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Evidence from an RCT in the city of São Paulo

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Abstract

The COVID-19 pandemic has required societal behavioral change in order to slow the spread of the virus. Making people keep proper distance when in public and wear face masks have become a priority for governments around the world. Following previous literature on the effects of behaviorally informed text messages on promoting healthy behavior, São Paulo's innovation in government lab implemented a text message (SMS)-based intervention informed by behavioral insights aimed at encouraging people to stay at home, wear face masks, and maintain 2 meters distance from others. Specifically, five different SMS frameworks were analyzed – reciprocity towards health workers, social norms, civic duty, risk perception, and self-efficacy/ collective identity. A field experiment was run in which beliefs about the pandemic, awareness of safe distancing, and social distancing behaviors were measured via a telephone survey. Results indicate that individuals who received text messages became better informed about the correct distance they should keep from others, and more likely to wear a mask. Respondents who received the 'civic duty' frame, designed to prime a sense of duty to protect family and friends, were consistently better informed and more likely to always wear a mask than other frames, although this difference is small. Specifically, those who received the 'civic duty' message were 12.75% more likely to report the right distance to keep from others and 3% more likely to report always wearing a mask compared to those who did not received a text message. When looking at differences across groups, it was found that men express more risky behavior than women; older individuals go out less and wear a mask more; respondents in richer areas less likely to leave home for work, but more likely to exercise or walk the dog; and, one's proximity to the disease affects belief and behavior, although differently depending on the relationship's degree and on the severity of the illness. These results have informed the scale up of this intervention: a second text message intervention of 3 text messages to over 2.7 million citizens, a combined effort between the city Sao Paulo and the Inter-American Development Bank (IDB) where through a difference-in-difference spatial discontinuity strategy changes in observed behaviors are expected to be analyzed.

JEL Classifications: C91, C93, D91, I12, I18

Keywords: COVID-19, RCT, Behavioral Economics, Brazil, text messages, civic duty, social distancing, mask-wearing

BACKGROUND

In the context of the COVID-19 pandemic, behavioral sciences might be part of the toolkit in the quest for solutions to guide the reopening efforts (Haushofer and Metcalf, 2020). Without vaccines available at the moment, prevention appears as the only effective measure to protect ourselves against the virus. However, many times procrastination (“leave everything for tomorrow”), lack of attention or simply forgetting make preventive behaviors difficult. Even though changing habits is not easy, simple interventions informed by behavioral sciences can reorient our decisions in the desired direction and help boost those preemptive actions in this context. For instance, explicitly linking hand-washing to regular activities (coming home, eating) can increase its practice (Hallsworth, 2020; Michie et al 2020); making consequences more salient and sending specific instructions for social distancing and seeking medical help has been shown to be important (Tantia and Perez, 2020); using messaging and digital platforms to plan online social games, exercises routines and events can promote social distancing and make following public health protocols more desirable (Barari et al , 2020).

Previous works across disciplines have shown that in the context of behavioral tools, specifically text message reminders are a powerful behavioral tool, as they successfully address limited attention, they can attack the bias related to limited information processing capabilities and can be used to address present bias (Ajzenman and Lopez Boo, 2019). SMS reminders have been used to increase retirement savings, remind people about voting, improve treatment adherence in parenting programs, pay taxes, and reduce school absenteeism (Gerber and Rogers, 2009; Karlan et al, 2016; Kettle et al, 2016; Bergman, Denning and Manoli 2017; Bosch et al, 2018; Doss et al, 2018; York and Loeb, 2018; Balsa et al, 2019; Gennetian et al, 2019; Mateo Diaz et al, 2020). In terms of promoting healthy behaviors, SMS have been used to increase adherence to medicine regimes, getting medical examinations, and incentivize a long-lasting change (Cole-Lewis and Kershaw, 2010; Free et al., 2013; Head et al., 2013; Armanasco et al., 2016; Scwebel and Larimer, 2018). And because mobile phones are relatively cheap and widely available, the use of text messages has become an efficient communication channel with the general public (Cole-Lewis and Kershaw, 2010).

During the pandemic, a number of governments have taken advantage of mass text messaging for public outreach. In the United Kingdom, the NHS has sent daily text messages to almost 2 million people warning about the risks of coronavirus. Similar to the study reported here, the content of the messages has been informed by behavioral science research. Messages have included information about why vulnerable people need to self-isolate, as well as other practical guidance, and wellbeing and emotional advice (Burd and Coleman, 2020). Text messages have also been used by Kenya’s Ministry of Health, and the South Africa government required “mobile network operators to send a minimum of two daily messages to combat the virus on behalf of the government” (Grabowska, 2020, p. 2). In the United States, Washington DC and New York, for example, have also sent messages to its citizens to inform about stay at home orders or steps to follow in case of contracting the virus.

The first case of COVID-19 was confirmed in Latin America on February 26, 2020, in Brazil. By mid-March, most countries in the region had adopted restrictive measures like banning

international flights, prohibiting public mass gatherings, suspending in-person education, and closing nightlife - in addition to other measures aimed at prevention such as informing about the importance of keeping social distance, washing hands and, later, face covering. In May 22, the World Health Organization (WHO) declared South America the new epicenter of the pandemic (Feuer, 2020). As of June 15, Brazil had the greatest number of confirmed cases in the region, followed by Peru, Chile, and Mexico (GovLab, 2020). In order to manage both with the first period of the pandemic, as well as with the organization for the reopening of their economies, some countries have relied on mass text messaging. Argentina, for example, sent SMS to those who came back from a foreign country at the beginning of the pandemic, to remind them to self-isolate (Costa, 2020). Ecuador is currently engaging in a mass text messaging campaign to promote the download of its coronavirus app, ASI Ecuador. The Mexican federal government also sent information about COVID through massive text messages in March, and used the system again in May to incentivize the download of the App COVID-19 MX (Steve, 2020). In Colombia, SMS were used to remind citizens about preventive measures they should take (Sanchez, 2020). In El Salvador, a massive text message was sent at the beginning of the crisis that read "The government of El Salvador informs about the new regulation and preventive measures regarding COVID-19: <https://www.presidencia-gob-sv/covid19>" (elsalvadorgram, 2020). Finally, and also in March, the government of Guatemala sent a massive message telling its citizens to wash their hands constantly and go to the doctors in case they experience any symptoms (Gramajo, 2020). Yet, not all messages achieve the same results and finding the right framework is key to achieve success.

Taking advantage of mass text messaging as a useful platform for public outreach, the City of São Paulo, where 96.5% of residents owned a cellphone in 2015, has implemented a behaviorally-informed text message intervention aimed at encouraging people to stay at home, wear face masks, and maintain a safe distance from others. The content was designed using the COM-B model to behavioral change¹ and thus identifying the need to provide citizens with information, instruction, and motivation (besides opportunity) to assure compliance with the intended behaviors. As such, a 4 text-message intervention was designed, in which the first SMS contained information and call for action, the second one was a motivational message, the third contained specific instructions for one particular action (for example, how to properly wear face masks), and the fourth was also a motivational message but with a different call for action (for example, keep the proper social distance). Five different versions of the *motivational messages* were sent - reciprocity towards health workers, social norms, civic duty, risk perception, and self-efficacy/ collective identity - and later tested to see which one is more efficient in provoking the desired change in self-reported behavior. As governments around the globe are faced with a new and unexpected challenge, it is important to understand the extent to which a SMS campaign based on behaviorally informed messages is effective in dealing with the pandemic.

¹ The COM-B model states that a particular behavior will occur when the individual has capability and opportunity to engage in the behavior and is more motivated to perform it compared to other behaviors (Michie, van Stralen and West, 2011)

LITERATURE REVIEW

After several months of the pandemic, different studies on the use of behavioral economics in the COVID-19 context have emerged. The first thing that stands out is the importance of appealing to our responsibilities with our families, friends and fellow citizens. In the United States, Everett et al (2020) carried out an experiment with 1,032 individuals. Four different types of messages for adopting social distancing behaviors were sent through Facebook (deontological, virtue-based, utilitarian, or non-moral justifications) from two types of messengers, a leader or a citizen. The authors found that the messages that appealed to our obligations and responsibilities towards our families and communities seem to be more effective in changing behavior regarding other's isolation and hand-washing practices, and the intentions of sharing these types of messages.

In Ireland, Lunn et al (2020) recruited 500 people, divided them into 3 groups and showed them a poster with 4 panels. The treatment posters contained the same four images of real people from different age groups that were not maintaining proper social distance, with text bursts that predicted a history of an infection chain. In one of the groups, the emphasis was set on the vulnerable person and on the other, on the transmission ratio. In the control group, the posters only made reference to the "2 meters" rule, but without real people. Both conditions of treatment resulted in a greater share of individuals who expressed high caution about the "intention" to perform marginal behaviors such as visiting a friend in their home, and "acceptability" about others' behaviors like allowing their children to play outside with friends.

In Denmark, Falco and Zaccagni (2020) carried out an experiment with 29,756 individuals (5,310 actually decided to participate) who received different versions of a reminder to be at home as much as possible in the peak of the crisis through e-Boks (the official communication system used by the country's authorities). Four alternatives were tested to enclose the recommendation (the consequences on the person, on the family, for people in general, and on the national health system) with two different emphasis of the recorder ("risk of failure" vs. "benefit"). It was found that while highlighting the individual and family consequences incentivized individuals to say they will stay at home, and emphasizing the consequences for society do not, nothing affects observed behavior.

Regarding the use of messages to increase the download of coronavirus applications, in Australia, Bradshaw et al (2020) conducted an online experiment with 1,117 individuals on a hypothetical application. They presented four versions of it and then download intentions were measured. The versions were combinations of two frames of the application - the first talking about the advantages of downloading it and appealing to their intentions, and the second appealing to the obligation of downloading, without questioning ("it is not a option, it's something you must do") - and two ways of storing information - the secure data that is destroyed every 21 days and is anonymous and the unsecured one that is kept forever and can be used by the government for other purposes. It was found that the application framework does not make any difference, but the fact of specifying that the information is secure increases the desire to download the application and the probability of recommending it to a friend or family member.

Finally, in the United Kingdom Williams et al (2020) performed a series of focus groups on attitudes towards contact tracing apps. Among the results to be highlighted is the importance of using traditional channels, social networks and text messages to communicate about the use of apps and thus reach the population that is currently avoiding the news of COVID-19 due to mental health issues; highlight the confidentiality of data and their anonymity; emphasize the contribution of the download to the "common good", have a single clear slogan ("Download the App, protect the NHS, save lives") and appeal to collective responsibility.

THE STUDY

São Paulo's innovation in government lab, (011).lab, designed a randomized controlled trial (RCT) to investigate whether behaviorally-informed text messages can be an effective tool to promote behavioral change during the COVID-19 pandemic, and the extent to which the content of the message matters. With a sample of 75,351 citizens who had contacted the city of São Paulo's e-government platform (SP156), individuals were randomly assigned to either receive a the previously mentioned series of four text messages (SMS) that informed, instructed and motivated to stay at home, to properly wear a mask, and to maintain distance from others, or to the control group in which participants did not receive any messages. From that initial sample, 63,438 individuals were randomly selected to receive messages (treatment groups), and were divided into five arms that received slightly different versions of the motivational messages. More specifically, the content of the second and last message varied to highlight distinct behavioral science principles: reciprocity towards health workers (*"healthcare professionals are risking their lives to combat the coronavirus. DO YOUR PART TO HELP THEM"*), social norms (*"the majority of people are already wearing masks. DO IT LIKE THEM"*), civic duty (*"avoid deaths of family and friends is YOUR DUTY"*), risk perception (*"People might be contaminated without knowing. ONE OF THEM COULD BE YOU"*), and self-efficacy/ collective identity (*"Everyone doing their part, we will win from the coronavirus. YOUR ACTION MATTERS"*).

Following the delivery of the SMS, between June 12 and July 3, all 75,351 citizens participating in the experiment were contacted by phone to answer a survey, and 7,825 (10.38%) responded to it². The survey asked questions on beliefs about the social distancing policies, awareness about appropriate behavior, and self-reported behavior such as leaving the house, keeping distance from others and mask wearing, as well as socio demographic characteristics. With responses to each battery of questions, additive indices were constructed and serve as the dependent variables in the analysis of the effects of the intervention.^{3 4}

IMPLEMENTATION CONSIDERATIONS

As it was previously mentioned, the first case of coronavirus in Brazil was registered in São Paulo on February 26 and community transmission in the city started on March 12. On March

² Response rate was not correlated with treatment status.

³ Specifically, the dependent variables in index form are: Beliefs, Self-reported Going out, Self-reported Mask Wearing, Self-reported Distance Keeping, and Awareness.

⁴ To avoid potential confoundedness, the following variables in the regression analyses were also controlled for: *gender, age, schooling, residence in the city of São Paulo, having private health insurance, having had COVID-19, knowing someone who had the disease, knowing someone who died from it, fixed effects for the day (as the survey took 19 days), and fixed effects for neighborhood (32 Subprefeituras).*

20, a government decree implemented social distancing measures. Another decree on the use of masks came one month later, on April 29. By May 2020 Latin America and the Caribbean had become the epicenter of the pandemic, with Brazil – and particularly the city of São Paulo – being the biggest center of coronavirus transmission. A serological survey conducted on June 22 by the city government department of health estimated that 9.5% of the population (margin of error of 1.7%), or 1.16 million people, already had antibodies for coronavirus.

Suddenly every department in the São Paulo City Hall had to deal with urgent challenges and to adapt to the new context. Given that, the initiative here mentioned was designed according to the existent resources available in-house. The City Hall's behavioral science initiative is situated in the department that manages the e-government platform, SP156. Having access to a database with contact information for the citizens who have subscribed to the SP156 platform, (011).lab decided to conduct a field experiment to test the effect of text messages on incentivizing preventive COVID-19 behaviors. The government already had a package of text messages available which was made available to conduct the experiment.

In the City of São Paulo, the use of text messages may be particularly useful because the share of residents who have mobile phones is not only large, but also substantially larger than Internet access on personal computers (96.5% vs. 65.2%).⁵ Moreover, because text messages do not require Internet connectivity, it is easy to reach individuals who may have a phone that is not “smart”. Finally, as the SP156 platform also works with a call center, resources were available in-house to perform the follow-up survey.

RESULTS

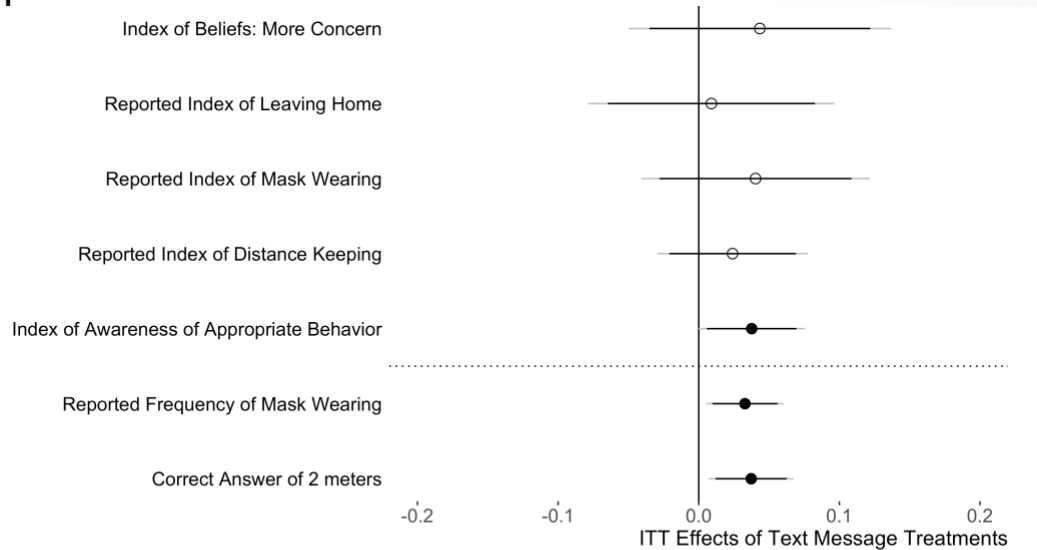
The main result of this experiment is that text messages are found to be an effective tool to inform the population during the pandemic. When respondents who were assigned to receive any of the text messages are compared to those who were not, there is a statistically significant difference in the knowledge to properly follow the recommended behaviors. As seen in Figure 1, receiving a text message significantly increases the probability of having reported using a mask when leaving their home in the last seven days, of having reported keeping distance from other people when in public in the last seven days and in the overall Awareness index (i.e. additive index that ranges from 0 to 3 and combines whether the respondent provided the right answer to the questions “What distance must you keep from others in public?”, “If I am wearing a mask and the other person too, do we need to keep distance?”, and “If I am wearing a mask for 1 hour and it gets humid do I need to change it?”). The impact on the last outcome is driven by variation in the question about the necessary distance one should keep from others.⁶ Moreover, citizens who received the text messages informing they should keep a 2-meter distance were significantly more likely to report the correct distance than those who did not, independent of the behavioral principle contained in the messages.⁷

⁵ <https://cidades.ibge.gov.br/brasil/sp/pesquisa/44/47044>

⁶ The rate of correct responses for the other two questions of the Awareness index were nearly 100%, which naturally hinders chances of finding any impact associated with our messages. On the bright side, these results show that the population was well-informed, regardless of the intervention.

⁷ It is important to note that the results found here may be a product of not only the text messages, but a combination of receiving the text message plus being primed to remember about the text by the introduction to the survey.

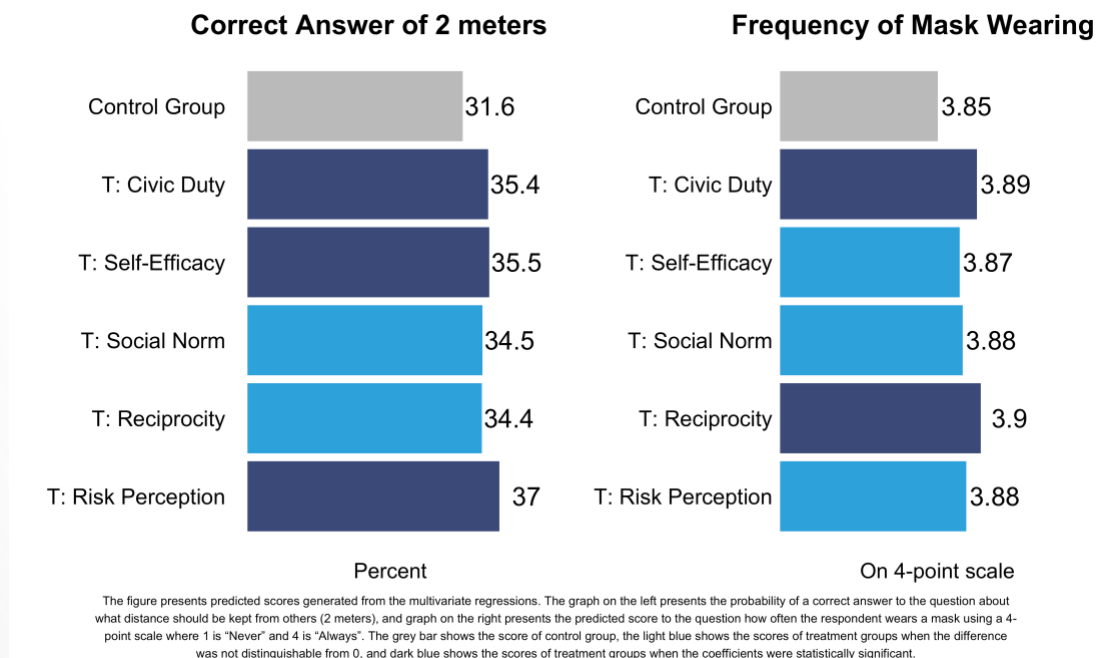
Figure 1



Circles indicate the beta coefficient associated with being in the treatment groups in comparison to being in the control group. Filled circles indicate statistically significant differences based on the two-sided 90% confidence intervals. Grey lines around the circles indicate the two-sided 95% confidence intervals, and the black lines indicate the two-sided 90% confidence intervals.

When the results are analyzed per treatment group (and compared individually to the control), three versions of the messages were significant: civic duty, self-efficacy, and the risk perception frames.⁸ This indicates that certain behaviorally informed text messages can be used to transmit specific guidelines and that they are more efficient in making recipients retain the information. See Figure 2.

Figure 2



The figure presents predicted scores generated from the multivariate regressions. The graph on the left presents the probability of a correct answer to the question about what distance should be kept from others (2 meters), and graph on the right presents the predicted score to the question how often the respondent wears a mask using a 4-point scale where 1 is "Never" and 4 is "Always". The grey bar shows the score of control group, the light blue shows the scores of treatment groups when the difference was not distinguishable from 0, and dark blue shows the scores of treatment groups when the coefficients were statistically significant.

⁸ These results are based on a multivariate regression in which the coefficient is associated with a p-value equal or less than 0.1.

The previous implies that when thinking about the different arms of the treatment, message frames were not as important, although priming individuals to think about protecting others as a duty worked slightly better. The text messages were associated with differences in awareness and mask-wearing behavior, but were not associated with differences in beliefs about the social isolation measures, the frequency with which individuals left their homes, or reported distance keeping.⁹ When varying message frames, there are not consistent differences across them. That is, *receiving the messages was more important than the specific principle they aimed to elicit*. Yet, when the five different treatment groups are compared with the control, *respondents who received the ‘civic duty’ frame, designed to prime a sense of duty to protect family and friends, were consistently better informed and more likely to always wear a mask, although this difference is small*. Specifically, those who received the ‘civic duty’ message were 12.75% more likely to choose the right keeping distance from others answer, i.e., an increase from 25% to almost 29%, or 3.7 percentage points. Also, on average, 77% of people report that they always wore a mask when in public in the previous seven days. However, respondents who received the ‘civic duty’ frame were 3% more likely to report always wearing a mask (an increase of 2.3 percentage points)¹⁰. See Table 1.

Table 1

	Control group mean	Civic Duty message (difference to control)	Controls
Mask wearing	0.7744	0.0233	Yes
Distance from others	0.2504	0.0374	Yes

The results from the survey also show large differences in beliefs and behaviors between demographic groups. Men are overwhelmingly less likely to report being fearful of the disease, or to be in favor of social isolation and mandatory mask wearing measures, including those implemented by the São Paulo city hall. Men are also more likely to report having gone out in the last seven days, particularly because of work, grocery shopping and exercising. Moreover, men report wearing a mask and keeping distance from others significantly less than their female counterparts. Moreover, citizens between the ages of 30 through 50 are less likely to leave their home for work than those ages 20-30 and 50 or above. Those 50 or above are also less likely to have gone out to exercise, and only those with age 60 or above report going out to walk the dog less than individuals of a younger age. Older individuals are also more likely to say they should keep a distance of two meters, and report wearing a mask more often than their younger counterparts. In contrast, those with less than 40 years of age are overwhelmingly less likely to report they have kept a safe distance from others.

⁹ It is important to note that because of difficulties during the data collection process, the number of interviews desired based on the initial research design was not reached, which reduces our ability to have confidence that the estimated impact is indeed different from 0.

¹⁰ The same is observed with the “reciprocity” frame.

Respondents were also asked if they left their homes for a series of reasons. Those who live in richer areas close to downtown, such as the district (Subprefeitura) of Pinheiros and Lapa, express leaving their homes for work significantly less than in other parts of the city. On the other hand, they are more likely to report leaving their homes to exercise and walk the dog. For instance, while 12% of respondents in the district of Aricanduva say they left home to exercise, 30% of respondents in the district of Pinheiros report leaving to exercise. While it is not clear if these differences have come about as a product of the pandemic, they suggest that policies to slow the spread of the virus should consider variation in the daily lives of those who live in wealthier and less well-off areas.

Finally, the proximity with the disease might affect how one perceives it and, consequently, how one behaves. People who have already had the disease have less fear and are more supportive of social isolation measures. People who know someone who has already had or who has died by the disease have more fear and are more supportive of mask wearing measures.

CONCLUSIONS AND FURTHER STEPS

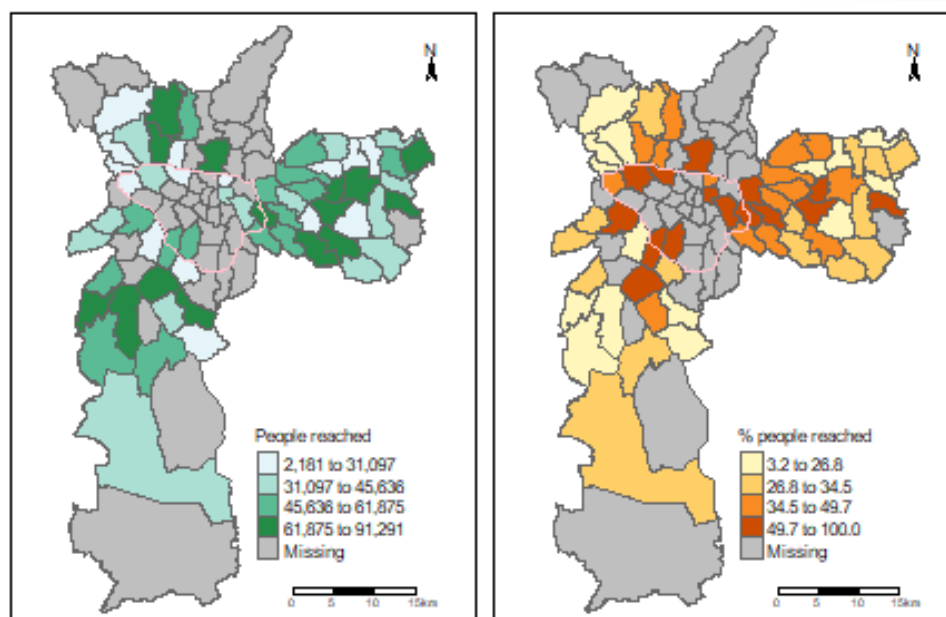
The pilot trial was useful to test the effect of the text messages, but was obviously limited in its capacity to have a large effect on the population. To make a real impact in the city, it was necessary to scale the intervention to a sizable amount of the population, and if possible, prioritize the most vulnerable subgroups. Therefore, the São Paulo's innovation in government lab, (011).lab, partnered with the Inter-American Development Bank (IDB) and Vital Strategies to hire a provider that had a broader database of contacts and scale up the message intervention.

Between August 10 and 14, approximately 8.24 million messages were sent to more than 2.7 million citizens, nudging them to follow the new behavioral requirements. The new messages were adapted from the ones used in the pilot described in this document. The call to action to stay at home was removed, since now the official recommendations have changed. The SMS then focused on the behaviors of wearing face masks and keeping a 2 meter distance from others. A “plan ahead” instruction was added since people are getting back to presential work, and therefore spending the whole day outside, and also the official City Hall's website regarding COVID-19, where citizens can find further instructions and recommendations was also included. Priority was given to São Paulo's administrative districts with the highest incidence of COVID-19¹¹ in the last three weeks before the launching, based on data from the Secretariat of Health. As such, the SMS reached 60 out of the 96 districts in the city. It is important to highlight that only a fraction of the citizens in each district received the intervention, since not all cell phone numbers were available¹². The map below shows the amount of people reached per district. The areas in grey represent the “non-treated” districts, and those in shades of green (left) and brown (right) those where individuals received the messages. The shades of the districts represent the number and percentage of individuals who received the messages classified based on quartiles of the distribution. See Figure 3.

¹¹ The index was calculated with the date of the beginning of symptoms.

¹² It was only possible to send the messages to those citizens whose cell phone numbers and addresses were in the providing company (Neoway) database, with data collected from public and official sources. There was a 99.95% success rate.

Figure 3



Consistent with the findings in countries like the United States and Denmark, also in Brazil highlighting the importance of appealing to our responsibilities with our families, friends and fellow citizens seems to be the way to increase awareness about preventive measures and produce changes in self-reported behavior necessary to slow the spread of the virus. Therefore, given that the ‘civic duty’ message was more consistent in the pilot trial, it was the motivational message chosen in the escalated intervention. The first message, on August 10th, informed about the need to use a mask and keep the 2- meter distance. It included a bit.ly link to the City Hall’s official COVID-19 website (it was observed that 13,669 citizens clicked on it). The second one, sent on August 12th, gave instructions about how to use the mask and keep proper distance. Finally the third one, on August 14th, motivated individuals to use a mask and keep distance through a civic duty message. See Figure 4.

Figure 4

SÃO PAULO CITY HALL: if you need to go out wear a MASK and keep a 2 METERS DISTANCE. Are you going to spend the day outside? Plan ahead to change masks. More at bit.ly/33q6JeR

SÃO PAULO CITY HALL: wear a fabric mask when you go out covering MOUTH and NOSE and tight to your face. Change it when it gets wet and ALWAYS WASH IT after use.

SÃO PAULO CITY HALL: to avoid DEATHS from family and friends is YOUR DUTY: if you need to go out wear mask and keep 2 meter distance from others.

In a combined effort between the IDB’s Social Protection and Health Division (SCL/SPH) and the São Paulo’s innovation in government lab, (011).lab a difference-in-difference spatial discontinuity strategy will be implemented to analyze the extent to which this larger intervention of text messages had other impacts on citizen observed behavior– mainly mobility patterns, but also ICU bed usages and new COVID infections per district. Contrary to the findings of the pilot

trial, that were based on self-reported behavior, this upcoming study will use administrative and mobile phone data at the district level for its outcome variables. Changing awareness of preventive measures, the willingness to comply with the country's guidelines and actual observed behavior are crucial to continue dealing with this pandemic.

Governments around the world have adopted a number of policies to promote social distancing behaviors, mask wearing and hand-washing. Yet, they have also struggled to guarantee compliance with rules and norms, particularly in Latin America. The dynamics of the pandemic have required constant communication with the public. Therefore, understanding the potential effects of government SMS sent to citizens has important implications in the fight against COVID and the reopening strategy of countries. The analysis of both the pilot project as well as the scaled up intervention may assist governments in the region – and throughout the world - in making decisions about the allocation of public resources by showing the extent to which a SMS campaign based on behaviorally informed messages is effective to achieve the desired changes.

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