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Trust, reciprocity and collective action to fight antibiotic resistance. An experimental approach

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ABSTRACT

Antibiotic resistance is a collective action dilemma. Individuals may request antibiotics, but an overall reduction in use is necessary to limit resistance. A reoccurring theoretical claim is that social capital increase cooperation in social dilemmas. The aim of this paper is to investigate the link between generalized trust and reciprocity and the willingness to postpone antibiotic treatment in order to limit overuse in a scenario-based study. A between-subject scenario experimental approach with hypothetical scenarios was utilized. Participants were asked to imagine that they were seeing a doctor for a respiratory infection. The doctor prescribes antibiotics, but advise postponing therapy to see if the disease resolves by itself, for the sake of limiting overuse. Respondents were asked to answer how long they could accept postponing antibiotic treatment, from 0 to 7 days. The number of days that most people would be able to accept postponing treatment was considered the between-subject factor. In total, the study sample included 981 respondents with a mean age of 51 years. A majority of respondents were men (65.7%). The mean number of days that the respondents stated they were willing to postpone antibiotic treatment was positively associated with the number of days the respondents were told that most people were willing to postpone antibiotic treatment, $p < 0.001$. There was a positive association between number of days they were willing to postpone antibiotic treatment and generalized trust, $p = 0.001$. In conclusion, the results showed that the proclaimed public willingness to postpone therapy influenced a respondent's willingness to postpone antibiotic therapy in different scenarios. Also, generalized trust was positively associated with the willingness to postpone therapy.

1. Introduction

Antibiotic overuse and the development of antibiotic resistance is a major problem for public health. Increasing antibiotic resistance to existing antibiotics causes substantial morbidity and mortality. Each year, antibiotic resistance is estimated to cause 50 000 deaths in Europe and the U.S. alone. If resistance is left unchecked, 10 million more people are expected to die every year by 2050 (Wise et al., 1998; European Commission, 2011; Cars et al., 2011; O'Neill, 2014).

There is a growing recognition that limiting antibiotic resistance is far from just a medical concern, but is rather a behavioural and social problem. Since antibiotic consumption is the main driver of the development of antibiotic resistance, large-scale behavioural change in relation to antibiotic consumption is urgently needed. But the problem is that, despite the long-term and collective threat posed by antibiotic resistance, there is little incentive for each individual to reduce his or her own consumption. According to the logic of collective action (Olson, 1965), individuals' short-term interest in antibiotic treatment will triumph over the long-term collective objective of an overall reduction.

A reoccurring claim in social capital theory concerns the causes of cooperation and defection in collective action dilemma situations. It is argued that social capital helps to solve collective action problems because it stimulates cooperation and the provision of public goods (Putnam et al., 1993, Putnam, 2000; Uslaner, 2002; Rothstein, 2000). Individuals adhering to norms of trust and reciprocity are more willing to accept short-term costs in order to work together and address collective problems.

Although few prior studies have investigated predictors of antibiotic consumption, one prior study has found antibiotic

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consumption to be linked with social capital. Blommaert and colleagues found that higher country-levels of contextual generalized trust were negatively associated with levels of antibiotic consumption in European countries (Blommaert et al. 2014). To further our understanding of this interesting association, this paper looks closer at the individual–level relationships between two aspects of social capital and antibiotic consumption. More specifically, the first aim of this paper is to investigate the influence of reciprocity on the willingness to postpone antibiotic treatment in order to avoid unnecessary use. This will be investigated using an experimental design where the respondents have been presented with hypothetical scenarios. A second aim is to investigate the association between generalized trust and the willingness to postpone antibiotic treatment for the same reason. Hypothetically, reciprocity and generalized trust increase the motivation to postpone antibiotic treatment, in order to mitigate resistance.

This paper will continue as follows: Firstly, we turn to social capital literature and theorize about the effects of generalized trust and reciprocity on levels of cooperation in collective action situations. Secondly, we provide a short review of the literature about social capital and health/health-related behaviours. Next, we derive testable hypotheses based on theory and prior empirical evidence. After this, we present the experimental design and measurements, including statistical procedures and confounders. We then present results from the empirical investigation. Following this, we briefly discuss the theoretical and practical implications of the findings in the discussion section. In the final section, we discuss strengths and limitations of this paper, and draw conclusions.

2. Theory

2.1. Social capital and collective action

Dilemmas of collective action are situations where short-term self-interest is in conflict with longer-term collective interests (Olson, 1965; Dawes, 1980). Lack of collective action has resulted in major large-scale problems such as the depletion of natural resources, greenhouse gas emissions, and antibiotic resistance. Antibiotic overuse and the development of antibiotic resistance is considered to be a collective action dilemma because individuals may have a short-term interest in antibiotic treatment, but an overall reduction in antibiotic consumption is necessary in order to limit antibiotic resistance. Laxminarayan and Heymann note that '[t]here is little incentive for patients or healthcare providers to consider the effect of their decisions to use antibiotics on overall levels of resistance' (2012).

Social capital theory concerns the causes of cooperation and defection in collective action dilemma situations. According to Putnam, social capital refers to features of social organization such as trust, norms and networks facilitating collective action for mutual benefit (1993; 2000). Central features of social capital are norms of generalized trust and reciprocity. Generalized trust is defined as the belief that most people can be trusted. Generalized reciprocity is the norm of mutual exchange of benefits which may be imbalanced, and yet involves the expectation for future transactions to level the imbalances. Robert Putnam argues that norms of generalized reciprocity facilitate collective action because they stimulates adherence to norms for acceptable behaviour (Putnam et al., 1993; Putnam, 2000).

Levi has theorized the role of reciprocity in large-scale collective action situations. She has developed a theory about the "ethical reciprocity" underpinning the strategic but ethical considerations of *contingent consenters*. The argument is that people are generally willing to cooperate in collective action as long as other people do so, too. Short-term self-interest might speak in favour of free riding, but if other people contribute and do their fair share, other people are motivated to cooperate, as well (Levi, 1997).

Available evidence supports the theoretical claims about the link between generalized trust and reciprocity and cooperation in collective action dilemma situations. It has been proven that generalized trust is associated with cooperation in large scale collective action dilemmas such as paying taxes, recycling, and cooperation in anonymous large-N public good games (Scholtz and Lubell, 1998; Sønderskov, 2009; Thöni et al., 2012). Plenty of studies show that reciprocity is important for most people facing a collective action dilemma. People who believe or know that others will cooperate are more willing to do so themselves (Levi, 1997; Fischbacher et al., 2001; Gächter and Herrmann, 2009; Fischbacher et al., 2012; Kocher et al., 2008).

2.2. Social capital and health-related behaviours

A strong association between social capital and different kinds of health-related outcomes has been presented (Kawachi et al., 1997, 1999, 2008; Rose, 2000; Kawachi and Berkman, 2000). For example, individual level social capital indicators, such as vertical trust in institutions and horizontal generalized trust, are strongly positively linked to self-rated health (Mohseni and Lindstrom, 2007). Moreover, recent results indicate that social capital may have a causal effect on depression (Riumallo-Herl et al., 2014).

Within the broader category of studies investigating the link between social capital and health, some studies focus specifically on the link between social capital and health-related behaviours (Lindström, 2008). Several of these studies investigate social capital in relation to health behaviour that – like consumption of antibiotics – has a impact on others. For example Poortinga (2006) and Lindström (2003) have investigated the link between social capital indicators and smoking. Also, associations between the individual level and contextual social capital indicators and immunization have been presented (Rönnerstrand, 2013, 2014).

Prior research has demonstrated that individuals with low trust in the health care system are less likely to purchase prescribed medicines (Johnell et al., 2006). Even so, Lindström maintains that more research is necessary in order to investigate the link between social capital and adherence to prescribed medication (2008).

The connection between social capital and antibiotic consumption has, to our knowledge, only been investigated in a few studies. In a survey study about the public knowledge and awareness related to antibiotics and resistance in Sweden, André and colleagues (2010) found that more respondents reported trusting the doctor who did not prescribe antibiotics, as compared to the doctor who did prescribe antibiotics. In a recent study, Blommaert and colleagues investigate factors to account for the large between-state variation in antibiotic consumption in Europe. Using data from the World Value Survey, they reported that country-levels of contextual trust are associated with lower levels of antibiotic consumption (Blommaert et al., 2014).

3. Two hypotheses

Building on the theoretical claims in social capital theory about the role of generalized reciprocity and prior empirical work on conditional cooperation in collective action situations, we hypothesize a positive relationship between the number of days the respondents were told that most people would accept postponing antibiotic treatment and the individual willingness to postpone treatment.