# Superspreading k-cores at the center of COVID-19 pandemic persistence (how contact tracing works)

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The spread of COVID-19 caused by the recently discovered SARS-CoV-2 virus has become a worldwide problem with devastating consequences. To slow down the spread of the pandemic, mass quarantines have been implemented globally, provoking further social and economic disruptions. Here, we address this problem by implementing a large-scale contact tracing network analysis to find the optimal quarantine protocol to dismantle the chain of transmission of coronavirus with minimal disruptions to society. We track billions of anonymized GPS human mobility datapoints from a compilation of hundreds of mobile apps deployed in Latin America to monitor the evolution of the contact network of disease transmission before and after the confinements. As a consequence of the lockdowns, people's mobility across the region decreases by ~ 53%, which results in a drastic disintegration of the transmission network by ~ 90%. However, this disintegration did not halt the spreading of the disease. Our analysis indicates that superspreading k-core structures persist in the transmission network to prolong the pandemic. Once the k-cores are identified, the optimal strategy to break the chain of transmission is to quarantine a minimal number of 'weak links' with high betweenness centrality connecting the large k-cores. Our results demonstrate the effectiveness of an optimal tracing strategy to halt the pandemic. As countries race to build and deploy contact tracing apps, our results could turn into a valuable resource to help deploy protocols with minimized disruptions.