

# Clusters of Social Isolation Trajectories

Ghaida Alsadah, MS, Janusz Wojtusiak, PhD

George Mason University

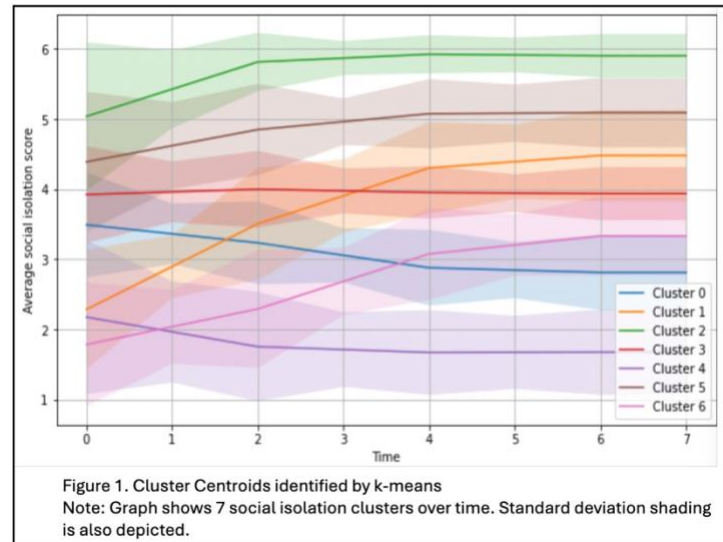
## Introduction

About 24 percent of community dwelling adults aged 65 and above are socially isolated.<sup>1</sup> Social isolation, which is characterized by the lack or deficiency of social connections, has been linked to numerous adverse health outcomes.<sup>1</sup> Most studies examined social isolation at a single point in time, with only few that analyzed social isolation over time. The studies focused on traditional statistical methods.<sup>2</sup> Machine learning methods have not been previously applied to identify and predict likely trajectories of social isolation in older adults. This study used the Health and Retirement Study (HRS), which is a nationally representative longitudinal study of people above age 50 in the United States.

## Methods

Cohort has been constructed by including retirees who completed a self-administered Psychological and Life-style Questionnaire (SAQ). The HRS data have been processed to include demographic variables such as education, gender, race, ethnicity, US origin, as well as variables related to social isolation. A 6-item multidomain measure for social isolation (ranging from 0-6) has been constructed on 2006 to 2020 HRS data. The scale, adopted from previous research, is based on frequency of contact with children, family and friends, social participation (groups, clubs, organizations, or religious services), marital status and living arrangements.<sup>3</sup>

On average, each participant responded to the survey 2.29 times, that corresponds to 5.58 years. To handle unequal length of trajectories the following steps were taken: (1) all trajectories were aligned to the first assessment completed by a person, regardless of year of completion; (2) values in between completed assessment were linearly interpolated; (3) values beyond last assessment were extrapolated with last known value. K-means algorithm was used to cluster trajectories of social isolation with K ranging from 3 to 10. Clusters were evaluated internally as well as using external variables not used to create them.



## Results

Figure 1 shows cluster centroids identified by k-means algorithm applied to temporal data. They indicate that for most people the social isolation score does not change, i.e., the largest clusters are formed around specific values of social isolation score that is constant over time. The trajectory depicted in Figure 1, highlighted in orange, demonstrates a notable increase, suggesting a reduction in the social isolation score within this cluster. That cluster is consistently present for all algorithm executions with different numbers of clusters. Components of social isolation score seem to change over time and there are differences in demographics (not used in clustering) of those in different clusters.

## Conclusion

This is the first study that applied machine learning, specifically k-means clustering, to uncover trajectories of social isolation in older adults. Social isolation is linked to adverse health outcomes, and for most people it stays constant or worsens over time. This work is intended to be the first step in a larger project that aims at identifying and predicting social isolation trajectories over time.

## References

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3. Pomeroy ML, Cudjoe TK, Cuellar AE, Ihara ES, Ornstein KA, Bollens-Lund E, Kotwal AA, Gimm GW. Association of Social Isolation With Hospitalization and Nursing Home Entry Among Community-Dwelling Older Adults. *JAMA internal medicine*. 2023 Sep 1;183(9):955-62.