

Comparing Macro, Meso and Micro level Network Structures between Hispanic and Black Dementia Caregiving Networks in Twitter

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Background and Aims

Racial and ethnic minorities have higher prevalence of dementia in the US.¹ Moreover, dementia caregiving demands a higher, more intense level of care than other conditions. Because of structural and socio-economic disadvantages, racial and ethnic minority dementia caregivers suffer more from social isolation, loneliness, and poor quality of life.¹ The expansion of social media use among underserved populations, particularly Twitter, can potentially provide social support for underserved dementia. The purpose of this study is to apply social network analysis on Tweets to compare Hispanic and Black dementia caregiving networks.

Methods

- We randomly extracted Tweets mentioning dementia caregiving and its related terms from corpora collected daily via API from Sep 1 to Dec 31, 2019 (n= 549,380 English Tweets, n= 185,684 Spanish Tweets).
- We applied a Twitter bot detection algorithm to remove bot-generated Tweets followed by applying a lexicon-based demographic inference algorithm to automatically identify Tweets likely authored by Black or Hispanic individuals (n= 114,511 English, n = 1,185 Spanish).
- Last, we applied the Louvain clustering algorithm³ to detect groups within each Hispanic and Black caregiving network using Python and ORA.

Analysis

- Fourteen distinct groups (11.0%, Leiden grouping, Modularity: 0.801) were detected in the Hispanic caregiving network whereas 123 groups (7.0%, Leiden grouping, modularity: 0.893) were found in the Black dementia caregiving network (Figure 1).

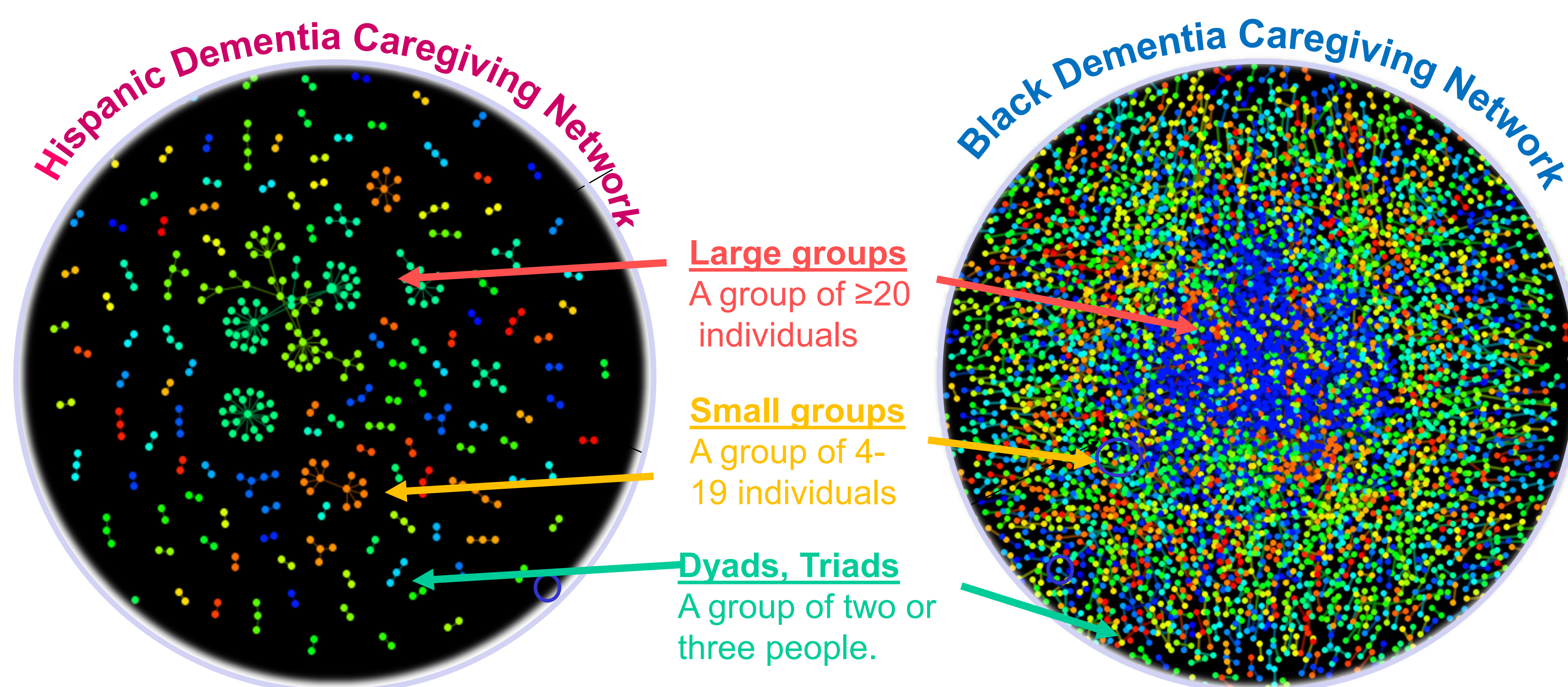


Figure 1. Social network structure of dyads, triads and communities of Hispanic and Black dementia caregiving networks

Results and Discussion

- Both networks contained a similar proportion of dyads or triads (Hispanics 88.2%, 88.9% Blacks) while the Black caregiving network included slightly larger proportion of isolates (Hispanics 0.8%, Blacks 4.0%) (figure 2).

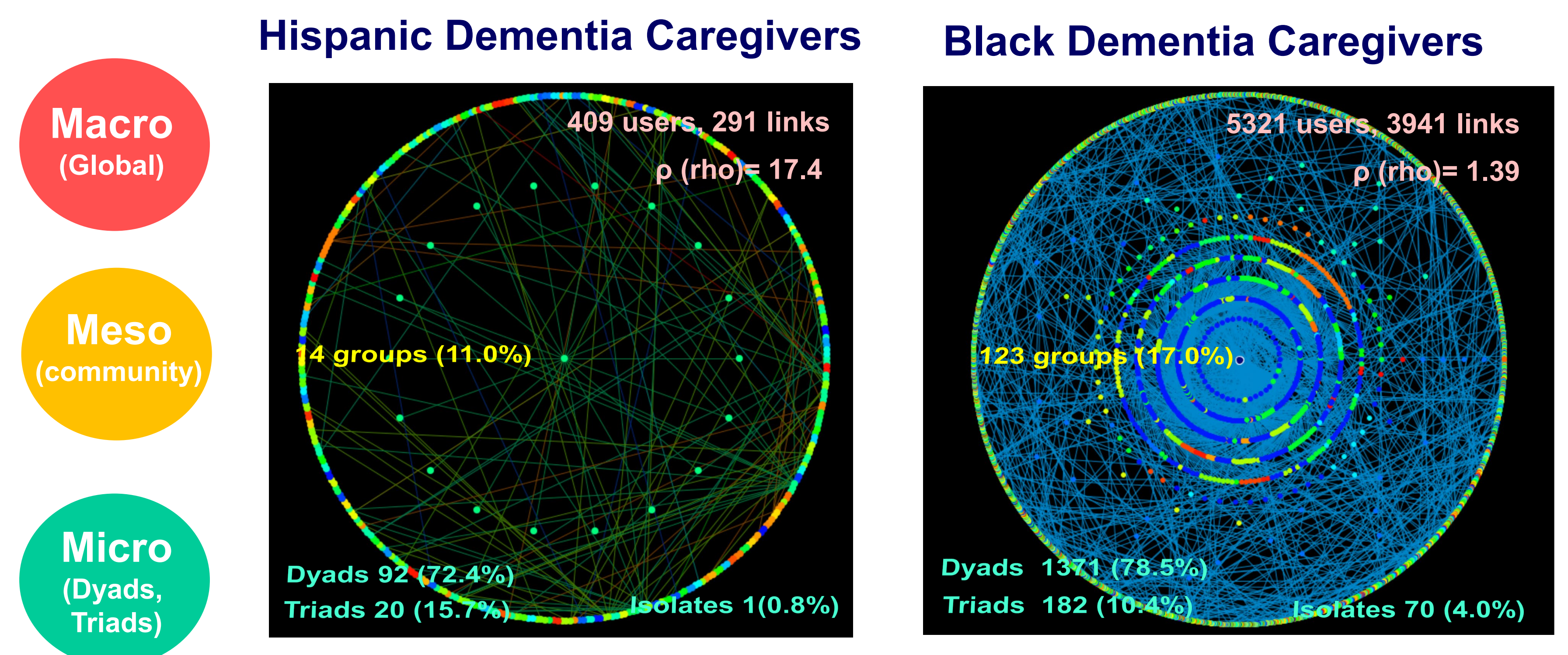


Figure 2. Characteristics of macro, meso and micro level Twitter networks between Hispanic and Black dementia caregivers (Center is highest Betweenness)

Conclusion

This study provides useful baseline information on composition of existing large groups, small groups and isolates for our future recruitment strategy and design of social support intervention for Hispanic and Black dementia caregivers.

Acknowledgments

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References

- Alzheimer's Association. Race, Ethnicity and Alzheimer's in America, 2021.
- Kurt H.W. Wolff (Ed.), The Sociology of Georg Simmel, The Free Press, Glencoe (1964)
- Yoon S. Application of social network analysis and text mining to characterize network structures and contents of microblogging messages: An observational study of physical activity-related tweets. Columbia University. 2011.
- Traag, V. A., Waltman, L. & van Eck, N. J. From Louvain to Leiden: guaranteeing well-connected communities. Sci Rep 9, 5233. 2019