male coaches.

Although the RU coaches had more interactions, the SU coaches enticed more interaction levels by the participants themselves in likes (30:22) and Comments (227:129). Logically, the averages for the SU participants was higher as well with Likes/Post being (2.5:1.83) and Comments/Post (18.9:10.75). With the SU participants so heavily engaged on their own, the SU coaches might of felt less entitled to like or comment on the posts.

Overall the RU coaches interacted more in comparison to the SU coaches, with the female coaches doing most of the interacting. However, the SU participants interacted more than RU participants. This can serve as an explanation as to why the SU coaches interacted less in comparison to RU coaches due to self-engagement by the participants. The tables for the coach interactions with all the other sub-dimensions can be found in Appendix B. They follow the same structure as the Weight Report table. They have not been included separately as a part of this chapter because the findings from that data analysis has not been statistically significant or noteworthy.

5.0 Discussion and Conclusions

5.1 Dimensions that Generate the Most Interaction

After all of the data analysis was completed, our team identified several key findings that were brought up for discussion. The first discussion point is that for both the RU and RUSU groups, the same sub-dimensions in each dimension received the most likes per post and comments per post. In the Format dimension, the Information sub-dimension received the most likes/post and the Weight Report sub-dimension received the most comments/post. However, the Weight Report high comment number can be explained by the participants being required to comment their weight every week. The second sub-dimension highest in comments/post in the Format dimension was Soliciting Progress Report. In the Media dimension, the Text Only sub-dimension was highest in likes/post and comments/post. This could be attributed to the sub-dimension only having three posts in total. The runner-ups were the Link sub-dimension with the most likes/post and the Image sub-dimension with the most comments/post. In the Content dimension, the Nutritional sub-dimension received the most likes/post and the Behavioral sub-dimension received the most comments/post.

5.2 Role of Super Users

Throughout the data analysis, an interesting observation was made. Overall, there were significantly more RUSU group interactions compared to the RU group. The regular participants in the RUSU group seemed generally much more involved with the coach posts compared to the participants in the RU group. In contrast, the coaches in the RUSU group interacted less than the coaches in the RU group. This indicates that the super users likely helped in motivating the participants to post and interact more.

A separate evaluation was performed for the super user posts. In the Format dimension, the Motivational Meme sub-dimension was the most popular in terms of likes/post and the Reporting a Challenge or Slip sub-dimension was most popular in comments/post. This shows that participants were willing to respond and talk about their challenges when other participants asked them to share their experiences. In the Media dimension, the super users made mostly text posts. However, as with the coach posts, the Image sub-dimension generated the most likes/post. It is interesting to observe that the Text Only posts generated the most

comments/post. That means that text posts by participants were successful at generating discussion. Although the super users made the most posts in the Nutrition sub-dimension under the Content dimension, the Exercise sub-dimension posts generated the most likes/post and comments/post.

Our team looked into the super user post analysis results further to determine which interactions were inconsistent compared to the others and what could possibly lead to the inconsistency. All of the post types under the Content dimension were very consistent in terms of interaction. However, in the Media dimension, the Link sub-dimension generated significantly fewer comments/post than the other sub-dimensions. This could be mostly because posts that simply have a link are related to relaying information and not actually generating interaction. There is no particular call for action in the posts for the participants to comment. The most inconsistencies could be found under the Format dimension. The Information sub-dimension generated the least comments/post for the same reason as the Link sub-dimension in the Media dimensions generated the least. The informational posts do not leave much room for the participants to discuss them further, they exist to generate awareness. The Reporting a Challenge or Slip sub-dimension generated the most comments/post mostly because there were a total of five posts under it. Compared to the other sub-dimensions, it had a much smaller sample size. The Motivational Meme and Reporting a Victory or Accomplishment sub-dimensions generated the most likes/post possibly because the participants were entertained by the memes and were more than eager to show their appreciation of others accomplishments.

5.3 Role of Coaches

In the RUSU group, the coaches interacted significantly less with the participants than the coaches in the RU group. It is also important to observe that because both RU group and RUSU group had different coaches, the posts for both of the groups were not always consistent. Sometimes there were deviation posts made by coaches in each of the two groups which were not planned as part of the experiment.

No concrete definition for a good coach was established. The only additional observation made about the coaches was that the female coaches ended up commenting more frequently than the male coaches. However, not enough in-depth data analysis was done to look into this observation further.

5.4 Recommendations

In conclusion to the data analysis, our team has come up with a few recommendations which could help improve weight loss interventions in the future.

1. Automate all coach posts. Instead of having coaches making the posts, set a schedule for the posts in all of the weight loss groups and have the posts to go out at the scheduled times every day. The coaches would not be allowed to make any of their additional posts. This would ensure consistency in the weight loss intervention.
2. Have the super users take on the roles of coaches and be the main facilitators of interaction. Instead of having two coaches per group, or even having any coaches, have the super users make additional posts and interact with the participants.
3. One coach can be left in a group to help motivate participants by leaving likes and comments on their weight reports and accomplishments but the super users should be doing the main facilitation work. They have proven to be much more successful at it in the RUSU group where the participants ended up interacting significantly more than the participants of the RU group.
4. In terms of post content, our conclusion is that behavioral posts and posts with images and calls to action are the most successful at generating interaction. Our findings show that for the Content dimension, the Behavioral sub-dimension generated the most interaction; for Media, it was the Image sub-dimension and for Format, it was the Soliciting Progress Report sub-dimension (excluding Weight Report which is mandatory). Include images and calls to action in all of the posts. This way participants will be more inclined to share their habits and interact.

We hope that our findings will be helpful in successfully staging social media weight loss interventions in the future and that we helped shed some light on a field that is still to be further explored.

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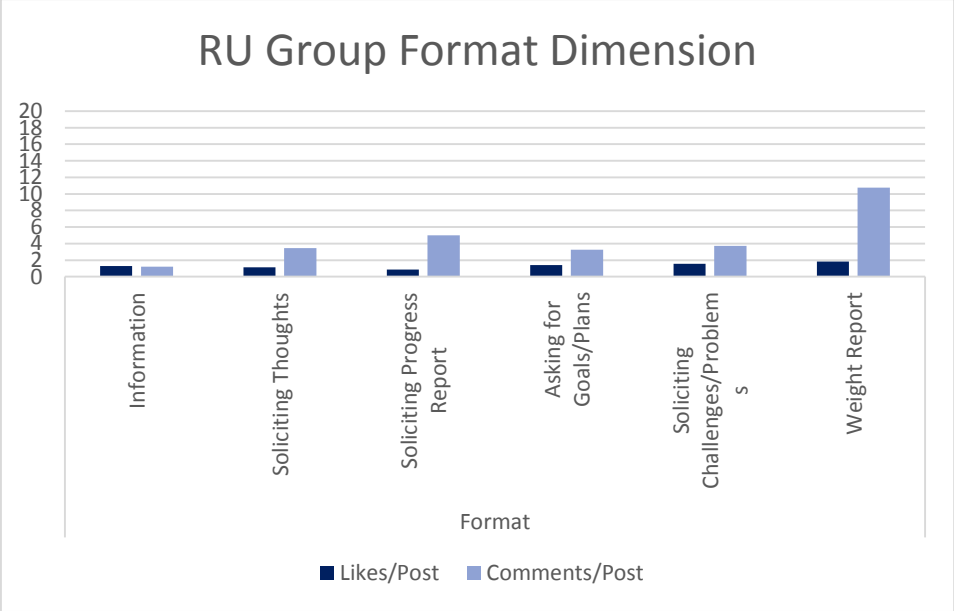
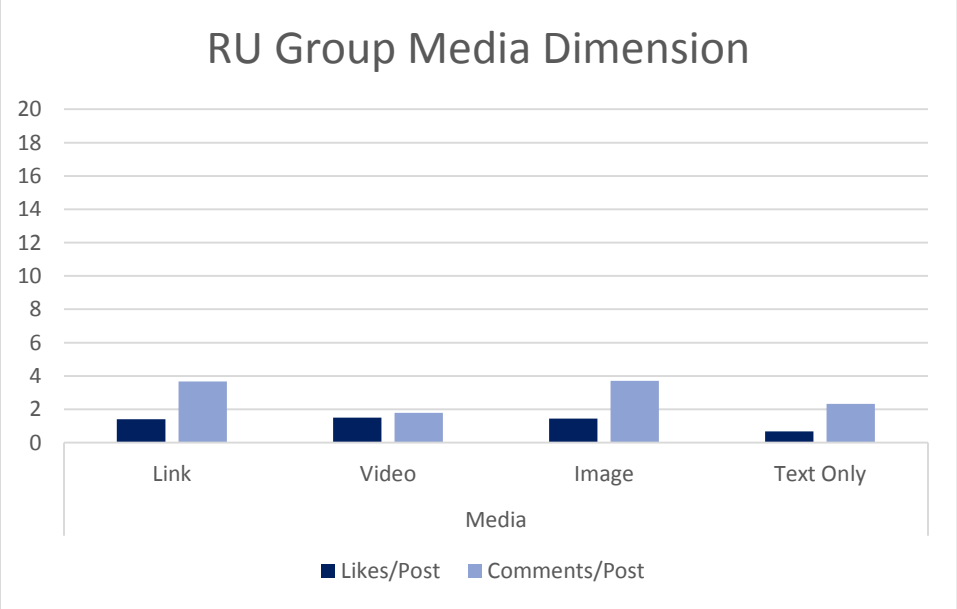
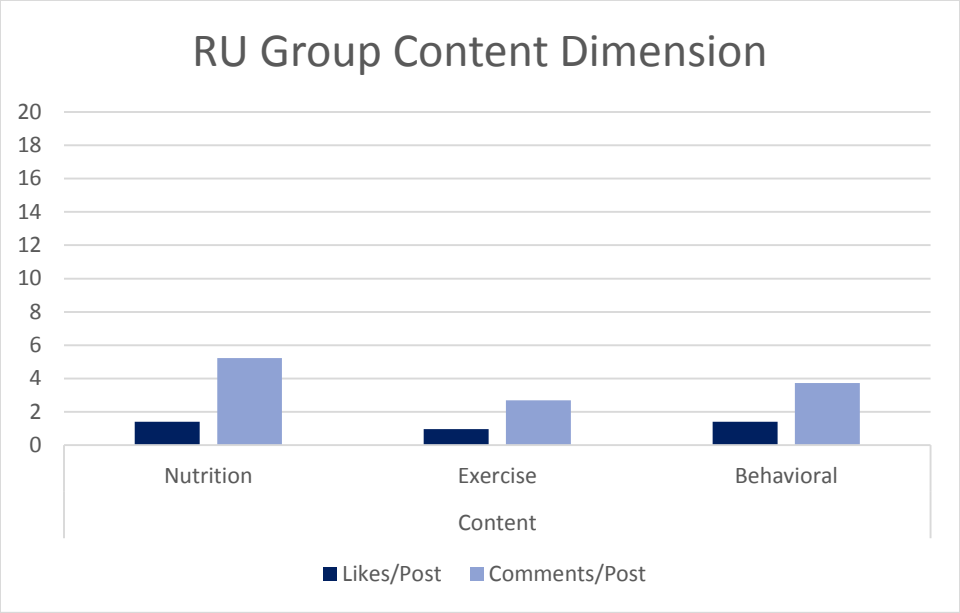
Appendix A: Graphical Summary of Coach and Super User Post Analysis

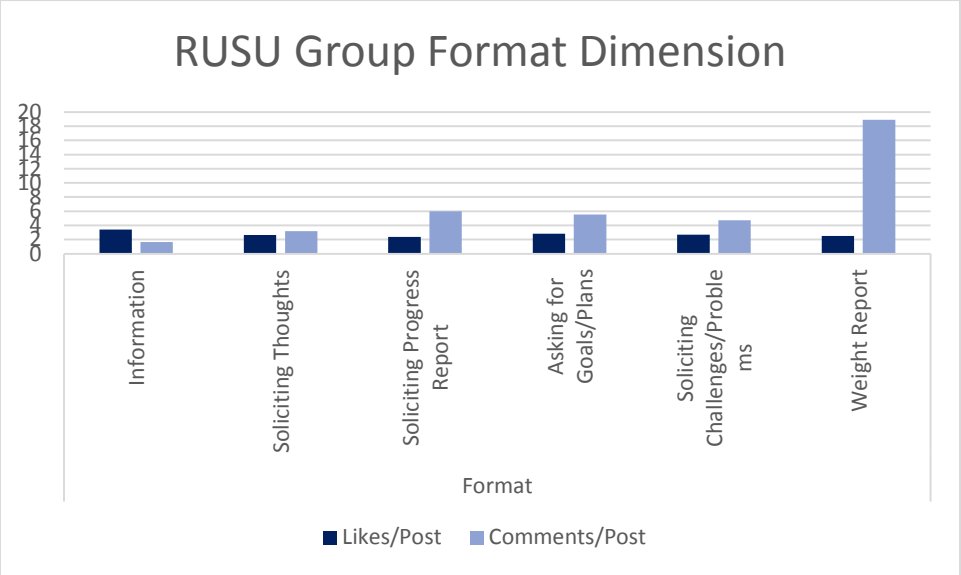
RU Group

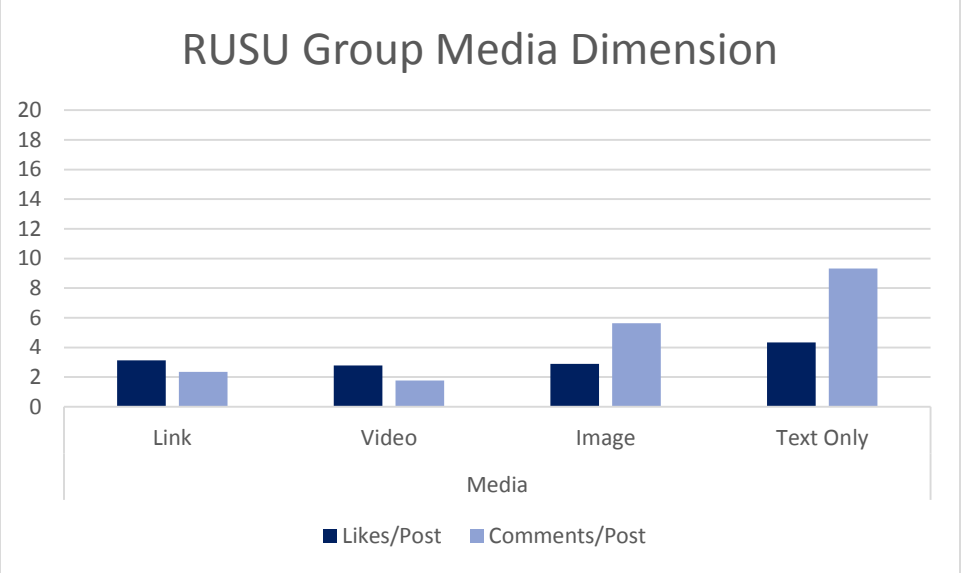


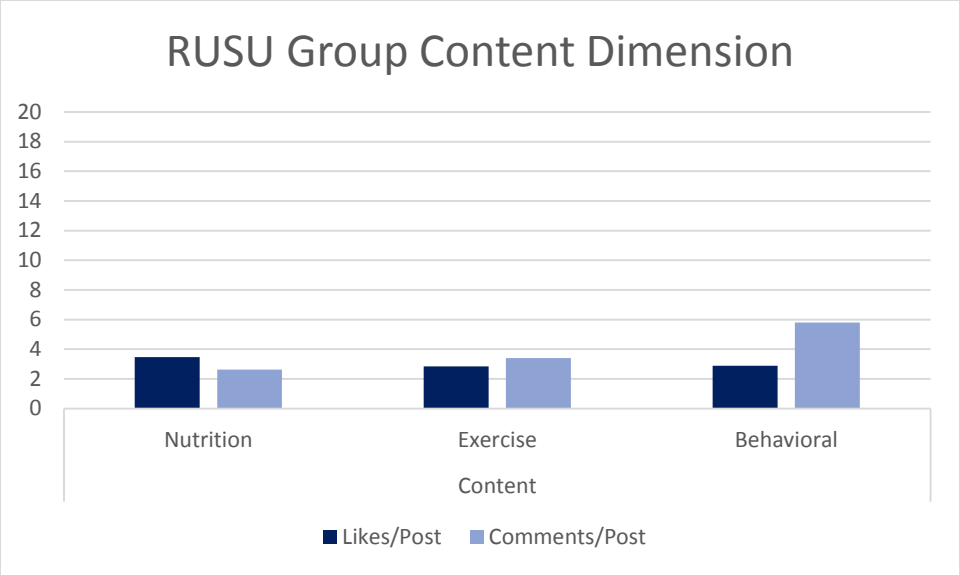



RU Group Content Dimension
20
18
16
14
12
10
8
6
4
2
0
Nutrition
Exercise
Behavioral
Content
Likes/Post
Comments/Post

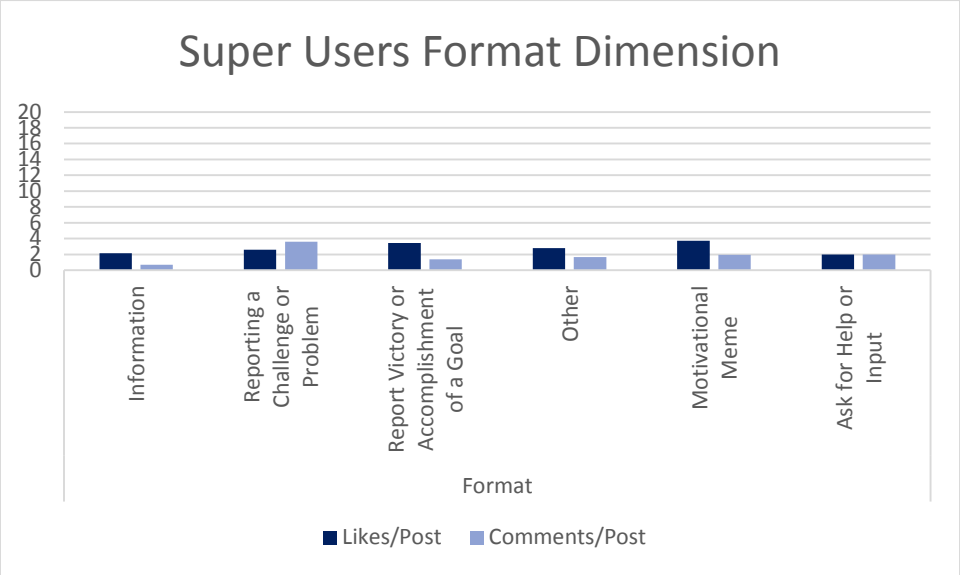
RUSU Group

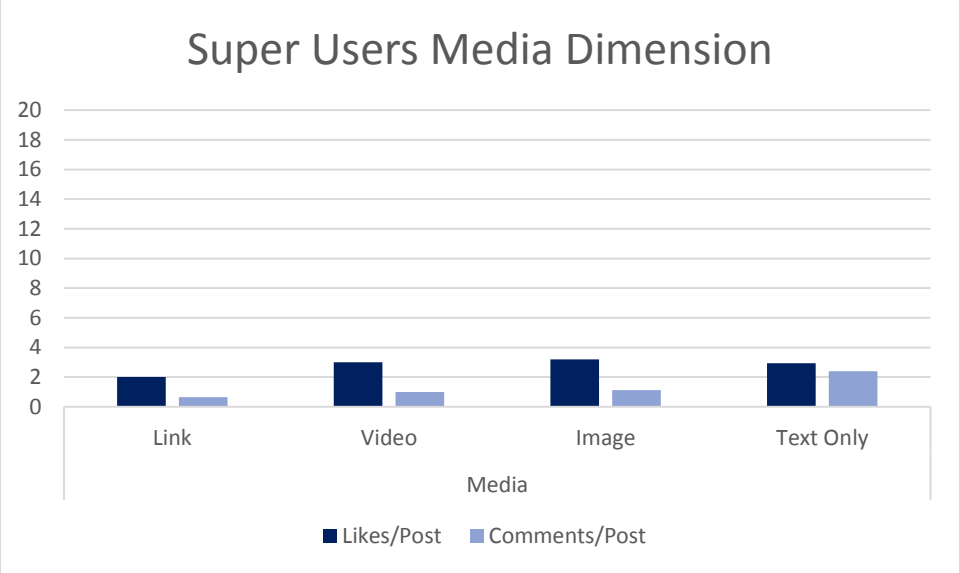

RUSU Group Format Dimension
20
18
16
14
12
10
8
6
4
2
0
Information
Soliciting Thoughts
Soliciting Progress Report
Asking for Goals/Plans
Soliciting Challenges/Problems
Weight Report
Format
Likes/Post
Comments/Post

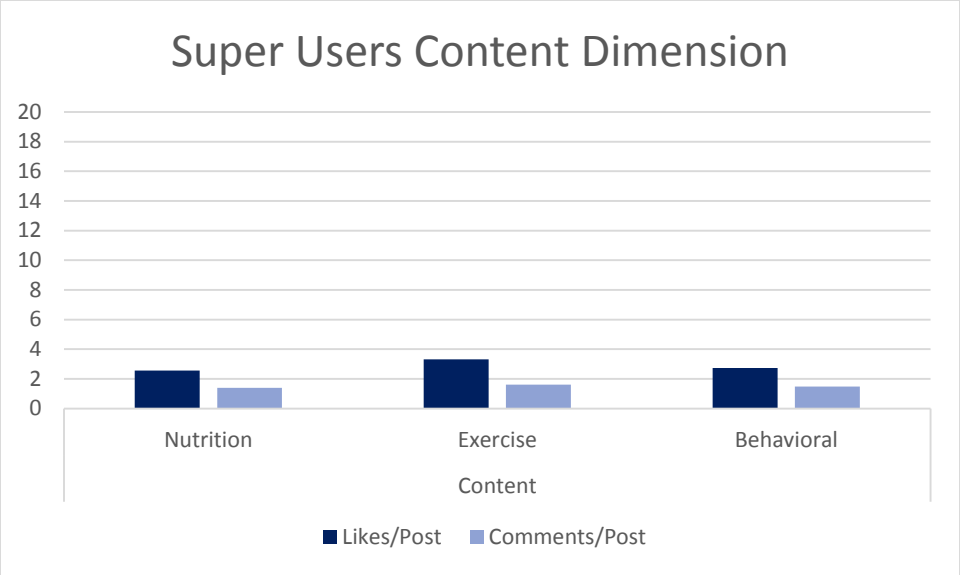

RUSU Group Media Dimension
20
18
16
14
12
10
8
6
4
2
0
Link
Video
Image
Text Only
Media
Likes/Post
Comments/Post


RUSU Group Content Dimension
20
18
16
14
12
10
8
6
4
2
0
Nutrition
Exercise
Behavioral
Content
Likes/Post
Comments/Post

Super Users


Super Users Format Dimension
20
18
16
14
12
10
8
6
4
2
0
Information
Reporting a Challenge or Problem
Report Victory or Accomplishment of a Goal
Other
Motivational Meme
Ask for Help or Input
Format
Likes/Post
Comments/Post


Super Users Media Dimension
20
18
16
14
12
10
8
6
4
2
0
Link
Video
Image
Text Only
Media
Likes/Post
Comments/Post


Super Users Content Dimension
20
18
16
14
12
10
8
6
4
2
0
Nutrition
Exercise
Behavioral
Content
Likes/Post
Comments/Post

Appendix B: Coach Interactions for Format, Media, and Content Dimensions

Format

Soliciting Thoughts

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	34	34	34	34	34	34
Likes	38	90	12	18	30	6
Comments	117	108	59	38	64	19
Likes/Post	1.12 (1.23)	2.65 (1.03)	.35 (.48)	.53 (.49)	.88 (.32)	.18 (.38)
Comments/Post	3.44 (4.19)	3.18 (3.82)	1.73 (2.83)	1.12 (1.71)	1.88 (1.59)	.56 (.85)

Soliciting Progress Report

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	14	14	14	14	14	14
Likes	12	33	3	2	9	4
Comments	70	84	22	13	35	8
Likes/Post	.85 (1.24)	2.36 (1.54)	.21 (.44)	.14 (.38)	.64 (.38)	.28 (.48)
Comments/Post	5 (4.69)	6 (3.67)	1.57 (2.29)	.93 (.83)	2.5 (1.79)	.57 (.86)

Asking for Goals/Plans

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	20	20	20	20	20	20
Likes	28	57	8	7	18	3
Comments	65	111	29	15	35	17
Likes/Post	1.4 (1.53)	2.85 (1.55)	.4 (.49)	.35 (.48)	.9 (.22)	.15 (.36)
Comments/Post	3.25 (3.45)	5.55 (4.18)	1.45 (1.82)	.75 (1.1)	1.75 (1.39)	.85 (1.16)

Soliciting Challenges/Problems

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	35	35	35	35	35	35
Likes	55	94	10	14	29	4
Comments	131	166	54	26	87	55
Likes/Post	1.57 (1.44)	2.69 (1.28)	.28 (.45)	.4 (.49)	.83 (.35)	.11 (.32)
Comments/Post	3.74 (3.97)	4.74 (4.56)	1.54 (1.97)	.74 (1.26)	2.48 (2.42)	1.57 (2.12)

Information

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	56	56	56	56	56	56
Likes	73	191	7	23	47	4
Comments	68	92	39	18	60	30
Likes/Post	1.3 (1.17)	2.65 (1.03)	.12 (.33)	.41 (.49)	.84 (.35)	.07 (.26)
Comments/Post	1.2 (1.48)	3.18 (3.82)	.69 (1.3)	.32 (.71)	1.07 (1.01)	54 (1.23)

Media

Link

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	79	79	79	79	79	79
Likes	111	248	20	36	67	9
Comments	289	186	63	30	139	58
Likes/Post	1.41 (1.35)	3.14 (1.41)	.25 (.43)	.45 (.49)	.85 (.33)	.11 (.32)
Comments/Post	3.66 (1.87)	2.35 (2.65)	.80 (1.45)	.38 (.72)	1.76 (1.59)	.73 (1.39)

Video

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	18	18	18	18	18	18
Likes	27	50	1	6	15	2
Comments	32	32	13	12	18	4
Likes/Post	1.5 (1.05)	2.78 (1.51)	.05 (.22)	.33 (.47)	.83 (.37)	.11 (.31)
Comments/Post	1.78 (1.61)	1.78 (3.85)	.72 (.8)	.67 (1.21)	1 (1.11)	.22 (.41)

Image

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	121	121	121	121	121	121
Likes	175	351	41	51	103	17
Comments	448	682	213	111	267	128
Likes/Post	1.45 (1.37)	2.9 (1.39)	.34 (.47)	.42 (.49)	.85 (.35)	.14 (.35)
Comments/Post	3.7 (4.52)	5.63 (6.11)	1.76 (2.61)	.92 (1.42)	2.21 (1.93)	1.06 (1.72)

Text Only

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	3	3	3	3	3	3
Likes	2	13	0	1	3	2
Comments	7	28	9	3	7	1
Likes/Post	.67 (1.88)	4.33 (2.05)	0 (.47)	.33 (.49)	1 (0)	.67 (.47)
Comments/Post	2.33 (3.29)	9.33 (1.88)	3 (2.16)	1 (0)	2.33 (1.88)	.33 (.47)

Content

Nutrition

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	31	31	31	31	31	31
Likes	44	108	5	6	26	2
Comments	162	82	37	17	39	14
Likes/Post	1.42 (1.35)	3.48 (1.76)	.16 (.37)	.19 (.4)	.84 (.33)	.06 (.25)
Comments/Post	5.23 (3.4)	2.64 (2.84)	1.19 (1.85)	.55 (.96)	1.16 (1.06)	.45 (.67)

Behavioral

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	103	103	103	103	103	103
Likes	146	298	35	48	87	16
Comments	385	599	196	92	231	112
Likes/Post	1.42 (1.3)	2.89 (1.38)	.34 (.47)	.46 (.49)	.84 (.35)	.15 (.36)
Comments/Post	3.74 (4.48)	5.81 (6.32)	1.9 (2.75)	.89 (1.3)	2.24 (2.02)	1.09 (1.7)

Exercise

	RU Participants	RUSU Participants	RU Coach 1 (Female)	RU Coach 2 (Male)	RUSU Coach 3 (Female)	RUSU Coach 4 (Male)
Posts	37	37	37	37	37	37
Likes	36	105	6	13	31	5
Comments	100	126	48	29	58	20
Likes/Post	.97 (1.34)	2.84 (1.38)	.16 (.37)	.35 (.48)	.84 (.34)	.14 (.34)
Comments/Post	2.7 (4.14)	3.41 (4.69)	1.29 (1.76)	.78 (1.56)	1.57 (1.53)	.54 (1.04)