

Understanding superusers' and regular users' engagement in UK Respiratory Online Health Communities and the impact of their interaction on sentiment: A BioBERT Perspective

Li X¹, Aghi E², Pasi G², Coulson NS³, Karampatakis G¹, Wood HE¹, Griffiths CJ¹, Panzarasa P¹, DeSimoni A¹, and Viviani M²

¹Queen Mary University of London, London, UK; ²University of Milano-Bicocca, Milan, Italy; ³University of Nottingham, Nottingham, UK

1. Background

- Online Health Communities (OHCs) enable exchange of self-management information, advice, and support among peers
- Engagement of 'superusers', i.e., highly active users, plays a key role in holding together the community and ensuring effective exchange of support and information.
- Understanding the dynamics between regular users and superusers is vital for uncovering how superusers influence community sentiment and self-management practices.

2. Aim

To understand the sentiment distribution and the dynamic of sentiment expressed in OHCs, focusing on regular users' interaction with superusers.

3. Methods

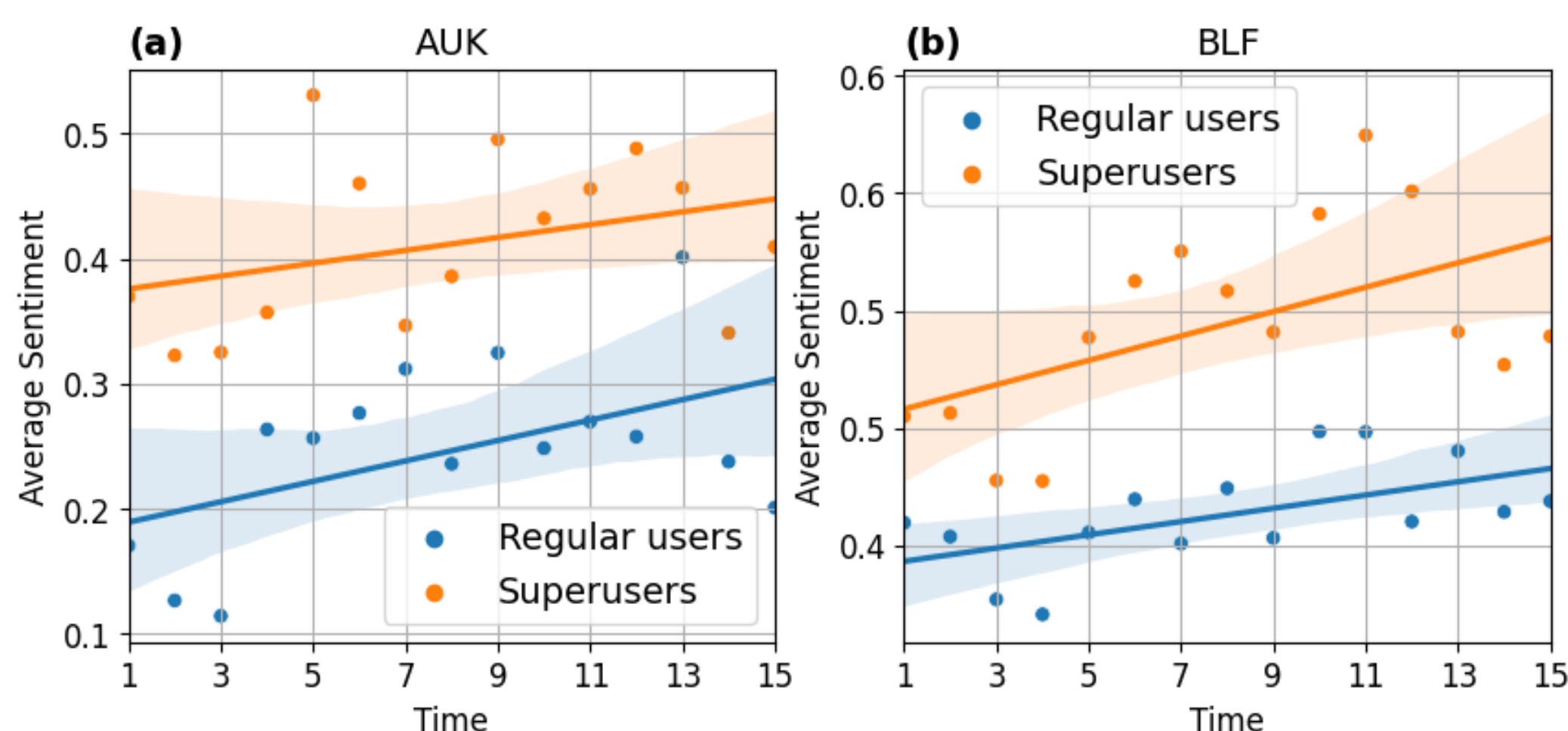
- We conducted Sentiment Analysis on anonymised data from two UK respiratory OHCs using a Bio-Bidirectional Encoder Representation from Transformers (BioBERT).
- Positive, neutral, and negative sentiment were categorised as 1, 0, and -1, respectively. The average sentiment of regular users' and superusers' aggregated posts was then calculated.

4. Data

- Data were provided by HealthUnlocked, the online platform provider of the Asthma and Lung UK (AUK), and the British Lung Foundation (BLF) communities.
- Three types of data were collected from both communities including: (i) level-0 posts (i.e., posts starting new threads), (ii) level-1 replies (i.e., replies to the level-0 posts), and (iii) level-2+ replies (i.e., replies to other replies beyond level 2).

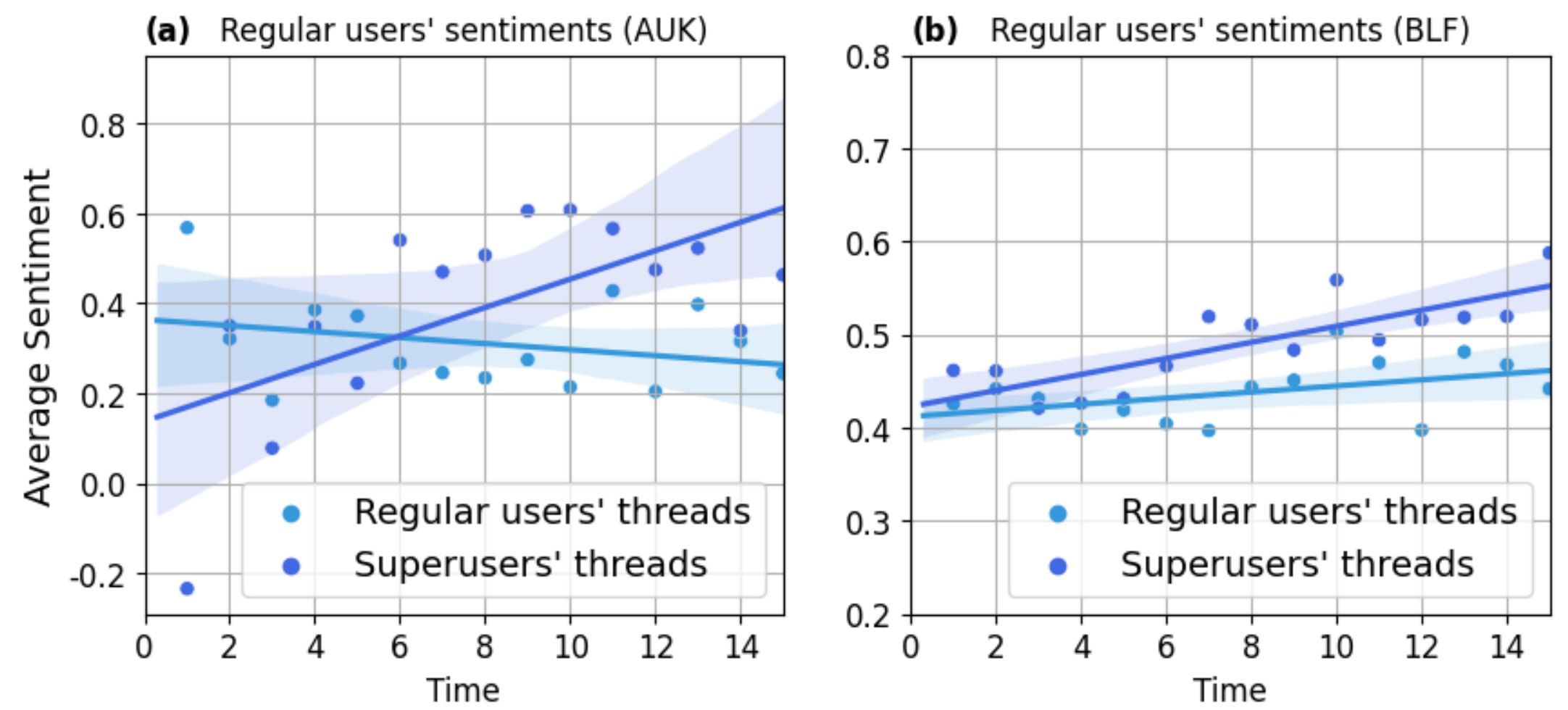
5. Results

5.1. The trend of users' sentiment over time:



By measuring the average sentiment of regular users and superusers over time, we found a trend towards positive sentiment for all users, with superusers being consistently more positive than regular users.

5.2. Regular users' reply to threads started by superusers and other regular users:



In both communities, the sentiment of regular users when replying to superusers' threads was becoming more positive while their sentiment in replying to regular users' threads was relatively stable.

5.3. Users' sentiment when replying to regular users' level-0 posts with different sentiment:

	Sentiment of regular users (AUK)			Sentiment of regular users (BLF)		
	Negative	Neutral	Positive	Negative	Neutral	Positive
Regular users' replies						
Negative	39.83%	21.15%	31.93%	31.03%	22.58%	20.80%
Neutral	9.87%	33.65%	12.09%	11.82%	20.48%	14.07%
Positive	50.30%	45.19%	55.98%	57.15%	56.94%	65.13%
Total	100%	100%	100%	100%	100%	100%
Avg. Sentiment	0.105	0.24	0.24	0.261	0.344	0.443
Superusers' replies						
Negative	30.87%	24.72%	25.83%	25.41%	16.75%	15.93%
Neutral	7.83%	23.60%	11.75%	10.07%	20.36%	12.75%
Positive	61.30%	51.69%	62.42%	64.53%	62.89%	71.32%
Total	100%	100%	100%	100%	100%	100%
Avg. Sentiment	0.278	0.319	0.388	0.395	0.463	0.567

For each sentiment category, the higher percentage of either superusers' or regular users' replies are in bold. We found that regular users' sentiment was largely affected by the sentiment expressed in the initial posts, whereas superusers tended to write positive replies regardless of the sentiment expressed in the initial post.

6. Conclusions

This study sheds light on regular users' and superusers' engagement in OHCs and on the impact of their mutual interactions on the sentiment of communication. The findings suggest that the active participation of superusers, who tend to have consistently positive sentiment, can enhance community cohesiveness and foster an encouraging environment conducive to positive interactions and effective spread of informational and emotional support. Sentiment change could potentially be modelled as a mediating factor for the effect of OHC engagement on self-management behaviours and patients' outcomes in health economics analysis.