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Community Under Stress: Trust, Reciprocity, and Community Collective Efficacy During SARS Outbreak

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Abstract The study of epidemics is almost non-existent in sociological literature, even though such outbreaks can have detrimental effects on communities. The occurrence of SARS (Severe Acute Respiratory Syndrome) in 2003 provides a rare opportunity to understand the social functioning of a community during the outbreak of an epidemic. To evaluate the extensive social impact of such an outbreak, we focus on the effects of perceived collective efficacy. Specifically, we focus on how the collective efficacy of a community, measured by trust and reciprocal relations, is related to collective action in places where SARS occurred and those where SARS did not occur. The study is based on a unique data set, the 2003 Taiwan Social Image Survey, collected during the outbreak of SARS in Taiwan. Our findings show that community collective efficacy, measured by trust and reciprocity, is not associated with community collective action when an outbreak of an epidemic occurs.

Keywords Epidemic outbreak · Community efficacy · Response

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Introduction

The study of epidemics is almost non-existent in sociological literature, even though such outbreaks can have detrimental effects on a community. There have been world famous epidemics, such as the bubonic plague, usually known as the Black Death, which killed 1.5 of 4 million people in Europe in the Middle Ages. Similarly, the Great Influenza Pandemic, commonly called the Spanish Flu, occurred at the end of World War I and cost 20–40 million lives. Although we know that these epidemics disrupted social life during the outbreak and aftermath, we are not able to study the effects systematically as there are limited data still available.

The occurrence of SARS (Severe Acute Respiratory Syndrome) in 2003 provides a rare opportunity to understand the social functioning of a community during the outbreak of an epidemic. With the dangerous potential to erupt into a catastrophic epidemic, the outbreak of SARS shocked the world. SARS victims were found in various countries, including Canada, China, France, Hong Kong, Taiwan, and USA [1]. Between the outbreak of November 2002 to July 2003, 774 died and 8,098 probable cases were reported [49]. In places with higher death rates, the daily activities of residents were disrupted. People avoided meeting in public places, and preferred to stay at home.

To evaluate the extensive social impact of the outbreak of an epidemic, we focus on the effects of perceived collective efficacy on community action. Since the concept of collective efficacy was introduced recently by Sampson and his colleagues in studying community dynamics [26, 33–35], a fast growing body of literature has documented that the collective efficacy of a community is critical to its functioning, and is an important resource within a community [2, 8, 13, 39, 47]. A community with higher collective efficacy

brings people in the community together, and reflects the core and classic argument about community, that the whole is greater than the sum of its parts. Given its significant role in community functioning, in this study we analyze how the collective reaction to the epidemic outbreak is related to collective efficacy, measured by trust and reciprocity.

In the following sections, we outline the relationships of trust and reciprocity, collective efficacy, and collective action. We then discuss how the outbreak of an epidemic is related to collective efficacy, and in turn affects collective action. We develop a few hypotheses and test them against survey data collected during the 2003 SARS outbreak in Taiwan. The discussion is supplemented by qualitative information to provide a contextual understanding of the situation. In the final section, we discuss the implications of the findings for the social impact of the outbreak, and the ways in which collective efficacy, measured by trust and a sense of reciprocity, is related to the perception of collective community action. In this study, the proxy for community is the city or town where respondents reside. Through the discussion and findings, we demonstrate the importance of disentangling the relationship of perceived collective efficacy, measured by trust and reciprocity, during the epidemic outbreak.

Literature Review

Collective Action, Collective Efficacy, Trust, and Reciprocity

The concept of collective efficacy is largely derived from the Chicago School's ecological understanding of community. However, the concept reflects a strong communitarian tendency that goes beyond the traditional social ecological approach [34]. Collective efficacy, according to Sampson et al. [33], can be defined as "social cohesion among neighbors combined with their willingness to intervene on behalf of the common good". Collective efficacy is an "activated process that seeks to achieve an intended effect", thereby maintaining the common good of the community.

According to Sampson and his associates [35], collective efficacy rests in large part on mutual trust and shared expectations. Trust has been a major topic among social scientists, all of whom give the concept different emphases. In this study, we interpret trust as "rational expectations of the behavior of the trusted" [16]. Research has further suggested that there should be differentiation between personalized trust and generalized trust [15, 50]. In our discussion, we focus on generalized trust, as personalized trust usually refers to a relationship based on prior or subsequent relationships with another person, group, or organization [15]. Personalized trust usually relies on prior information about the actors, and there is an expectation of certain consequences. However, generalized trust goes beyond the social exchange between individual actors and is about trusting others in random situations or institutions without attachment to or knowledge of particular others [25]. Thus, generalized trust usually incorporates people not known personally. As Stolle [37] suggested, the boundaries of generalized trust include relationships beyond kinship, friendship, and acquaintance.

Although both levels of trust are important to community functioning, generalized trust (hereafter referred to as trust) is particularly important to collective efficacy [18]. Trust can develop through cooperative experiences among members of the community. Foley and Edwards [10] have argued that the social capital generated through trust enables a community to achieve and maintain its functions. More specifically, trust facilitates an environment in which members of the community can learn about and become socialized to attitudes, behaviors, and expectations held by the community [21]. This dynamic helps in developing social capital, which in turn strengthens the sense of collectivity. Collective action, such as community engagement and participation are likely to follow. As Putnam [29] states, "…the attendant norms and trust … enable participants to act together more effectively to pursue shared objectives" (pp. 665–666).

Trust also influences community members to follow and maintain the rules of the community. As Tyler and Blader [40] suggest, if there is trust, community members are more likely to act according to community rules, and the community is more likely to function effectively. This argument suggests that individuals with a higher level of trust are more ready to recognize the authority of the community and believe that the authority acts in their interest. Community collective efficacy is then more likely achieved and collective action is more likely followed [46].

Finally, trust can exert control in the community [3]. It facilitates a "regulatory process by which elements of a system are made more predictable through the establishment of standards in pursuit of some desired objective or state" [31]. According to Khodyakov [19], trust facilitates regulatory structures and recognition of common interests. Thus, trust increases interdependence among members of the community, which facilitates collective efficacy and leads to collective action.

Generalized reciprocity is another crucial element for facilitating community collective efficacy [34]. It is largely based on normative expectation and sometimes has moral implications. Generalized reciprocity is an exchange relationship that is less precise, has less monitoring, and is less contractual than interpersonal reciprocity. It is different from the analysis of exchange in a dyad relationship as discussed by Simmel or the exchange relationship in a

small group setting described by Emerson. According to Sahlins [32], drawing from the classic work of Mauss on reciprocity, generalized reciprocity is characterized by a relationship in which detailed accounts are not kept and the individuals are not specified. The relationship continues because it is expected that the exchange will be balanced in the long run.

In generalized reciprocal relations (hereafter referred to as reciprocal relations), community members decide with whom they will exchange and the terms of exchange that are acceptable in the relationship over time [35]. Though the relationship is motivated by individual interests, there are usually strong informal sanction mechanisms, including the use of emotions [20] to reinforce the reciprocal relations [9].

Reciprocity is important to the continuance of community collective efficacy [3]. A strong reciprocal expectation implies that a long-term relationship is possible. Experimental studies have shown that reciprocity and repeated games reinforce each other [12]. In other words, reciprocity facilitates repeated interactions among members in the community and creates commitment to certain types of behavior in the future. These patterns make it easy to sustain the pursuit of common good over time.

A reciprocal relationship produces norms that enhance individuals to pursue the common good. Thus, reciprocity binds relationships even when information about other parties is incomplete or unavailable. Luhmann [24] describes this behavior as "overdrawing" from the information. It creates a social situation that makes community collective action possible.

Community During Epidemic Outbreak

Although there has been limited research into social relations when a community experiences an epidemic, there are studies showing how social relations are affected when a community is under stress. In the following discussion, we draw from this literature to explore how perceived collective efficacy, trust and reciprocity are related when a community experiences an epidemic.

Several early Chicago sociologists, drawing from the ecological theoretical framework, discussed how stress on a community could disrupt relationships. In his classic essay, "Community Organization and Juvenile Delinquency," Park [27] argued that the "habits" of a community will collapse as the community experiences stress and undergoes change. To further develop this idea, Shaw and McKay [36] argued that when a community is under stress, there is more likely to be a breakdown in the social relations and organizational structures upon which the community relies. Although later studies have focused on how economic deprivation or rapid mobility affects crime rates in a community, the original argument of the social

disorganization theory has strong implications for understanding how social relations and social lives in general are affected when a community is under stress. As Park [27] stated, a change or stress in the community "that brings any measurable alteration in the routine of social life tends to break up habits; and in breaking up the habits upon which the existing social organization rests, destroys that organization itself." (p.107) Although the argument offers insights to understanding a community under stress, it is unclear how the "social habits" break up.

Hechter's study [17] of group behavior fills in the theoretical gap and provides an explanation. He suggested that the weakening of informal control would lead to a decline in compliance with group objectives. In the context of our discussion, his argument implies that when a community is under stress, the informal control of social relations, such as trust and reciprocity, will be weakened. In turn, these elements of social relations will be decoupled when there is an outbreak of an epidemic in a community. In addition, later studies on issues related to "free riders" in groups showed that while institutions play an important role in reducing non-cooperative relationships by imposing heavy penalties on free riders, this control mechanism collapses when institutional arrangements weaken in a situation of vulnerability [28]. Although individuals may maintain trust and reciprocal relationships with selected others, they do not necessarily contribute to the community when they see the increase in free riders, because individuals are less likely to contribute to a group when they do not expect returns.

The decoupling of collective efficacy from the perception of community action is further reinforced by the nature of epidemics. In Coleman's terminology, the situation is a second-order public good problem [7]. It is not only about taking advantage by not contributing to the public good, it is also that the benefit to the individuals who contribute to the collective efficacy is not sufficient to overcome the potentially high cost of helping out (i.e., contracting SARS).

The suggested decoupling of trust and reciprocity from the perception of community action during an epidemic is a fact not observed in studies of natural disaster. For example, Klineberg's study (2002) of the Chicago heat wave in 1995 showed that the growing mistrust and reduced expectation of reciprocity are positively related to the breakdown of the community action. Similarly, Erickson (1976) found that individuals' trust in community institutions is related to whether their community experienced disaster. Thus there was an effect on their contribution to the collective good. The differences between a natural disaster and an epidemic in relation to trust and reciprocity lie in the contagious nature of epidemics. Given the possibility of being infected by the disease, individuals

hesitate to contribute to the public good even though trust and reciprocity may still be found among individuals.

Therefore, we hypothesize that

1. Community action is positively related to levels of collective efficacy, measured by trust and reciprocity;
2. Community action less likely occurs among communities with an outbreak of epidemic;
3. Levels of collective efficacy, measure by trust and reciprocity, are not associated with community action when the community is under stress.

Data and Methods

This study of the social effects of SARS in Taiwan is based on a unique data set, the 2003 Taiwan Social Image Survey (TSIS), collected during the outbreak of SARS. TSIS began in 1990 and four surveys are administered each year to gauge the perception, attitudes, value, and subjective well-being of the people of the societies, Following the general procedure of telephone survey, a representative sample of population in Taiwan were generated from the last two digits of the telephone numbers from a file of telephone numbers[1] compiled by the telephone company in Taiwan. The interviews were conducted through a Computer Assisted Telephone Interview (CATI) system housed at the Center for Survey Research, Academia Sinica.

The survey employed in this study was taken from the May cycle of the TSIS in 2003. The interviews were administered between May 27 and May 30, 2003. The average length of each interview was about half an hour. To put this information in context, the first case of SARS in Taiwan was reported on March 14, 2003; there were 676 cases reported by the end of May [11]; and the last case was reported on June 15, 2003 (WHO 2003). The survey was conducted during the peak of the SARS outbreak.

Our data include respondents from age 18 to age 80. There were demographic questions, and respondents were asked about their knowledge of SARS, their sources of information, the causes of the SARS outbreak, preventive behavior, their level of confidence in the competency of various types of agents and agencies, and the impact of the SARS outbreak on their personal life, on society and on the economy. Despite the richness of the information gathered during the epidemic, our study focuses on how the social and demographic backgrounds of individuals and their views on trust and reciprocal relations are related to the community collective efficacy.

Data related to the central concerns of this paper are derived from four questions. We used two questions to measure the perception of collective community action. Community refers to the city where the respondents reside. The first question was the respondent's perception of whether most people carried out collective preventive preparation according to suggested guidelines. It addressed the collective measures set up to prevent further spread of the epidemic. The government launched extensive a nation-wide campaign, strongly advocated that this collective effort was necessary to combat SARS and to contribute to the benefit of the community during the crisis. Individual action was framed in the public discussion as a collective effort to achieve the public good.

The second question was the respondent's perception of whether the community took good care of SARS patients and individuals who were quarantined ("Caring for" in Chinese includes physical, social, and emotional aspects).[2] During the period between March and April, over 130,000 individuals were quarantined who had had close contact with SARS patients or with travelers from infected areas. The quarantined individuals came from most of the cities in Taiwan. The question considers whether individuals respect the welfare of all members even at a high cost. While the first question relates to collective prevention that ensures the situation will not get worse, the second question addresses the collective effort of taking care of those already in need. Taken together, the two questions incorporate two important aspects of perceived community action.

We used two indicators, trust and reciprocity, to represent collective efficacy. To measure trust, we asked the respondents whether people in general could be trusted in dealing with the SARS issue. The answers were coded in a four-point Likert scale. The question is consistent with the question on trust asked in the General Social Survey used by most studies on trust [30]. The second indicator of collector efficacy, reciprocity, was measured by a question that asked whether people in the community help one

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[1] Cell phone numbers and the telephone numbers of government administrations were not included.

[2] Though the question did not specifically include the phrase "in your community," there are reasons to believe that respondents were referring to their local community when answering. First, it was asked in the context of other questions that included the local community. Two questions earlier asked about their experience related to a SARS outbreak in their immediate social circle. It would be quite natural for respondents to assume that the next few questions also referred to their local community, even though the phrase "in your local community" was not included. It would seem redundant to repeat the phrase in every question in the segment. Second, the questions asked for their views of events that they experienced in their everyday lives. It would be natural for them to relate to events within their own community rather than experiences elsewhere. Nevertheless, we will interpret the results with caution.

Table 1 Descriptive statistics of the variables included in the analysis

	Cities SARS occurred		
	Yes	No	Total
Age			
Mean	42.92	44.03	43.82
N	324	1,360	1,684
Gender*			
Female	56.25	46.48	48.38
Male	43.75	53.52	51.62
N	336	1,394	1,730
Education*			
Less than elementary	4.19	6.05	5.69
Completed elementary	6.29	14.77	13.12
Completed junior high	8.38	14.63	13.41
Completed senior high	31.14	33.36	32.93
Completed junior college	19.76	14.63	15.62
Completed university	30.24	16.57	19.22
N	334	1,388	1,722
Family income*			
Less than NT20,000	5.67	11.14	10.08
NT20,000–NT49,999	22.99	30.55	29.08
NT50,000–NT99,999	46.57	40.76	41.89
NT100,000–NT150,000	12.54	8.63	9.39
More than NT150,000	12.24	8.91	9.56
N	335	1,391	1,726
Marital status*			
Married/Cohabiting	71.26	74.8	74.11
Single	22.75	19.65	20.26
Widowed	3.89	3.53	3.6
Divorced	2.1	2.02	2.03
N	334	1,389	1,723
Carried out collective preventive preparation according to suggested guidelines*			
All followed	6.85	8.18	7.92
Most followed	59.8	53.3	54.57
Some followed	14.58	12.34	12.77
Few followed	3.57	3.8	5.76
Not familiar the guidelines	15.18	22.38	20.98
N	336	1,390	1,726
Perception of Whether the community took good care of SARS patients and individuals who were quarantined*			
Very adequate	4.17	8.06	7.30
Adequate	25.3	26.98	26.65
Inadequate	42.26	37.05	38.06
Completely inadequate	18.75	15.4	16.05
Don't Know	9.52	12.52	11.94
N	336	1,390	1,726
Trust level*			
Very high	8.63	11.42	10.88
High	38.39	31.97	33.22

Table 1 continued

	Cities SARS occurred		
	Yes	No	Total
Not high	32.14	30.03	30.44
Not high at all	13.99	16.88	16.32
Don't know	6.85	9.7	9.14
N	336	1,392	1,728
People in the community help one another*			
Always	12.8	15.01	14.58
Depends on occasion	58.33	54.74	55.44
No	27.68	26.08	26.39
Don't know	1.19	4.17	3.59
N	336	1,392	1,728

Taipei and Kaohsiung were cities where SARS cases were found

* Significant at 0.05 level

another. The answers were coded in a three-point Likert scale.

It is important to highlight that our data set is cross-sectional. Therefore, our analysis cannot address how the SARS outbreak affected the level of collective efficacy. However, the data can demonstrate how the levels of collective efficacy are related to the perception of collective efforts among respondents living in cities where SARS occurred and in cities where SARS did not occur. Our interpretation must be cautious.

To control for the possible effects of the socio-demographic background of respondents, we included their marital status, educational level, and income level. Marital status was coded as "0" for respondents who were married or cohabiting, "1" for those who were single, "2" for widowed, and "3" for divorced. Education is an ordinal variable. To reflect the educational level in Taiwan, categories include "less than elementary," "the completion of elementary school (6 years)," "the completion of junior high (9 years)," "the completion of senior high school (12 years)." "the completion of junior college (14 years)," and "the completion of university (16 years or more)." Compulsory education in Taiwan is 9 years of schooling, including 6 years at the elementary level and 3 years at the junior high level. Family income is an ordinal variable ranging from "more than NT150,000," "NT100,000–NT150,000," "NT50,000–NT99,999," "NT20,000–NT49,999," and "less than NT$20,000."

The descriptive information of the variable presented in the first table and the latter part of the analysis is to explore the relationship of collective efficacy and perceived community action when community under stress. Therefore, we ran separate analyses for Taipei and Kaohsiung, two major metropolitan cities in Taiwan and where all SARS cases
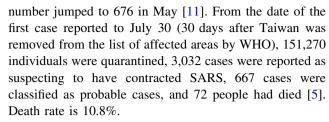
located, and for respondents who were not from Taipei or Kaoshiung.

SARS Outbreak in Taiwan

Before we present results of the statistical analysis, we offer a chronological summary of the SARS outbreak in Taiwan, to provide a context to understand the statistical findings. In our discussion, we focus on the ways in which social relations (trust and sense of reciprocity) were affected during the period.

The first case of severe acute respiratory syndrome (SARS) was reported in November 2002 in a city in southern China. By May 2003, cases were reported in 32 countries and regions [6]. Thousands of people (close to 2,700) were infected and 446 died (including Taiwan, China, Hong Kong, and Canada only).[3]

Taiwan is in close proximity to Hong Kong and China's Guangdong Province, which were considered the centres of SARS cases reported during the period of the outbreak. The SARS outbreak in Taiwan began with a businessman who travelled to Guangdong Province and returned to Taipei through Hong Kong on February 21, 2003 [5]. He was hospitalized on March 8. His wife and son also developed SARS-like symptoms. All cases were confirmed as SARS after various medical tests, including RT–PCR, on March 14. From March 14 to April 19, about 51 individuals were identified as probable cases.[4] SARS spread rapidly at the end of April. 78 cases were reported in April and the

number jumped to 676 in May [11]. From the date of the first case reported to July 30 (30 days after Taiwan was removed from the list of affected areas by WHO), 151,270 individuals were quarantined, 3,032 cases were reported as suspecting to have contracted SARS, 667 cases were classified as probable cases, and 72 people had died [5]. Death rate is 10.8%.

After the first case was reported on March 14, the Department of Health immediately began a series of responses to the potential spread of the deadly disease, including rapid review of each reported case within 3 days. All suspected cases were reported immediately to the Department of Health, and all health institutions were sent N-95 masks for protective purposes [5]. Arrangements were made for individuals with suspected symptoms to reside in isolated rooms with HEPA filtered air [5]. At the same time, local public health officials were responsible for ensuring adequate quarantine of all individuals with whom the patients had had recent contact. These contacts were quarantined because the virus seemed to be most active approximately 10 days after the onset of symptoms. Quarantine was first required for 14 days. It was revised to 10 days after June 10, as health officials had better understanding of the incubation period for SARS [5].

The number of SARS cases jumped rapidly at the end of April with two peak periods between April 20 and May 27. Despite the implementation of precautionary measures, the high number of SARS cases reported in this period was largely the result of severe infection within hospitals. Because an infected laundry worker continued to work in one of the hospitals for 6 days before being diagnosed with SARS, about 10,000 patients and visitors were exposed to the disease according to one estimate [5]. On April 24, all patients, staff, and visitors in the hospital were quarantined. Some SARS patients were transferred to other hospitals. Later, SARS spread to other hospitals and other cities. Most of the probable SARS cases and deaths were concentrated in Taipei City during the first peak period. During the worst period, in late April, the epidemic was so severe in two hospitals in Taipei that they had to shut down. The second peak occurred as the epidemic spread from Northern to Southern Taiwan by an infected female who was returning to her home in the South due to fever. Cases were found in a major teaching hospital in the South.

Without doubt, the outbreak shook the foundations of established institutional arrangements and routine social relations. People avoided meeting in public areas and taking public transportation. According to a survey conducted during the same period, about 33% of respondents no longer took public transportation but drove their own vehicles, about 33% reduced the frequency of taking their children outside, and about 30% reduced the frequency of visiting relatives. In particular, close to 50% of respondents

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[3] According to a report from the World Health Organization, SARS is a disease caused by SARS coronavirus (SARS-CoV). It has an incubation period of about 5–10 days. In the first week, patients develop influenza-like symptoms, such as fever and headache, although these symptoms are sometimes absent. Coughing, dyspnoea and diarrhoea usually develop in the second week. The severity of these symptoms progressed rapidly. About 20% of patients required intensive care by the second week. The clinical records indicate that transmission of the disease usually occurred in the second week. Drawing from the data gathered around the world, the fatality rate (number of deaths divided by total number of infected cases) ranged from 0% to 50% depending on the age of the patient. In Taiwan, the fatality rate rose from 3.8% in April to 45% in mid-May [11].

[4] According to WHO Guidelines [48]. "WHO Guidelines for the Global Surveillance of Severe Respiratory Syndrome (SARS): Updated Recommendations October 2004."), probable cases of SARS are "an individual with clinical evidence of SARS epidemiologically linked to 'preliminary positive' or 'confirmed' cases of SARS or 'unverifiable' cases of SARS if epidemiologically linked to 'preliminary positive' or 'confirmed' cases" [48] Clinical evidence includes the symptoms of a history of fever of at least 38C and "one or more symptoms of lower respiratory tract illness" (such as coughing or shortness of breath) and "radiographic evidence of lung infiltrates consistent with pneumonia or ARDS, or autopsy findings consistent with the pathology of pneumonia or ARDS without an identifiable cause," and "no alternative diagnosis can fully explain the illness" [48].

reduced the frequency of participating in gatherings with friends [22]. Some daily routines, such as going to school or work, were seriously affected. Classes at the universities were cancelled because suspected cases were identified among students or university personnel [41].It is not surprising that many businesses suffered because of this reduction in social contacts. According to the same survey, about 40% of respondents reduced their visits to restaurants, and 30% reduced their visits to department stores.

The reduction in social activities was largely a reflection of changes in social relations. Public fear and anxiety intensified. People wore masks all the time outside the home, in the classroom and at work [42]. Many students were absent from high school because parents kept their children at home [43]. Public trust and willingness to maintain reciprocal relations dropped to the lowest level in 13 years [38].[5] The situation affected trust in others and in institutions, particularly those that were health-related. Two telephone surveys conducted during this period consistently showed that over fifty percent of the respondents did not trust other individuals or health institutions [4]. A substantial proportion also showed a lack of trust in government officials, medical experts, and healthcare workers [4]. This response indicated that the lack of knowledge about SARS at the beginning of the outbreak created an environment of mistrust in the community. A survey documented that about one-third of the public did not believe that quarantined individuals had complied with the quarantine orders [4]. Taken together, trust and reciprocity towards individuals and other members of the community cracked during the outbreak. Under these circumstances, it was not surprising that individuals were living in a state of fear and anxiety.

The effect of the outbreak was more prominent in cities where SARS occurred. A study has documented that in Taipei, where there was a serious SARS outbreak, 23.5% of individuals drove rather than taking public transportation [23]. Only about 16.7% of individuals in counties outside Taipei did the same. Similarly, 36.8% of respondents in Taipei claimed they visited fewer relatives, and 57.8% visited fewer friends, compared to only 27% and 46.5%, respectively, in counties outside Taipei. It is obvious that individuals living in areas where SARS occurred felt more under stress than did those living in areas where SARS did not occur.

Although it was not a systematic analysis, a crude survey of anecdotal stories that appeared in daily newspapers during the period vividly described the fear and anxiety of the residents. People with fever were reluctant to identify their problems to others, because they were afraid of

isolation and refusal of service. They worried that the daily life of their entire family would be affected at work and at school. People avoided approaching or providing help to people who coughed and/or had fever. In addition, numerous incidents were reported of panic buying, especially surgical/N95 masks (the mask recommended for use during the outbreak) in different parts of Taipei and Kaohsiung. In an extreme example, a county mayor blocked a highway exit to prevent the transfer of infected patients to the hospital located in his county.

Public discussion also showed the breakdown of reciprocal expectation. Healthcare workers and their family members, especially those who worked in hospitals where SARS cases were reported, were considered a high risk group and dangerous to the safety of the community. Assistance rendered to healthcare workers and others in the affected hospitals, such as preparing meal boxes and shopping for them, was provided not from altruistic motives, but to ensure that they did not leave the hospitals or visit any public area. Most individuals were acting out of panic and self-protection.

The mistrust and breakdown of reciprocal relations even spread among medical professionals. Ambulances were asked to transport incoming patients with fever to other hospitals without prior notice, so as to minimize the likelihood of refusal. Patients who were transferred to different hospitals were labeled as "human balls," suggesting that they were transferred reluctantly from one party to another by the health workers. Hospital administrators had to be discreet about the admission of individuals with fever for fear that other patients would leave the institution once they learnt of the admission. Since hospital administrators no longer expected their healthcare workers to provide professional services based on reciprocal support, various precautionary measures were developed that greatly affected the provision of care to other patients. For example, large numbers of officials from the public health department were assigned to ensure that thousands of quarantined individuals stayed home [44]. Individuals with related symptoms went through additional testing procedures. These required procedures increased the already enormous workload of laboratories and X-ray departments in hospitals, and related personnel were under tremendous stress [45]. As mistrust grew and reciprocal support broke down within health care settings, the collapse of trust and reciprocal support further diffused to all walks of life in the community.

Compounding the situation, the media constantly reported new cases and developments throughout each day. Newspapers devoted major coverage to the outbreak every day. Their audience and readers, even those not living in affected areas, could feel the seriousness of the problem as the media provided medical reports of symptoms and told

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[5] The data on the trend of maintaining the reciprocal relationship is available upon request.

stories of the spread of cases, the disruption of daily routines (such as cancelling classes in high schools and universities), the fear in the community, and the traumatic experiences of the victims' families. As they watched the same images and heard the same statements on television, and read the same stories in newspapers, people in unaffected areas developed the same attitude towards others as did people in areas that were affected by SARS.

Descriptive Statistics by Cities Under Epidemic Outbreak

To begin our analysis, we report the collective efficacy level, measured by trust and reciprocity, and the sociodemographic characteristics of the respondents. In Table 1, we divide our sample into those who resided in cities where SARS occurred and those in cities without cases of SARS. Cities where SARS occurred included the two largest cities in Taiwan, Taipei and Kaohsiung. We presented statistics to compare whether there were different patterns for respondents in Taipei and Kaohsiung and for respondents in other cities. A T test was used when means were presented, and a chi square test was used for categorical variables.

By and large, as shown in Table 1, a considerable proportion of residents in all cities reported that most people carried out the collective preventive preparation according to suggested guidelines (62%), but a far less proportion of residents reported that the community took good care of SARS patients and individuals who were quarantined (34%). Nonetheless, different response patterns were noted. About 66% of respondents in cities where SARS occurred suggested that all or most people carried out the collective preventive preparation according to suggested guidelines, and 29% considered that the community took adequate care of SARS patients and individuals who were quarantined. In cities where SARS did not occur, the responses were 61% and 35%, respectively.

A close look at the results shows that, despite the government and local media aggressively promoting the importance of following the prevention guidelines throughout Taiwan, there are still substantial differences between respondents in cities where SARS occurred and respondents in cities where it did not occur in reporting whether or not most people carried out the collective preventive preparation according to suggested guidelines. Respondents in cities where SARS occurred had a more favorable view of the collective preventive preparation. Only 15% of respondents from SARS cities answered, "not familiar the guidelines" to the question regarding compliance with guidelines compared to 22% in non-SARS cities. Despite intense promotion of guidelines that would help to prevent the spread of SARS, respondents living in cities

without SARS did not pay much attention. Those cities clearly showed a lower level of collective action.

In responses to the question of whether or not the community took good care of SARS patients and quarantined individuals (those who were asked to stay at home or in their room at home during the quarantine period), there is also a statistically significant difference between the opinions of respondents from cities where SARS occurred and those where it did not occur.

In terms of trust and reciprocity, a larger proportion of respondents living in cities where SARS did not occur maintained a high level of trust during this difficult time, and a larger proportion expressed a higher sense of reciprocity. 47 of respondents in SARS cities and 43 in non-SARS cities considered the communities in which they resided to have a high level of trust, while 71% and 70% to have a sense of reciprocity respectively.

Table 1 also reports the socioeconomic characteristics of respondents, which largely reflect the general sociodemographic characteristics of the Taiwan population. Close to 74% of the respondents were married or cohabiting, and over 20% were single. About 68% of the sample had completed senior high school. About 39% had a monthly income of less than NT$50,000.[6] The sociodemographic characteristics of respondents residing in two major cities where SARS cases were reported, Taipei and Kaohsiung, were quite different from those in other cities. The differences reflect the fact that these two cities are the major financial and industrial centers of northern and southern Taiwan, attracting a younger population with higher levels of education and income, which are reflected in a higher living standard. The higher socioeconomic status of the residents in Taipei and Kaohsiung may explain the finding that there was a relatively high level of perceived community action in the two cities. Perhaps residents with greater socioeconomic resources, especially education, are able to maintain some kind of community action despite a stressful situation.

Multivariate Analysis

To address the connection of collective efficacy, measured by trust and reciprocity, to community action, we ran a set of models reported in Table 2. The dependent variable of the first set of analysis is the respondent's perception of whether or not most people carried out the collective preventive preparation according to suggested guidelines. Since the variable is an ordinal variable, ordered logit regression was performed. We tested for over-dispersion as

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[6] One US dollar can be exchanged for 31 New Taiwan dollars (NT$ hereafter). Income per capita was US$12,200 in 2000, and household income was US$37,000.

Table 2 Effects of collective efficacy on perceived collective preventive preparation controlling other factors

	Model 1	Model 2	Model 3	Model 4
Trust level: very high	0.965**		0.923**	0.858**
Trust level: high	0.483**		0.443**	0.426**
Trust level: not high	0.407**		0.390**	0.374**
Trust level: not high as all	rc		rc	rc
Reciprocity level: always		0.287**	0.206**	0.209*
Reciprocity level: depends on occasion		0.320**	0.227**	0.159**
Reciprocity level: no		rc	rc	rc
Female				−0.073
Age				0.004
Marital status: single				0.104
Marital status: widowed				−0.017
Marital status: divorced				0.34
Marital status: married/cohabiting				rc
Education: completed university				0.26
Education: completed junior college				0.226
Education: completed senior high				0.338
Education: completed elementary				0.414
Education: less than elementary				0.372
Education: completed junior high				rc
Family income: more than NT150,000				−0.452*
Family income: NT100,000–NT150,000				−0.260
Family income: NT50,000–NT99,999				−0.145
Family income: NT20,000–NT49,999				−0.100
Family income: less than NT20,000				rc
Intercept 1	−1.198**	−1.404**	−1.060**	−0.811
Intercept 2	−0.289**	−0.488**	−0.152	0.091
Intercept 3	1.709**	1.502**	1.847**	2.100**
Log likelihood	−1066.1	−1086.5	−1061.6	−1049.300
N	1,189	1,189	1,189	1,189

* Significant at 5%; ** significant at 1%; *rc* reference category

well as conducting likelihood ratio tests, and found the data to be over-dispersed for almost all models. The first model includes only independent variables that capture the level of trust. The second model includes independent variables to measure the sense of reciprocal relations among respondents. The third model taps the trust level and the reciprocity level. Finally, the last model controls for the socioeconomic background of respondents. Cases in which any of the variables under study were missing were excluded from the analyses. Consequently, the total sample for analysis is 1,189.[7]

The first model shows that all levels of trust are positively associated with higher perceived preventive preparation. The association is stronger for higher levels of trust. The results clearly suggest that a higher trust level is related to a higher level of perceived community preventive preparation. The second model includes only the level of reciprocity. Results show a positive and significant relationship between level of reciprocity and perception of collective preventive measures. The results remain the same when both variables are included in Model 3.[8]

The final model controls for the socioeconomic background of respondents. The results show that there is still a consistently positive relationship between the levels of trust and reciprocity and the level of perceived community collective preventive preparation. Most of the socioeconomic characteristics of respondents are not related to the level of perceived community preventive preparation. In other words, the perception of community preventive preparation is not affected by socioeconomic background, but it is affected by the collective efficacy, measured by levels of trust and reciprocity.

[7] We also ran models with different contrasts of the variables. They are available upon request.

[8] The variance inflation factors of trust and reciprocity are below 7. The results suggest that multicollinearity should not be concerned between the two variables in the model.

Table 3 Effects of collective efficacy on taking care SARS patients and individuals who were quarantined controlling other factors

	Model 1	Model 2	Model 3	Model 4
Trust level: very high	0.798**		0.714**	0.547**
Trust level: high	0.609**		0.555**	0.536**
Trust level: not high	0.384**		0.358**	0.335**
Trust level: not high as all	rc		rc	rc
Reciprocity level: always		0.613**	0.499**	0.400**
Reciprocity level: depends on occasion		0.272**	0.202*	0.185 *
Reciprocity level: no		rc	rc	rc
Female				−0.084
Age				0.005
Marital status: single				0.095
Marital status: widowed				0.084
Marital status: divorced				−0.057
Marital status: married/cohabiting				rc
Education: completed university				−0.461
Education: completed junior college				−0.465
Education: completed senior high				−0.347
Education: completed elementary				0.007
Education: less than elementary				0.110
Education: completed junior high				rc
Family income: more than NT150,000				−0.158
Family income: NT100,000–NT150,000				−0.262*
Family income: NT50,000–NT99,999				−0.307*
Family income: NT20,000–NT49,999				−0.141
Family income: less than NT20,000				rc
Intercept 1	−0.367**	−0.557**	−0.220**	−0.610
Intercept 2	0.774**	0.575**	0.925**	0.548
Intercept 3	1.838**	1.648**	1.991**	1.637**
Log likelihood	−1420.4	−1434.7	−1407.4	−1363.8
N	1,189	1,189	1,189	1,189

* Significant at 5%;
** significant at 1%;
rc reference category

To further explore the relationship of collective efficacy, measured by trust and reciprocal relations, to perceived community collective action, we use another dependent variable, perception of adequate care for SARS victims and individuals who were quarantined. The setup of the analysis remains the same.

Similarly, the results of this set of analyses reported in Table 3 show that stronger levels of trust and reciprocity, indicating higher levels of collective efficacy, are associated with greater satisfaction regarding the care of SARS victims. As in the previous set of analyses, the relationship is maintained even when socioeconomic factors are controlled.

Community With and Without Stress

The foregoing results provide clear and consistent support for the hypothesis that there is a significant and positive relationship between (a) level of trust and perceived community action, and (b) reciprocity and perceived community action. In the following section, we examine this relationship when a community is under stress.

For this set of analyses, we ran the same set of models with only the respondents from Taipei and Kaohsiung, two cities where SARS occurred shown in Table 4. For the first set of analyses, as in the previous analysis, the dependent variable is the individual's perception of whether or not people carried out the collective preventive preparation according to suggested guidelines. The results show that trust levels are not related significantly to the perception of preventive preparation. A similarly insignificant relationship is found between sense of reciprocity and perception of preventive preparation. These relationships remain insignificant even when socioeconomic factors are controlled. The analysis of trust level and sense of reciprocity with perception of whether the community took good care of SARS patients and individuals who were quarantined shows similar results, except reciprocity level becomes

Table 4 Effects of collective efficacy on perceived preventive preparation and taking care SARS patients and individuals who were quarantined in cities with SARS occurred controlling other factors

	Perceived preventive preparation				Taking care SARS patients and individuals who were quarantined			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Trust level: very high	0.541		0.491	0.467	0.366		0.315	0.211
Trust level: high	0.553*		0.509*	0.427	0.501*	0.452*		0.363
Trust level: not high	0.270		0.263	0.254	0.062		0.057	0.019
Trust level: not high as all	rc		rc	rc	rc		rc	rc
Reciprocity level: always		0.335	0.280	0.231	0.341*	0.294		0.393*
Reciprocity level: depends on		0.377	0.287	0.210	0.557*	0.443		0.547*
Reciprocity level: no			rc	rc		rc	rc	rc
Female				−0.195				−0.062
Age				0.006				0.005
Marital status: single				−0.004				0.046
Marital status: widowed				−0.217				0.040
Marital status: divorced				0.099				−0.424
Marital status: married/cohabiting				rc				rc
Education: completed university				1.353*				0.148
Education: completed junior college				1.000				−0.186
Education: completed senior high				1.295*				0.133
Education: completed elementary				0.910				0.606
Education: less than elementary				1.919*				0.614
Education: completed junior high				rc				rc
Family income: more than NT150,000				−1.022*				0.349
Family income: NT100,000–NT150,000				−0.715				−0.244
Family income: NT50,000–NT99,999				−0.535				0.161
Family income: NT20,000–NT49,999				−0.574				0.252
Family income: less than NT20,000				rc				rc
Intercept 1	−1.32**	−1.435**	−1.135**	−0.487	−0.465**	−0.440**	−0.256	0.170
Intercept 2	−0.325	−0.437**	−0.140	0.514	0.710**	0.725**	0.923**	1.369
Intercept 3	1.775**	1.661**	1.960**	2.639**	2.000**	2.025**	2.212**	2.659**
Log likelihood	−215.0	−216.5	−213.6	−202.6	−283.4	−286	−280.9	−268.8
N	248	248	248	248	248	248	248	248

* Significant at 5%; ** significant at 1%; *rc* reference category

significant when socioeconomic resources are taken into consideration.[9]

In short, the results show that collective efficacy, measured by trust and reciprocity, is not significantly related to any indicator of collective community action when the community is experiencing the outbreak of an epidemic.

The final set of analyses shown in Table 5 includes only respondents who are not from Taipei or Kaoshiung. The results in general show that levels of trust and sense of

reciprocity are positively related to perception of community action.

Conclusion

Despite the drastic impact of the outbreak of an epidemic on the social functioning of a community, few studies have analyzed the impact systematically. One obvious reason is the lack of available data. In this study, we employed a unique data set collected during the SARS outbreak in Taiwan in 2003 to understand how community collective efficacy, measured by two indicators: trust and reciprocity, are related to perceived community action, and we

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[9] We ran models that include all cases with a variable to indicate whether the city experienced a SARS outbreak. The findings are similar to the models reported in the paper.

explored these relationships further when the community was under stress.

There is weak support for Hypothesis 2 in our findings. Despite statistically significant differences in responses, closer look of the data shows that a considerable proportion of residents perceived that the community maintained a high level of community action, both in cities that experienced the outbreak of SARS and in cities that did not. One possible reason is that the widespread news coverage of SARS on the island. As most people obtained information from the same sources, their views of the perceived collective efficiency were similar regardless of whether they were living in cities where SARS occurred or not. This study has hinted at the important role of media in affecting the general public's perception of community action.

The findings show differences in the relationship between the levels of trust and sense of reciprocity and the level of perceived community action in cities that experienced the outbreak of SARS and those that did not. In cities where there was no SARS outbreak, trust and sense of reciprocity are positively related to perceived community action taken, as suggested by Hypotheses 1. However, as suggested in Hypothesis 3, the relationships are not significant in cities that experienced the outbreak. A possible explanation of the high level of community action in cities that experienced outbreaks and those that did not is that, while trust and reciprocity do not relate to perceived collective action in cities with SARS, different elements of social relations, such as avoidance or self-protection, rather than trust and reciprocity, contributed to the community

Table 5 Effects of collective efficacy on perceived preventive preparation and taking care SARS patients and individuals who were quarantined in cities without SARS occurred controlling for other factors

	Perceived preventive preparation				Taking care SARS patients and individuals who were quarantined			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Trust level: very high	1.064**		1.026**	0.968**	0.894**		0.808**	0.638**
Trust level: high	0.464**		0.425**	0.418**	0.636**		0.593**	0.577**
Trust level: not high	0.441**		0.424**	0.414**	0.463**		0.431**	0.410**
Trust level: not high as all	rc		rc	rc	rc		rc	rc
Reciprocity level: always		0.276**	0.215**	0.136		0.258**	0.498**	0.374**
Reciprocity level: depends on occasion		0.308**	0.185*	0.202*		0.625**	0.178*	0.159
Reciprocity level: no		rc	rc	rc		rc	rc	rc
Female				−0.056				−0.096
Age				0.003				0.005
Marital status: single				0.106				0.074
Marital status: widowed				0.019				0.142
Marital status: divorced				0.341				0.034
Marital status: married/cohabiting				rc				rc
Education: completed university				−0.018				−0.571*
Education: completed junior college				0.050				−0.458
Education: completed senior high				0.104				−0.417
Education: completed elementary				0.246				−0.087
Education: less than elementary				0.103				0.018
Education: completed junior high				rc				rc
Family income: more than NT150,000				−0.019				−0.196
Family income: NT100,000–NT150,000				−0.078				−0.300
Family income: NT50,000–NT99,999				−0.178				−0.240
Family income: NT20,000–NT49,999				−0.304				−0.184
Family income: less than NT20,000				rc				rc
Intercept 1	−1.168**	−1.4	−1.040**	−0.943	−0.349**	−0.586**	−0.218*	−0.705
Intercept 2	−0.283**	−0.5	−0.155	−0.645	0.788**	0.540**	0.924**	0.450
Intercept 3	1.696**	1.465	1.825**	1.923**	1.814**	1.576**	1.953**	1.505**
Log likelihood	−848.0	−868.2	−844.7	−836.8	−1,130	−1,146	−1,120	−1083.7
N	941	941	941	941	941	941	941	941

* Significant at 5%; ** significant at 1%; *rc* reference category

action in cities that experienced SARS. Since trust can be seen as "rational expectation," then avoidance or self-protection is another form of social relations based on rationality [14]. As Coleman [7] succinctly argued, social relations are no longer based on trust and reciprocity when individuals feel fear and anxiety. Given their sense of uncertainty, they consider it too risky to cultivate relationships based on trust and reciprocity that would lead to long-term stable relations. Therefore, our findings show that perceived community action taken is possible in an uncertain and stressful environment, but not through trust and reciprocity. It is possible that individuals develop defensive strategies in such circumstances and are still take community action. One possible defensive strategy is to reduce the interaction between the community at large and the family, a smaller social unit, while family members take care of one another. The aggregate effect is community action still possible.

In short, the study has several directions for our future study of the impact of the outbreak of an epidemic on social functioning. First, modern media can vividly portray events associated with the outbreak, and broadcast widely beyond any geographical limitations. Subsequently, though statistically significant differences in responses, analysis of the data shows that a considerable proportion of residents perceived that the community maintained a high level of community action, both in cities that experienced the outbreak of SARS and in cities that did not. Future studies of the outbreak of epidemics should explore these effects of spatial diffusion on collective efficacy and community action in nearby communities. Second, the study has demonstrated that how community action operates can be strongly related to the outbreak of an epidemic. The impact is far-reaching and fundamental to the core of social relations: trust and reciprocity. However, at the same time, the findings suggest that the maintenance of community action in communities where SARS occurred could be retained by other elements of social relations. In other words, community action is not necessarily related to trust and reciprocity. Further studies should identify the alternative elements that are related to community action and how these elements relate to trust and reciprocity in contributing to community collective efficacy. Finally, though our study can show the relationship of how collective efficacy level is related to community action, future study should determine whether collective efficacy affects community action or vice versa.

Although the outbreak of an epidemic can have serious social impacts that go beyond the communities immediately affected, we still know very little about the social consequences or how the social functioning of these communities is maintained. An important task for future research is to further investigate various aspects of the disruptions in social lives and changes in social relations that occur during an epidemic. Through a better understanding of these effects, we will be able to extend our understanding of social relations under stress. In these ways, the findings of this study have the potential to inform and enrich our understanding of community social functioning.

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