Networks of Mutual Support in Mental Health - Results of a Digital Citizen Science Experiment

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CoAct for Mental Health[1] sheds light on informal support networks in mental health (ISNMH) by means of Citizen Science. Albeit the manifold substantiated importance of ISNMH for both resilience and recovery[3], data and knowledge on their functioning are scarce. The project on includes the life-long experience of persons with mental health issues that act as co-researchers who participate in and shape all research phases. The central experimental tool of the project is a co-designed Telegram chatbot[4].

The chatbot shares everyday experiences and anecdotes in the context of mental health and social support that were lived and written down by the co-researchers with the chatbot participants. The reactions of the participants in the chatbot are collected to gain a better understanding on ISNMH. Already for one year, the chatbot "CoActuem per la Salut Mental"[2] collects the answers from up to now $N_{\rm tot} = 1049$ participants on a daily basis. All participants receive the same contents from the chatbot and in the same order, so that a set of $222 = n_{\rm all} < n$ stories should be answered by all $N_{\rm tot}$ participants, or, alternatively a fixed number of e.g. 20 stories $n = 20 < n_{\rm all}$ are answered by still a considerable number of currently $N_{20} = 98$ participants. Citizen science digital tools are known to have an unequally distributed participation, i.e. most answer little, some answer much, with Gini coefficients around 0.80[5]; we find a lower Gini coefficient of 0.76.

In the presentation we discuss the results from $n_{\rm max} = 130$ stories of type "Sharing experiences". These stories are sent to the participants in the form of dialogues consisting of a short description (≈300 characters) of a co-researchers' experience and two questions asking the participant for his/her relation to this experience. The participants is asked for their own record of experiences Q_1 = *Have you had the same experience?* and for the experience they know of from their surrounding Q_2 =*And those around you... Has anybody had the same experience?*, both with answer possibilities *Yes (A)*, *Not exactly (B)*, and *No (C)*. The data from these stories in then contrasted with the participants profiles per (e.g. gender identity) they gave in a 32-questions sociodemographic survey in the beginning of their conversation with the chatbot.

We build networks from the answer of participants' to Q_1 and Q_2. The N participants are the nodes and the weights of the edges are calculated for pairs of participants $i, j \in \{1 \dots N\} \times \{1 \dots N\}$. Superscripts $q \in 1, 2$ denote whether a link represents an answer to Q_1 or to Q_2, respectively. We build two networks, for Q_1 and Q_2, respectively, which can be understand as two layers of a multiplex network. The network of **same lived stories** $\mathcal{P}^1_{ij}$ gives a strong weight to equal and lived experiences, and less weight if the story has not been lived exactly by both. The network of **same shared stories** $\mathcal{P}^2_{ij}$ gives a strong weight to equal experiences lived by the environment of the participant, and less weight if the story has not been lived exactly by the surrounding of both connected participants.

$$\mathcal{P}^q_{ij} = \frac{\#_s AA + \frac{2}{3}\#_s AB + \frac{2}{3}\#_s BA + \frac{1}{3}\#_s BB}{\#\text{ stories} \cdot (N-1)} \quad (1)$$

where $\#_s AB$ is the number of stories to which participant i answered A and participant j answered B, and so forth. The coefficients shown for the presentation are arbitrary and will be discussed in the talk. In the talk, we present different network properties, such as the node degree shown in 1 that help to understand ISNMH better, and to propose more reasonable data collection categories in mental health, with special focus on Catalunya.

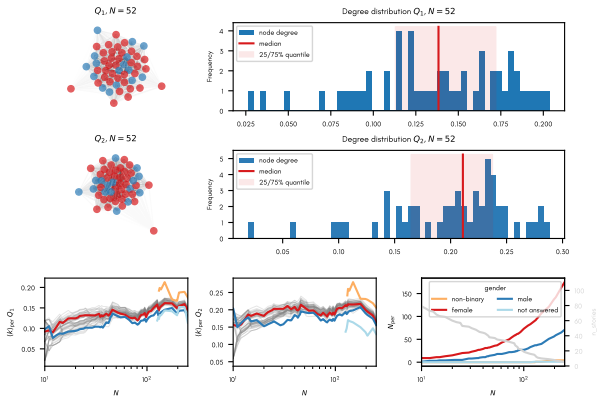

Fig. 1. First rows: spring layout representation (color acc. gender, red=f, blue=m) and node degree distribution of $\mathcal{P}^q_{ij}$ for $q \in [1, 2]$ for $N = 52$. Third row: Mean node degree for different gender profiles across number of participants included in the network. In gray: Node degrees of 50 random subsets of women of the same size as the set of men for each N, respectively. The mean node degree of women is strictly higher than the mean node degree of man across all $N > 12$. The last plot: number of representatives per profile across N in colors, and the nu,ber of stories answered by N participants in gray.

[1] https://coactuem.ub.edu.

[2] lit. "we act together for mental health.". t.me/CoActuem_bot.

[3] Zhang T. Cai W. Song X. Chen A. Deng G. Ni C. Hou, T. Social support and mental health among health care workers during coronavirus disease 2019 outbreak: A moderated mediation model. *PloS One*, 15(5), 2020.

[4] Franziska Peter, Santi Segui, Guillem Pascual Guinovart, and Josep Perelló. CoActuem per la Salut Mental Chatbot. github.com/Chaotique/CoActuem_per_la_Salut_Mental_Chatbot.

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