

Analysis And Research on The Influence of The Social Network on Public Opinion and The Transmission Path of The Epidemic

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Abstract. Social networks, a connection of social interactions and personal relationships by nodes, are becoming a vital part of the 21st century. Nearly all human beings have sorts of connections with social network, including but not limiting to personal relationships, electronic gadgets, as well as social media. However, human beings never thought about how important this social network has been to us. As an unprecedented COVID-19 wave hit the world in 2020, the roles of social networks never fail to elicit topics and highlights. Some claim that the social network creates negative impacts such as agony and rumors while others claim that it benefits our lives more than we actually thought. In this paper, my group and I investigate the relationship of social network and how it helps us to understand the COVID-19. To this end, we've gathered data and graphs showing the effect of COVID-19 and how social network mitigates the problem. Our findings indicate that social network brings both positive and negative impacts to our understanding of COVID-19. On the other hand, it helps us to understand the problem more, as well as the alleviation of such hazards. What's more, for different groups, classifying as different age groups as well as different job groups, social network has a variety of impacts on them either.

Keywords: Social network; covid; social groups; clusters.

1. Introduction

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by the virus SARS-CoV-2. The first known case was identified in Wuhan, China, in December 2019. The disease quickly spread worldwide, resulting in the COVID-19 pandemic around the world. Spreading from Wu Han, Covid has devastated China thoroughly. Actions such as quarantines, rapid Covid tests every 24 hours, QR codes that represent your status, and even tracking the location of residents. This outbreak of Covid not only devastates the residents in China physically, but more, mentally. Morale suffers, from depression, losing help, and fleeing to other places, all these bring down the GDP and economy of China exponentially. However, as a country that has strong media power, social networks have begun to play an important role in mitigating the Covid problem. From prehistoric ages to modern times, humans have undergone a seismic transformation in science and technology. The world has witnessed social networks soaring to the next level as humans are progressing to explore regions that lie outside their comfort zones. Social networks, a network of individuals connected by interpersonal relationships, are one of the greatest achievements and contributions of the 21st century. Even during the outbreak of COVID-19 that devastated the whole world, the social network still plays a major role in delivering necessary information, helping us to recognize Covid, as well as mitigating emotional problems.

2. The influence of the network on public opinion about the epidemic

Social networks helped people to a large extent in a positive way during the COVID-19 epidemic. The social networks of all three groups consisted mainly of (colleagues/classmates/best friends),

(social software). This allowed us not to be too disturbed during the epidemic. Especially when someone in a social network starts to feel negative emotions, people can quickly comfort and support them. Social networks have a lot to do with this, the way in which emotions are conveyed is largely the same, but the content of the emotions conveyed is very different, and this is reflected in the different age groups of people. I would categorize people into three groups, firstly, teenagers and children (4-25 years old), secondly, working people (25-55 years old) and finally, the elderly (55 years old and above).

However, these three groups have very different social circles and social networks, and the emotions conveyed on their behalf would be very different. Due to the wide age range of the categorized groups, the content of the emotions they convey will all be from their own perspectives reflecting the emotions conveyed by COVID-19 to specific groups.

First, there are the students, a group that has a basic understanding of the epidemic, which means that they may not be as sensitive to the concept of COVID-19 as those in other groups. When they first hear the term Covid-19. What they convey may be an emotion of worry, but once the outbreak happens to their classmates and friends around them, they will have a new perception of COVID-19. When they see their peers around them being pulled away by ambulances, when they don't see their classmates the next day, they will begin to convey an emotion of panic, of panic. At this point, they will begin to gradually understand how to maximize and effectively not be infected by COVID-19. The transmission of emotions between this group is very fast because they are a little closer to each other than the other two groups.

The next group is the working population, and the working population will have many ways of transmitting emotion. But the ultimate expression will always be anxiety. This is because in every sense the working person is the most important person in the family, the backbone of the family, and part of the business. They will always have to think about the whole (family), which includes the elderly, the children, and their own careers. They will be anxious whether their children will be infected and become COVID-19 patients. They also have to think about whether the elderly will be infected with COVID-19 and whether there will be a series of complications due to the decline of their body functions that may lead to life-threatening situations for the elderly. At the same time, they also have to think about what they should do if they are infected with COVID-19, whether they should stay at home or go to a hospital in a square cabin for effective quarantine. To summarize, there are so many factors that need to be considered by the working people. Not only their families but also their careers. Communication between employees can slow down during an epidemic, and the range of challenges that working remotely creates for them becomes a daily issue for the incumbents to deal with. The emotions they convey to each other will also be relatively less positive and will instead reflect negative emotions. The emotions conveyed must also be similar to anxiety, negativity, and helplessness. The working people have too many things to juggle, and this becomes one of the main reasons why they pass on negative emotions.

Finally, the elderly are the first group to show panic because they are aware of the new epidemic and because they experienced the SARS outbreak in 2003. They know very well that the worst consequence of this virus is death, so this negative sentiment will spread rapidly among the elderly. Moreover, the elderly's ability to filter false information is reduced, and their conception of the epidemic may be led to an extremely negative emotion by false information.

3. The role of networks over physical distances for COVID-19

In the country where COVID-19 was first discovered, the outbreak began in China during the Chinese New Year when there was a large movement of people. Novel coronavirus pneumonia is mostly spread by respiratory droplets and close contact [1]. Public transportation is recognized as a potential risk factor for the rapid global spread of infectious diseases [2]. The large number of people moving through airplanes, high-speed trains, and other means of transportation led to an increase in the number of nodes and links in the network, which provided the conditions for the rapid spread of

the virus. In order to reduce infection rates, governments have adopted policies such as travel restrictions and quarantines while taking full advantage of the network's features. Restrictions on travel can avoid new connections created by proximity as crowd nodes move, and quarantine policies can cut off existing edges to block airborne pathways for viruses. The immeasurable effect of travel restriction and isolation policies on reducing infection rates was demonstrated by quantifying the impact of isolation periods on the transmission of COVID-19 [3].

In addition to its role in physical isolation to control the rate of COVID-19 infection, the network plays a good predictive role in the number of infected persons and areas of infection. The graph convolutional network (GCN) model of a public transportation network represented by a graph composed of nodes and edges capturing the potential geographic movement of people is a powerful tool for the state to predict COVID-19. By analyzing changes in the daily number of newly diagnosed COVID-19 cases in 190 countries or regions over a 20-month period and the spatial relationship between airways, railways, and roads in regions or countries. The number of future COVID-19 cases on the eighth day is based on data from the previous 7 days corresponding to 190 regions or countries and the results proved to be broadly consistent with the real data [4]. The network has demonstrated its importance in predicting new crown infections, which advantageously promotes solutions for public health response to COVID-19 and helps public health policymakers make the right decisions in epidemic prevention and control.

During the period of COVID-19, all non-essential economic activities requiring physical interaction were suspended as governments enacted quarantine policies in response to the spread of the virus. However, the quarantine policy had a negative impact on the health of the population and the economy. Prolonged lockdowns weaken interpersonal connections and the increases in the prevalence of depression and domestic violence offenses have been linked to lockdowns [5]. To address this dilemma without increasing infection rates, separating and balancing two network intervention strategies that correspond to the network-based susceptible–exposed–infectious–recovered (SEIR) model has important implications. One study that the dividing groups (each population group is divided into two subgroups to reduce connections) and balancing groups (balance the number of group members across different groups within the same sector) strategies that can effectively control the rate of virus transmission while ensuring sustained economic development and maintaining social stability [6]. Dividing group strategy reduces the number of network ties and the variation of degree to control infection rates by weakening the link between potentially positive and negative patients. In the balancing group, after the size of the group in each sector is equalized, individuals in the network who with higher connectivity and greater contribution to the spread of communication lose a significant number of network connections. By divesting and dismantling the network with higher average clustering, the government can control the prevalence of COVID-19 while lifting the strict ban on quarantine.

4. Contact and dissemination between different groups

During the outbreak of NCV, social networks played an active role in the dissemination of information. This role cannot be ignored. One of the notable social media phenomena triggered by the COVID-19 pandemic is that online social networks on social media platforms serve as a powerful channel for disseminating negative COVID-19 information [1]. The main body and way of information dissemination are also different. The main groups can be divided into three major groups: students (teenagers aged 7 to 25), workers (middle-aged and young people aged 26 to 55), and retirees (middle-aged and elderly people aged 56 and above).

Due to these stringent measures, older adults were forced to self-isolate, and as a result, had to cut off their routine off-line social engagements (e.g., family visits, and outdoor social gatherings) [7], which seriously affects the health of the elderly.

The social circles and networks of the three groups are very different:

For students, their social network is mainly composed of classmates, teachers, and parents on campus, as well as various social software on the internet. Many colleges and universities implemented lockdown measures that involved quarantining students with negative nucleic acid test results on campus for the duration of the academic semester to maximize learning quality and minimize transmission risk[8]. Most of their information comes from relevant personnel and parents on campus. They will also learn about the symptoms, transmission routes, prevention, and epidemic situation of COVID-19 through observational learning and communication learning. For example, after understanding relevant policies, the majority of the population chooses to wear masks, wash their hands frequently, and maintain good social distancing to avoid infection. After a period of time, other members of the group observed the effectiveness of these actions, and based on strategic complements, the remaining members of the group would also be more inclined to engage in the same behavior. More importantly, on campus, prestigious groups such as teachers account for a relatively large proportion compared to other groups, and their words and information can be better disseminated. Therefore, the knowledge of COVID-19 transmission and coping strategies is the most important among students.

For workers, their social network is mainly composed of colleagues in the company, social friends, social software on the Internet, family, neighborhood, and so on. The extent to which people are embedded in a social network influences their information sharing. Information that most members of the network value are more likely to be shared and upon which people base their attitudes and behaviors. Meanwhile, people who strongly identify as members of a social network are more likely to take action to protect and serve network members' collective interests [9]. Most of their sources of information are colleagues, friends, and the Internet. They will also learn about COVID-19 through observational learning and communication learning. For example, some workers and companies advocate working from home during the pandemic to reduce offline contact. After social distancing becomes widely implemented and most people stay at home, the majority of new cases are expected to be from household transmission. One way to further reduce the epidemic is to bring all patients with confirmed COVID-19 to medical facilities to prevent the spread of infection at home [10], so most companies will choose to use this method to avoid unnecessary virus transmission and infection. So social networking is a great way to help people understand the COVID-19 epidemic.

For retirees, their social networks are more composed of neighbors, relatives, children, news, etc. Compared with the first two groups, they received much less information about the outbreak of COVID-19 from social networks. But they can also learn about the prevention of COVID-19 by observing learning and communicating with neighbors. However, in this situation, they have fewer sources of information and less up-to-date information, which increases their risk of infection and diagnosis. But there are also downsides to social networking. The transmission of NCV is mainly through droplets and contact. Too extensive and large a social network is also likely to increase the risk of infection.

For students, the intensity of a campus is very high, so if a person is infected, the virus is passed from person to person, and the epidemic will spread rapidly in the crowd. This also applies to workers. But retirees with simple social networks are less likely to be exposed to COVID-19. Therefore, social networks are particularly important for spreading information about COVID-19 knowledge and prevention.

5. Conclusion

Social networks are especially important for disseminating information about NCV knowledge and prevention. They spread the divergent information effectively and they draw the attention of numerous people into the real-life situation of the epidemic. What's more, network can help for reducing, as well as predicting the further Covid 19 cases around us, keeping sustainable development as well as information updated for us available. As we are in a more positive cycle, the emotions we derived can made us feel more determined and gave us a lot of support to ger through the arduous

period. Even if there are negative downsides such as rumors or creating panic, social network are a vital part during the Covid times. One may argue that social network is detrimental under Covid, bringing unexpected results such as the risk of infection, causing by both direct as well as indirect contacts from a larger social network group. One may also consider the questions such as rumors as well as negative or fake information. However, human beings differ from all the other species is because our ability to think and to reflect. One might question the point of investing centuries of focus into pursuing a disputation almost untestable by means. We have, through arguments and controversies, come across the consensus that the meaning of social network. As one of the most important breakthroughs in the 21st century, social network will only grow and becoming more and more of an indispensable part of our lives. Social network indicates more than a gadget for us, but of the responsibility to help us improving. The responsibility might come in joy or pain. Perhaps both, and perhaps neither. But without its presence what could otherwise define us as human.

Authors Contribution

All the authors contributed equally, and their names were listed in alphabetical order.

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