Does Social Media Behavior Reflect Users' Anxiety - A Case Study of Twitter Activities

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- Publications:
  - Sharma, T., Wang, T., Giulio, C.D., & Bashir, M. (2020). Towards Inclusive Privacy Protections in the Cloud2nd Workshop on Cloud Security and Privacy (Cloud S&P 2020). Rome, Italy. October, 2020. (In press).
  - Sharma, T., Wang, T., & Bashir, M. (2020). Advocating for Users' Privacy Protections: A Case study of COVID-19 apps. MobileHCI 2020 Late Breaking Results (Poster). Virtual Conference. October, 2020. (In press).
  - Wang, T., & Bashir, M. (2020). Privacy Considerations When Predicting Mental Health Using Social Media. Association Information Science & Technology Annual Meeting (ASIS&T). Pittsburgh, Pennsylvania, USA. October 2020. (In press).
  - Wang, T., & Bashir, M. (2020, July). A Study of Social Media Behaviors and Mental Health Wellbeing from a Privacy Perspective. In *International Conference on Applied Human Factors and Ergonomics* (pp. 137-144). Springer, Cham.

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Research Interests

- Social media analytics

- Health informatics, especially on mental health assessment and prediction

- Privacy considerations for online environment, such as social media platforms, cloud computing, etc.

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Introduction

- Anxiety disorders are very common among children, adolescents, and young adults
  - In 2012, about 30% of young adults aged 18-29 in U.S. have some type of anxiety disorders
- However, assessment and treatment for mental illness are considered to be insufficient in the recent past
  - About 75% of nearly 10,000 people with generalized anxiety disorder or social anxiety disorder didn't receive any treatment
- It is necessary to explore new approaches to provide more effective mental healthcare services
  - Use of social media

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Study Goals

- This research study aims to examine the relationship between young adults' social media (Twitter) behaviors and their mental health status, especially general anxiety level

- Research questions:
  - Is there a relationship between Twitter activities and one's anxiety level?
  - Are there any differences in Twitter activities among people with symptoms of anxiety and people without such symptoms?

Methods

- Participants were recruited randomly via Amazon Mechanic Turk (MTurk) to complete an online survey including:
  - General Anxiety Disorder-7 (GAD-7)
  - Questions related to social media usage
  - Twitter link (with permission)
  - Basic information (gender, age, etc.)
- A total of 200 participants were randomly recruited from MTurk
- 95 responses were recorded after excluding noisy data
- By using Twitter link provided by each participant, data on all the publicly available information was collected
  - User profile, Tweets, Retweets, Reply, Likes, Following, Followers, …

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Methods

- To analyze Twitter data, three elements were measured:
  1. Overall engagement: Number of Tweets, Retweets, replies, liked Tweets, followers, and followings
  2. Negative emotions: Frequency of words with negative sentiment used, and if any negative attitude was exhibited in Twitter activities
  3. Level of personal information revealed publicly:
     - Profile photo: Is the user's selfie being used as profile photo?
     - Profile description: Is there any personal identifiable information disclosed in the profile description?
     - Media posts: Is there any media post (photo or video) related to user's personal life?

Results

- Overall Engagement

Statistics on engagement

Participants	With anxiety symptoms N=34	Without anxiety symptoms N=61
Average # of Tweets	4970.30	4138.04
Average # of following	449.96	373.13
Average # of followers	190.18	229.42
Ratio of Following/Follower	2.37	1.63

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Results

- Negative Emotions

Word frequency for original posts

Rank	With anxiety symptoms	Without anxiety symptoms
1	love (0.27%)	love (0.74%)
2	good (0.20%)	good (0.52%)
3	new (0.12%)	new (0.52%)
4	better (0.10%)	liked (0.41%)
5	great (0.09%)	best (0.40%)
6	best (0.09%)	chance (0.38%)
7	happy (0.08%)	right (0.37%)
8	over (0.07%)	never (0.37%)
9	stop (0.06%)	happy (0.33%)
10	bad (0.05%)	amazing (0.27%)

Results

- Level of Personal Information Shared Publicly
  - Participants with less or no anxiety symptom (21 out of 61, 34.4%) are more likely to use their selfies as profile photos than participants with anxiety symptoms (7 out of 34, 20.6%)
  - 13 of 61 participants with less or no anxiety symptoms had detailed information about themselves in profile description, while only 2 of 34 participants reported anxiety symptoms included some basic level of personal information
  - Participants with less or no anxiety symptoms were also more willing to post photos and videos about themselves, family, and friends

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Discussion

- Social media behaviors may be a useful source of information for individuals' general mental health status

- Such information could be potentially used as a novel and effective approach to identify, detect, and predict one's mental health status along with traditional methods
  - Easy to implement
  - Include rich content coverage of an individual's online activities
  - Provide more efficient, objective, and unbiased information sources

- It is important to address privacy violations since people could be identified and targeted while using such information

Conclusion

- This research study shows initial findings that…
  - Individuals' social media behaviors may be relevant to their mental health status
  - People with symptoms of anxiety may behave differently than people without such symptoms
- Social media could potentially be considered as a new method for mental health assessment and treatment
- Results from this study may provide the initial steps towards a new direction in mental healthcare services that can be timely and reach broad and diverse populations

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