

Boredom on Periscope and the number of Twitter followers: An exploratory study

Yeslam Al-Saggaf, Charles Sturt University, yalsaggaf@csu.edu.au

Arnela Ceric, Charles Sturt University, aceric@csu.edu.au

Corresponding author: yalsaggaf@csu.edu.au

Abstract

Emotions expressed in the online social media have an impact on the size of an online social network. Boredom is an emotion that can prompt users of social media to be more active in engaging with their online social network. However, there has been little research to draw attention to the relationship between feelings of boredom and the size of the social media network. The focus of this paper is on the Periscope App users' expressions of boredom, and their number of Twitter followers and the number of their friends. This study has found that bored English-speaking Periscope users have less Twitter followers compared with the English-speaking Periscope users who expressed 'something else' in the title of the live-streamed Periscope broadcast. This held true across three separate periods of time. Similarly, the study has found that having less Twitter followers is not related to expressions of boredom among Arabic-speaking Periscope users. Again this held true across three separate periods of time. On the other hand, while having less Twitter followers is related to expressions of boredom among English-speaking Periscope users but not among Arabic-speaking users, the two groups of users did not differ with respect to the number of Twitter friends in that expressions of 'boredom' in the title of the live-streamed Periscope broadcast was not associated with the number of Twitter friends; a finding that also held true across all the three periods.

Keywords: Boredom, Twitter, Periscope, network size, emotions and negative feelings

Introduction

Launched as recently as March 26, 2015, Periscope App has already surpassed 10 million Periscope accounts and on July 29, 2015 the number of daily active users exceeded 1.8 million (Kayvon 2015). Periscope allows its users to broadcast live video from their smartphones, enabling them to share what is happening around them with the public via online social media or just their friends (Periscope team 2015a).

Periscope's motto is "explore the world through someone else's eyes" (Periscope team 2015b). The App allows a degree of flexibility to its users. Links to the broadcast can be tweeted out and a recording of the broadcast can remain for up to 24 hours. Users have the ability to make their location known and can block viewers from watching their feed. Furthermore, viewers can report offensive or inappropriate content to Periscope. In addition to the ability to broadcast live videos, Periscope viewers can comment on a video, either through text or by using emojis, that is, a pictorial representation of non-verbal communication. For example, users can send a heart icon, by tapping their screens, to show their 'love' or appreciation for a live feed. To start a live-streamed Periscope broadcast, users enter a title to describe their broadcast; in this title users can also express an emotion, such as boredom. Hence, the App allows both users and viewers to directly interact with the comments of other viewers.

Al-Saggaf, Utz and Lin (2016) compared tweets expressing loneliness and sadness with tweets expressing love and happiness and explored their relationship with network size. The authors found that people expressing loneliness had less followers and less friends than people expressing love. In addition, people expressing sadness were found to have less friends than people expressing happiness. The title of all live-streamed Periscope broadcasts is tweeted to the broadcaster's Twitter followers. However, it is not clear how expressions of emotions in the title of the Periscope live feeds and the number of Twitter followers and friends are related. With the exception of Al-Saggaf, Utz and Lin's (2016) study, which focussed on Twitter users, there is no study in the extant literature that has investigated, using naturally occurring data (i.e. real Periscope and Twitter data), a relationship between the number of Twitter followers, the number of Twitter friends and the expressions of negative feelings, such as 'boredom', among Periscope users. Gruzd (2013) found that positive emotions are re-tweeted three times more often than negative emotions, suggesting that people prefer not to read negative updates. But Gruzd (2013) did not address the association between negative emotions and the number of Twitter friends and followers. Similarly, Utz (2015) who studied emotions expressed in Facebook messages, found that negative emotions are less attractive to followers, which may indicate that those who tend to express negative emotions may have less followers compared to those who tend to express positive emotions in social media. However, Utz (2015) did not specifically examine the association between negative emotions and network size. While this gap in the literature is understandable in the case of the Periscope App as it is less than one year old, it is not clear why it exists in the case of Twitter. It is the aim of this exploratory study to address this gap in the literature for both Twitter and Periscope.

The aim of this study is to determine if a relationship exists between the number of Twitter followers, the number of Twitter friends and the expressions of 'boredom' in the title of the live-streamed Periscope broadcast among Periscope users. To investigate if the results hold true across different groups, the study compares two groups of Periscope users namely, Arabic- and English-speaking users. The relationship between the number of Twitter followers and the number of Twitter friends and expressions of 'boredom' on Twitter in general is also investigated in this paper. As the first of its kind, this exploratory study hopes to pave the way for future research into this emerging technology.

Background

Emotions and network size

There is a dearth of research studies that focus on Periscope in general and on emotions and network size specifically. For this reason the limited literature relating to the relationship between emotions on Twitter and network size was consulted. Twitter is a hybrid network, and it serves as both an information and social network (Myers et al. 2014). That is, 'following' relationships in Twitter satisfy users' information needs, and these relationships are often built on social ties where Twitter users interact and share information with each other. Social media supports relationships with both strong (e.g., family members) and weak (e.g. acquaintances) ties. Twitter in particular allows users to post and receive 'tweets', that is, short messages with a maximum length of 140 characters, and to 'follow' other Twitter users by subscribing to their tweets. In Naaman et al.'s (2010) sample, 80 percent of Twitter users posted messages about themselves. Honeycutt and Herring (2009) explain there are 12 categories of Twitter messages: 'information about the addressee', 'announcements', 'exhort', 'information for others', 'information for self', 'metacommentary', 'media use', 'opinion', 'other's experience', 'self-experience', 'solicit information', and 'others'.

Social network services typically make friendship networks visible to the public. Thus, the number of followers is an important measure of users' popularity on social media. For example, users who share information have more followers, while users who only post about themselves have a significantly lower number of Twitter followers (Naaman et al. 2010). Hutto et al. (2013) further explored what affects the number of followers on Twitter. They found that the content of tweets, social behaviour and network structure equally affect the growth of the Twitter network.

Emotions expressed in tweets can have a significant impact on the number of followers (Utz 2015). Hutto et al. (2013) found that negative emotions expressed in tweets reduce, while positive emotions facilitate, network growth. The opposite is also true. The size and the strength of an online social network affects the degree to which Twitter users express their emotions. Kivran-Swaine and Naaman (2011) found that users are more likely to express emotions of joy and sadness in larger and sparser networks. When their network is dense, users' posts seem to be less emotional. These results imply that emotional Twitter posts are related to the number of followers. They also found that expressions of joy and sadness in Twitter posts increases the number of followers, which is in contrast to Hutto et al.'s (2013) findings. Furthermore, emotional Twitter messages are retweeted more often and more quickly in comparison to those that are neutral (Stieglitz & Dang-Xuan 2013). Similarly, Lin and Qiu (2012) found that positive emotions in Facebook posts are positively correlated with network size and negatively with network density. Additionally, they emphasise the role of users' relationship management motivation in explaining their findings. That is, users who have low relationship management motivation are more likely to express negative emotions in a smaller network. On the other hand, users with a high level of motivation are more likely to express negative emotions in a sparser network.

Boredom

Boredom is an emotion that has rarely been investigated in regard to online social media use and its effect on the social media network. Individuals who experience boredom can make their situation more interesting, meaningful and fun (Smith et al. 2009; Csikszentmihalyi 2000) by engaging in social interactions on social media (Barbalet 1999). Use of social media can lead to satisfaction of different needs. Whiting and Williams (2013) found ten gratification factors that explain why people use social media. These factors are 'social interaction', 'information seeking', 'pass time', 'entertainment', 'relaxation', 'communicatory utility', 'convenience utility', 'expression of opinion', 'information sharing' and 'knowledge about others'. Internet use can decrease loneliness, depression, and isolation, widen social circles and increase self-acceptance and acceptance of others (McKenna & Bargh 1999). Furthermore, Oh et al. (2014) found that online social networking enhances online supportive interaction, perceived social support, sense of community, and life satisfaction.

Boredom is an ordinary human experience that is characterised by a lack of stimulation, challenge or meaning (Csikszentmihalyi 2000; Mikulas & Vodanovich 1993). It has been defined as "a restless, irritable feeling that the subject's current activity or situation holds no appeal, and that there is a need to get on with something interesting" (Barbalet 1999, p. 631). This definition points to boredom being a multi-dimensional construct composed of unpleasant emotions on one hand, and low arousal on the other. In fact, Russell (1980) identified boredom as the 240° location in a grid coordinate system, with negative value of both valence (x-axis) and arousal (y-axis). When considering only a subjective perception of negative feelings, boredom can be seen as a personality trait, where an individual is inclined to experience feelings of disinterest. When both components of boredom are considered, that is, subjective perception and the objective assessment of low arousal, boredom is defined as a state that is affected by environmental and situational factors (Vogel-Walcutt et al. 2011). Additional factors that lead to boredom are related to loneliness, depression, anxiety, reduced work satisfaction (van Tilburg & Igou 2011), being confined to restrictive circumstances, lack of power or control, and monotonous tasks (Vogel-Walcutt et al. 2011).

Boredom is distinct from other emotions such as sadness, anger, frustration, depression and anxiety (van Tilburg & Igou 2012; Barbalet 1999). Two essential characteristics of boredom that distinguish it from other emotions are lack of challenge, and lack of meaning of one's situation and one's actions (van Tilburg & Igou 2012). Furthermore, boredom is a reaction to meaninglessness. That is, boredom is characterised by "active discomfort" in relation to an absence of interest as opposed to "resignation towards the state of indifference" (Barbalet 1999, p. 634). In addition, Barbalet (1999 p. 633) emphasises that boredom directs individuals to find meaning in other activities. Van Tilburg and Igou (2012) emphasise that boredom motivates individuals to engage in any activity that seems meaningful. Thus, boredom can be an impetus for curiosity, invention and meaning, as it is directed towards activity and engagement with the environment. On the other hand, boredom promotes positive evaluation of in-group members, especially when these groups have high meaning-regulation potential, and negative evaluations of out-group members (van Tilburg & Igou 2011).

There are two main types of boredom; trait boredom (Schroeter, Oxtoby, Johnson & Steinberger 2015) and state boredom (Hunter, Dyer, Cribbie & Eastwood 2015). This study

focuses on state boredom, since boredom was expressed in single tweets posted by the Periscope users in the title of the live-streamed Periscope broadcasts. State boredom is the experience of boredom in the moment (Hunter et al. 2015); Fahlman, Mercer-Lynn, Flora & Eastwood 2013) or in a situation (Ng et al. 2015). State boredom is a fleeting emotional state (Damon & Louis 2010); i.e. not enduring or chronic like trait boredom.

Methods

Researchers are attracted to Twitter because they can extract thousands of tweets using freely and publicly available and easily configurable tools (Marwick 2014). The large amount of data that can be gathered from Twitter has given rise to the use of data science tools to analyse ‘big data’ (Marwick 2014). Researchers are increasingly using techniques such as social network analysis (Ackland 2013) and topic modelling (Howes, Purver & McCabe 2013) to make sense of this ‘big data’. The present study collected about 300,000 tweets using freely and publicly available tools to explore the relationships between the number of Twitter followers, the number of Twitter friends and expressions of ‘boredom’ on Periscope and Twitter.

Process of collecting data

The aim of this study was to determine if a relationship exists between the number of Twitter followers, the number of Twitter friends and expressions of ‘boredom’ in the title of the live-streamed Periscope broadcast among Twitter Periscope users. To find out if the results hold true across different groups, the study also sought to determine if there are differences in the relationships between these variables among Arabic-speaking and English-speaking Periscope users. To determine if the relationships between the number of followers and the number of friends and expressions of boredom on Periscope are also applicable to Twitter users in general, the relationship between the number of Twitter followers, the number of Twitter friends and expressions of ‘boredom’ on Twitter in general, was also investigated.

A total of 284,447 tweets were retrieved from Twitter during three separate periods of time between 2015 and 2016. The tweets were retrieved using the TAGS App after setting the maximum number of tweets to be returned to 100,000 tweets and executing, firstly, the ‘Run Now’ script, so data can be retrieved once, and, then, executing the Update Archive Every Hour script and leaving it to run for three days. To retrieve the tweets the phrase "LIVE on #Periscope", in double quotations marks, was entered in the TAGS search area. The same process was followed and the same phrase was used to collect the data during the three separate time periods. Table 1 shows the breakdown of tweets collected during the three periods and the tweets remaining in the datasets after the cleaning process, which is discussed in Section 2.2.

#	Number of tweets collected	Period of data collection	Remaining tweets after the cleaning process
1	116,887	26/11/2015-28/11/2015	87,666
2	115,143	07/12/2015-10/12/2015	88,466

3	52,417	18/02/2016-20-02/2016	43,518
Total	284,447		219,650

Table 1: The breakdown of tweets across the three periods

Using the phrase "LIVE on #Periscope" ensured that only tweets relating to live-streamed Periscope broadcasts (i.e. at the time of data collection) were returned. The reason for collecting data over three separate periods of time was to ensure that the results of the statistical analysis were not a coincidence, thereby facilitating the reliability of the findings from the statistical analysis.

The TAGS App (Version 6.0) is a Google Sheet template developed by Martin Hawksey (2014) and made freely available for users to run an automated collection of search results from Twitter. For the TAGS App to work, another App was developed in Twitter to automatically authorise the TAGS App to retrieve data from Twitter on behalf of the user. After downloading the dataset from Google Sheets it was imported into SPSS (IBM SPSS Statistics Version 20) for analysis.

The 284,447 tweets collected are not the only tweets that contained the phrase "LIVE on #Periscope" that were posted to Twitter during the periods of data collection, but rather those that the TAGs App succeeded in retrieving during the three day window of each period.

To determine if the relationships between the number of followers and the number of friends and expressions of boredom on Periscope are also applicable to Twitter users in general, a further 13,008 tweets were collected following the same process as above with the exception of executing the 'Run Now' script only to retrieve the tweets. The additional tweets were collected on 22 February 2016. For the English-speaking Twitter users the phrase "I am bored" and its opposite feeling "I am excited", in double quotation marks, were entered in the TAGS search area. The reason for searching two opposing phrases was to facilitate the validity of the findings. The corresponding phrases in Arabic were entered in the TAGS search area to retrieve the tweets for the Arabic-speaking Twitter users.

Along with the tweets, the TAGS App also returned the unique tweet ID, the Twitter username, the time the tweet was posted, the sender's language, the sender's unique user ID, the source of the tweet, the sender's profile image url, the sender's followers, the sender's friends, the sender's status url, the hashtags included in the tweet and the 'in_reply_to_screen_name'.

Preparing data for analysis

The following attributes were used to prepare data for analysis: the unique tweet ID, the Twitter username, the sender's language, the sender's number of followers and the sender's number of friends. It should be noted that Twitter does not use the term "friend", but Apps that retrieve tweets from Twitter, such as the TAGS App and also TwitterR package for R (Gentry 2015), call users who follow each other "friends". It is not clear, however, if the TAGs App actually checks a Twitter user's followers to see if the user also follows them

before deciding the number of friends a user has. The reason for using ‘numbers of friends’ in this paper is because the TAGs App uses this phrase.

The process of preparing data involved the following steps. First, the duplicate tweets were removed from the dataset. Second, the retweets (RTs) were also removed since the focus of this study was on the original tweets that captured the invitation to a live-streamed Periscope broadcast. Third, using the sender’s language attribute, tweets generated by users who tweeted in a language other than Arabic or English were removed, as these tweets were not a focus of this study. Fourth, any Arabic tweet containing the words ‘tafash’ or ‘malal’, the Arabic words for bored, was given the code ‘1’ in a newly created variable called ‘bored’. Similarly, any English tweet containing the word ‘bored’, was given the code ‘1’ in the same variable ‘bored’. All other tweets were coded as ‘0’ in the ‘bored’ variable. Table 2 shows the breakdown of the ‘bored’/‘something else’ tweets by users’ language across the three periods.

Period 1			Period 2			Period 3					
	0	1	Total		0	1	Total		0	1	Total
Arabic	1132	116	1248	Arabic	1421	95	1516	Arabic	797	51	848
English	85968	450	86418	English	82485	465	82950	English	41971	699	42670
Total	87100	566	87666	Total	83906	560	84466	Total	42768	750	43518

Table 2: The breakdown of the bored/‘something else’ tweets by language across the three periods

The same process discussed above was followed to prepare additional 13,008 tweets for analysis, which were collected from Twitter using the phrase “I am bored” and its opposite feeling “I am excited”, in both English and Arabic. In addition, there was no need for Step 4 of the data preparation, as the tweets either contained “I am bored”, in which case they were coded as 1, or “I am excited” in which case they were coded as 0. Table 3 shows the breakdown of the bored/excited tweets by users’ language.

	0	1	Total
Arabic	504	123	627
English	7614	4767	12381
Total	8118	4890	13008

Table 3: The breakdown of the bored/excited tweets by language

Statistical analysis

The number of followers and the number of friends on Twitter were the predictor variables and expressions of ‘boredom’ or ‘something else’ in the title of the live-streamed Periscope broadcast was the criterion variable. Both predictor variables were of type metric or continuous; while the criterion variable was dichotomous with bored coded as 1 and ‘something else’ was coded as 0.

To investigate differences in the relationships between these variables among the Arabic-speaking and the English-speaking Periscope users, the Compare Groups within the Split File function in IBM SPSS Statistics (version 20) was used. Since both predictor variables were positively skewed (i.e. they did not display a normal distribution), a log-transformation (using LN()) was first performed on the values of the predictor variables. Next, a point

biserial correlation was performed as it was judged to be the most appropriate statistical tool for the analysis. The above process was repeated for all three periods and the additional 13,008 tweets.

Findings

Periscope users

A point biserial correlation found a significant but low correlation between the number of Twitter followers and expressions of ‘boredom’ in the title of the live-streamed Periscope broadcast for the English-speaking Periscope users in all three periods, $r_{1(EN)}^1(1, N=85,752) = -.021, p=0.000$; $r_{2(EN)}(1, N=82,204) = -.021, p=0.000$; $r_{3(EN)}(1, N=41,645) = -.020, p=0.000$. Considering the coding of ‘bored’ as 1 and ‘something else’ as 0, it appears that bored English-speaking Periscope users have less Twitter followers compared with the English-speaking Periscope users who expressed ‘something else’ in the title of their live-streamed Periscope broadcast. The fact that these correlations were found for this particular group of Periscope users across three separate periods of time provides strong evidence for the reliability of the findings. While the level of relationship is low, a connection between these two variables can still be made. Table 4 summarises the findings of the point biserial analysis.

Period 1				Period 2				Period 3			
		Fol	Fri			Fol	Fri			Fol	Fri
Arabic	r	-.052	-.043	Arabic	r	-.004	-.051	Arabic	r	-.030	-.057
	p	.067	.134		p	.879	.050		p	.392	.102
	N	1245	1229		N	1508	1489		N	805	812
English	r	-.021	-.006	English	r	-.021	-.006	English	r	-.020	-.002
	p	.000	.088		p	.000	.104		p	.000	.742
	N	85752	85627		N	82204	81936		N	41645	41338

Table 4: Summary of the findings from the point biserial analysis

No significant relationship was found between the number of Twitter followers and expressions of ‘boredom’ in the title of the live-streamed Periscope broadcast among the Arabic-speaking Periscope users. This finding held true for all three periods. This suggests that the number of Twitter followers did not differ across those who expressed boredom and those who expressed ‘something else’ for this group of users. It appears that expressions of boredom are not related to the number of Twitter followers for Arabic-speaking Periscope users.

Similarly, no significant relationship was found between the number of Twitter friends and expressions of ‘boredom’ in the title of the live-streamed Periscope broadcast among both the Arabic- and English-speaking Periscope users. This was again the case in all three periods. It appears that the number of Twitter friends is not related to boredom as expressed in Periscope live feeds by Arabic- or English-speaking Periscope users. Do Arabic viewers find the title of Periscope live-streams interesting even if a negative emotion, such as boredom, is expressed in it? This is a question for future research.

¹ $r_{1(EN)}$ = Pearson Correlation for the English-speaking group in Period 1.

The finding that no significant relationship was found between the number of Twitter followers and expressions of 'boredom' in the title of the live-streamed Periscope broadcast among the Arabic-speaking Periscope users necessitated the exploration of the difference between the means of the number of followers of the Arabic-speaking Periscope users and the means of the number of followers of the English-speaking Periscope users across the three periods. The Descriptive Statistics showed that the means of the number of followers for Arabic-speaking Periscope users were much smaller than the means of the number of followers for English-speaking Periscope users. This was the case throughout the three time periods. Table 5 shows the means and the standard deviations for the number of followers variable.

	Period 1		Period 2		Period 3			
	Mean	Std. Deviation		Mean	Std. Deviation		Mean	Std. Deviation
Arabic	1940.32	15890.62	Arabic	1672.42	11882.36	Arabic	367.20	1113.30
English	7334.30	160899.45	English	9445.05	234394.54	English	3732.89	50895.56

Table 5: The means and the standard deviations for variable the number of followers

The larger means of the number of followers for the English-speaking Periscope users possibly explain why low numbers of followers for some in this group is associated with their expressions of boredom. Further research is needed to explore this. Similarly, the smaller means of the number of followers for the Arabic-speaking Periscope users possibly explain why low numbers of followers among this group was not related to their expressions of boredom; but again this is a matter for future research to confirm.

Twitter users

A point biserial correlation found a significant but low correlation between the number of Twitter followers and expressions of 'boredom' or 'excitement' among the English-speaking Twitter users, $r(1, N=12,365) = -.056, p=0.000$. Considering the coding of "I am bored" as 1 and "I am excited" as 0, it appears that the bored English-speaking Twitter users have less followers compared with the excited English-speaking Twitter users. This suggests that having less Twitter followers is associated with expressions of boredom not only among the English-speaking Periscope users investigated in this study, but also among English-speaking Twitter users in general. No significant relationship was found between the number of Twitter followers and expressions of 'boredom' or 'excitement' among the Arabic-speaking Twitter users. This suggests that having less Twitter followers is neither associated with boredom among the Arabic-speaking Periscope users investigated in this study, nor among Arabic-speaking Twitter users more generally.

Likewise, no significant relationship was found between the number of Twitter friends and expressions of 'boredom' or 'excitement' among the Arabic-speaking Twitter users. Thus, having less Twitter friends is not associated with expressions of boredom or excitement among the Arabic-speaking Twitter users. However, a significant but low correlation between the number of Twitter friends and expressions of 'boredom' or 'excitement' was found among the English-speaking Twitter users, $r(1, N=12,322) = -.098, p=0.000$. Considering the coding of "I am bored" as 1 and "I am excited" as 0, it appears that bored

English-speaking Twitter users have less friends compared to the excited English-speaking Twitter users. This finding contradicts the finding about the English-speaking Periscope users. This suggests that having less Twitter friends is not associated with expressions of boredom among English-speaking Twitter users in general. Table 6 summarises the findings of the point biserial analysis for the additional 13,008 tweets. Table 7 shows the means and the standard deviations for the number of followers and the number of friends variables.

Twitter users (13,008 additional tweets)			
		Fol	Fri
Arabic	r	-.009	.009
	p	.831	.815
	N	624	619
English	r	-.056	-.098
	p	.000	.000
	N	12365	12322

Table 6: Summary of the findings from the point biserial analysis for the additional 13,008 tweets

Number of followers			Number of friends		
	Mean	Std. Deviation		Mean	Std. Deviation
Arabic	5646.89	38290.491	Arabic	867.39	4562.285
English	2869.99	35265.284	English	941.30	5498.912

Table 7: The means and the standard deviations for the number of followers and the number of friends variables

Discussion and conclusion

To determine if a relationship exists between the number of Twitter followers, the number of Twitter friends and expressions of 'boredom' in the title of the live-streamed Periscope broadcast among Periscope users, 284,447 tweets were retrieved from Twitter at three different times from Arabic-speaking and English-speaking Periscope users. The reason for collecting tweets at different times and from different groups of users was to determine if the results hold true at different times and across different groups.

This exploratory study has found that bored English-speaking Periscope users have less Twitter followers compared with the English-speaking Periscope users who expressed 'something else' in the title of the live-streamed Periscope broadcast. This held true across all three different periods of time. Similarly, the study has found that having less Twitter followers is not associated with expressions of boredom among Arabic-speaking Periscope users. Again this held true across three separate periods of time. On the other hand, while having less Twitter followers is associated with expressions of boredom among English-speaking Periscope users but not among Arabic-speaking users, the two groups of users did not differ with respect to their number of Twitter friends and expressions of 'boredom' in the title of the live-streamed Periscope broadcast; a finding that also held true across all three periods.

To determine if the relationships between the number of followers and the number of friends and expressions of boredom on Periscope are also applicable to Twitter users in general, a further 13,008 tweets were collected. These additional tweets contained the phrase “I am bored” and “I am excited”. The study has found that the bored English-speaking Twitter users have less followers compared with the excited English-speaking Twitter users. But interestingly the bored English-speaking Twitter users also have less friends compared with the excited English-speaking Twitter users. This finding differed from the Periscope findings. The number of followers and also the number of friends continued, as in the case of the Arabic-speaking Periscope users, to matter less to the bored Arabic-speaking Twitter users.

The likely explanation for why bored English-speaking Twitter users have less followers could be because expressing negative emotions is less attractive to followers (Utz 2015). Thus when the number of followers drop, possibly because users expressed negative feelings, these users may feel bored as there are less users with whom to interact. As they continue to express negative emotions they lose more followers which may make them feel even more bored because there are less and less followers with whom to interact. Of course these findings should be consumed with caution as they are drawn from only 300,000 tweets. More tweets should be gathered and at different times to confirm these findings. It would be useful to find out if expressions of boredom predict the number of followers or if the number of followers predicts expressions of boredom. Utz (2015) notes that while most Facebook friends know each other offline; on Twitter, the majority of network ties are weak or involve strangers. Thus, when users post negative tweets, such as expressions of boredom, it is easy for followers in a weak tie to unfollow because there is no cost that discourages followers from unfollowing. The finding relating to the number of friends and the expressions of boredom in the case of the English-speaking Twitter users is interesting. Twitter users can follow as many users as they want; having a smaller number of friends among bored users suggests a lack of interest in developing relationships.

In the case of the Arabic-speaking Periscope and Twitter users, the fact that the number of followers and friends had smaller means may explain why low numbers of followers and friends among this group was not associated with expressions of boredom; but again this is a matter for future research to confirm. It may be that these users are bored offline and so they use Periscope and Twitter to alleviate their feelings of boredom. Again, this is a question for future research. That is, a future study could investigate the relationship between the use of Periscope and boredom offline among both Arabic- and English-speaking users.

It should be noted that this exploratory study only reported the existence of a significant relationship between the number of followers and friends and the expression of boredom in the title of the live-streamed broadcast. Neither it implied causation between the variables; nor did it imply directionality. Therefore the findings should not be construed as indicating that expressing boredom on Periscope causally affects Twitter network size or that the direction of this relationship is from expressions of boredom to network size. It is possible that network size affects the expression of boredom or that both variables affect each other concurrently. The study also did not imply that these variables are the only possible

variables in this relationship. There must be other interesting variables that must be examined in a future study.

Acknowledgments

The authors wish to thank Professor Sonja Utz (a Professor at the University of Tübingen, Germany, and Head of the Social Media group @ the Leibniz-Institut für Wissensmedien in Germany) for her valuable insights and wise guidance. The authors also wish to thank Katherine Bell (CSU) for editing an earlier draft of this manuscript.

References

Al-Saggaf, Y Utz, S & Lin, R 2016, Expressing feelings on Twitter and network size. In van der Velden, M, Strano, M, Hrachvec, H, Abdelnour Nocera, J & Ess, C (ed), Culture, Technology, Communication: Common worlds, different futures? *Proceedings of the Tenth International Conference on Culture, Technology, Communication*. London, 15-17 June, UK, pp. 81-92.

Ackland, R 2013, *Web social science: Concepts, data and tools for social scientists in the digital age*. Sage.

Barbalet, JM 1999, Boredom and social meaning, *British Journal of Sociology*, vol. 50, no. 4, pp. 631-46.

Csikszentmihalyi, M 2000, *Beyond boredom and anxiety: Experiencing flow in work and play*, Jossey Bass, San Francisco, CA.

Damon, C-HP & Louis, W-CL 2010, Effects of narcissism, leisure boredom, and gratifications sought on user-generated content among Net-Generation users, *8th International Telecommunications Society (ITS) Asia-Pacific Regional Conference*, pp.1–34.

<http://doi.org/10.4018/ijcbpl.2011070101>

Fahlman, SA, Mercer-Lynn, KB, Flora, DB & Eastwood, JD 2013, Development and validation of the multidimensional state boredom scale, *Assessment*, vol, 20, no.1, pp. 68–85.

<http://doi.org/10.1177/1073191111421303>

Gentry, J 2015, *Package twitteR* July 29 2015, retrieved from <https://cran.r-project.org/web/packages/twitteR/twitteR.pdf>.

Gruzd, A 2013, Emotions in the twitterverse and implications for user interface design *AIS Transactions on Human-Computer Interaction*, vol. 5, no. 1, pp. 42-56.

Hawskey, M 2014, *About*, September 17 2014, retrieved from <https://tags.hawksey.info/about/>.

Honeycutt, C & Herring, SC 2009, Beyond microblogging: conversation and collaboration via Twitter' in RH. Sprague (ed.). *Proceedings of the 42nd Annual Hawaii International Conference on System Sciences*, Los Alamitos, CA: IEEE Computer Society.

Howes, C, Purver, M & McCabe, R 2013, Investigating topic modelling for therapy dialogue analysis. *Proceedings of IWCS Workshop on Computational Semantics in Clinical Text (CSCT)*, pp. 7-16.

Hunter, Ja, Dyer, KJ, Cribbie, Ra & Eastwood, J D 2015, Exploring the Utility of the Multidimensional State Boredom Scale, *European Journal of Psychological Assessment*, pp. 1–10. <http://doi.org/10.1027/1015-5759/a000251>

Hutto, CJ, Yardi, S & Gilbert, E 2013, A longitudinal study of follow predictors on Twitter. *Proceedings of the 2013 SIGCHI Conference on Human Factors in Computing Systems*, pp. 821-830.

Kayvon, J 2015, *Periscope, by the numbers* August 12, 2015, retrieved from: <https://medium.com/@periscope/periscope-by-the-numbers-6b23dc6a1704#.buud0t7no>

Kivran-Swaine, F & Naaman, M 2011, Network properties and social sharing of emotions in social awareness streams, paper presented at the *ACM 2011 conference on Computer supported cooperative work*, Hangzhou, China.

Lin, H & Qiu, L 2012, Sharing emotion on Facebook: network size, density, and individual motivation, paper presented at the *CHI '12 Extended Abstracts on Human Factors in Computing Systems*, Austin, Texas, USA.

McKenna, K & Bargh, J 1999, Causes and consequences of social interaction on the internet: a conceptual framework, *Media Psychology*, vol. 1, no. 3, pp. 249-69.

Marwick, AE 2014, *Ethnographic and qualitative research on Twitter*, in K Weller, A Bruns, J, Burgess & M, Mahrt (eds.), *Twitter and Society*, e-book, Peter Lang, New York, pp. 109-21, viewed 4 June 2015.

Mikulas, WL & Vodanovich, SJ 1993, The essence of boredom, *Psychological Record*, vol. 43, no. 1, pp. 3-12.

Myers, SA, Sharma, A, Gupta, P & Lin, J 2014, Information network or social network?: the structure of the twitter follow graph, paper presented at the *23rd International Conference on World Wide Web*, Seoul, Korea.

Naaman, M, Boase, J & Lai, CH 2010, Is it really about me? Message content in social awareness streams, in K Inkpen & C Gutwin (eds.), *Proceedings of the 2010 ACM Conference on Computer Supported Cooperative Work*, New York, ACM Press, pp. 189-92.

Ng, A H, Liu, Y, Chen, J zhi & Eastwood, J D 2015, Culture and state boredom: A comparison between European Canadians and Chinese, *Personality and Individual Differences*, vol. 75, pp. 13–18. <http://doi.org/10.1016/j.paid.2014.10.052>.

Oh, HJ, Ozkaya, E & LaRose, R 2014, How does online social networking enhance life satisfaction? The relationships among online supportive interaction, affect, perceived social support, sense of community, and life satisfaction, *Computers in Human Behavior*, vol. 30, pp. 69-78.

Periscope team 2015a, *What is Periscope*, June 7 2015, retrieved from:
<https://help.periscope.tv/customer/en/portal/articles/2016126-what-is-periscope>.

Periscope team 2015b, *About us*, June 7 2015, retrieved from:
<https://www.periscope.tv/about>.

Russell, JA 1980, A circumplex model of affect, *Journal of Personality and Social Psychology*, vol. 39, pp. 1161-78.

Schroeter, R, Oxtoby, J, Johnson, D & Steinberger, F 2015, Exploring Boredom Proneness as a Predictor of Mobile Phone Use in the Car. *Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction on - OzCHI '15*, pp. 465–473. <http://doi.org/10.1145/2838739.2838783>.

Shao, G 2009, Understanding the appeal of user-generated media: a uses and gratification perspective, *Internet Research*, vol. 19, no. 1, pp. 7-25.

Smith, JL, Wagaman, J & Handley, IM 2009, Keeping it dull or making it fun: task variation as a function of promotion versus prevention focus, *Motivation and Emotion*, vol. 33, pp. 150-60.

Stieglitz, S & Dang-Xuan, L 2013, Emotions and information diffusion in social media - sentiment of microblogs and sharing behavior, *Journal of Management Information Systems*, vol. 29, no. 4, pp. 217-48.

Utz, S 2015, The function of self-disclosure on social network sites: not only intimate, but also positive and entertaining self-disclosures increase the feeling of connection, *Computers in Human Behavior*, vol. 45, pp. 1-10.

van Tilburg, WAP & Igou, ER 2011, On boredom and social identity: a pragmatic meaning-regulation approach, *Personality and Social Psychology Bulletin*, vol. 37, no. 12, pp. 1679-91.
van Tilburg, WAP & Igou, ER 2012, On boredom: lack of challenge and meaning as distinct boredom experiences, *Motivation and Emotion*, vol. 36, no. 2, pp. 181-94.

Vogel-Walcutt, JJ, Fiorella, L, Carper, T & Schatz, S 2011, The definition, assessment, and mitigation of state boredom within educational settings: a comprehensive review, *Educational Psychology Review*, vol. 24, no. 1, pp. 89-111.

Whiting, A & Williams, D 2013, Why people use social media: a uses and gratifications approach, *Qualitative Market Research: An International Journal*, vol. 16, no. 4, pp. 362-9.