The Promises and Pitfalls of 311 Data

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Abstract
Local governments operate 311 service request lines across the United States, and the publicly available data from these lines provide a continuously measured, geographically fine-grained, and non-self-reported measure of citizens’ interactions with government. It seems a promising measure of neighborhood political participation. However, these data are empirically and theoretically different from many common citizen-level participation measures. We compare geographically aggregated 311 call data with three other measures of political and civic participation: voter turnout, political donations, and census return rates. We show that rates of 311 calls are negatively related to lower cost activities (voter turnout and census return rates), but positively related to the high-cost activity of campaign donation. We caution against interpreting 311 data as a generic measure of political engagement or participation, at least in the absence of high-quality controls for neighborhood condition. However, we argue that these data are still potentially useful for researchers, because they are by definition a measure of the service demands that neighborhoods place on city governments.

Keywords
civic engagement, political participation, city services, 311

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**Introduction**

In recent years, cities across the United States have started providing “311” services (phone numbers to which citizens can call in nonemergency service requests). These give residents a new way to interact with their local government, and millions of calls have now been placed. Because these calls are a form of citizen contact with government, the resulting data have caught the attention of social scientists as, among other things, a possible new measure of political participation. In this article, we focus our attention on the potential uses of 311 data for the purpose of studying citizens’ political participation and engagement.

Existing work that uses 311 data has approached this new resource from several different angles. For example, Minkoff (2016) directly engaged with the question of how 311 data are jointly determined by neighborhood condition and citizen propensity to contact the government. Similarly, O’Brien, Sampson, and Winship (2015) used 311 data combined with independent audits of city neighborhoods to break 311 data down into indicators of neighborhood condition and a “civic response rate.” Other research has treated 311 data as an indicator of neighborhood condition; Legewie and Schaeffer (2016) used these data as an indicator of neighborhood conflict, and Lacoe and Ellen (2012) showed that neighborhood-level foreclosures increase the number of 311 calls. Finally, 311 data have been used as an indicator of political engagement and participation, which is the use of these data that we are most interested in. Levine and Gershenson (2014) used these data as a measure of political engagement, showing that this form of participation is more common in neighborhoods with higher shares of African-American residents and lower concentrations of first-generation immigrants. Lerman and Weaver (2013) likewise conceptualized 311 calls as an indicator of political engagement and showed that specific forms of concentrated policing reduce this form of citizen political participation. However, to our knowledge, no one has validated the use of 311 data as a measure of political participation.

In this article, we explore the potential to use 311 data as a measure of political participation. In addition, we examine the potential for using these data as a measure of citizens’ propensity to participate in politics. We define political participation as the act of engaging in a political activity. We distinguish political participation from the *propensity* to participate in politics, which we define as citizens’ tendency to take part in political activity when an opportunity for such participation exists. We explore the potential uses of 311 data for measuring each of these concepts: We start by characterizing 311 calls as a form of political participation, we compare these data with two measures of political participation (voter turnout and political donations) and
one measure of civic participation (returning the census form), and finally we ask whether 311 data can reasonably be used as a measure of underlying propensity to participate.

Advantages and Disadvantages of 311 Data

We are interested in 311 data because of several features that make them attractive and convenient (and therefore likely to become commonly used in the social sciences). One key advantage of 311 data is their availability: Data about 311 calls are frequently publicly available and highly detailed. In New York City, you can download a dataset of calls placed to the city’s 311 service since 2010, with fine-grained information on the date, time, geographic coordinates, and disposition of the call. In Boston, the dataset also includes notes on whether the call was resolved by its planned completion date. Other cities have begun to build on the Open311 initiative to produce publicly available 311 data, which should make these datasets increasingly easy to come by.

In addition to practical considerations regarding availability, 311 calls are also theoretically appealing. Making a 311 call is voluntary and expresses a specific request from the citizen to the government. This makes 311 calls conceptually similar to other forms of political participation, like contacting a public official. Compared with other measures of political activity, a key advantage of 311 calls is that they occur—and data about them are recorded—continuously. This sets 311 call data apart from behaviors like voting (data are recorded, but the behavior is not continuous) or contacting public officials (behavior occurs continuously, but is not systematically recorded). In addition, unlike for voting the contents of the message are also recorded, and in some cases it is possible to track whether and how fast the city responded to the citizen’s request.

Although the richness of the data makes them an appealing resource, some other features reduce their usefulness. The data are geocoded at the level of street address, but they typically do not include information about the individuals who make calls. As a consequence, traditional analyses of political participation (with individual-level covariates) cannot be conducted and any comparisons must occur on the level of geographic units. Researchers who use the data should therefore be mindful of the risk of committing ecological fallacies when interpreting their results.

However, the lack of individual-level data does not mean that the data cannot be used to examine interesting variation in government contacts. For example, 311 data, when aggregated at appropriate geographic levels, can illustrate the frequency with which different locations in a city demand the
government’s attention (Wiseman 2015). In the empirical sections below, we show how the intensity of total and per capita calls varies across census tracts in New York City. Insofar as it is of interest to know, for example, whether poorer and/or more diverse neighborhoods place more/fewer demands on the attention of the government, 311 data can be a key resource for establishing what the city looks like to the state.

**311 Calls and Propensity to Participate**

Even after acknowledging the limitations of geographically aggregated data, 311 data look potentially appealing as a tool for studying the determinants of political participation. Although the danger of ecological fallacy means that these data cannot speak to individual-level correlates of participation, they may nonetheless help reveal such correlates at the neighborhood level. In particular, researchers may be interested in but struggle to measure neighborhood-level variables such as average access to resources like time or political knowledge, citizens’ aggregate trust in government, citizens’ aggregate perceptions of efficacy, the spread of prosocial mind-sets, and so forth.

For such difficult-to-measure determinants of participation, 311 data may look like an appealing proxy measure. A hypothetical research design in this spirit may look as follows. A researcher wants to study neighborhood-level perceptions of efficacy, but does not have access to reliable survey data. Observing that, ceteris paribus, neighborhoods where feelings of efficacy are higher will exhibit higher rates of participation, the researcher chooses to use 311 data as a proxy for relative levels of neighborhood efficacy. A design of this type may apply to a number of theoretical concepts that are thought to influence participation but are not readily observed. For the sake of brevity, we will refer to this type of research designs as studies of “propensity to participate.”

Research designs that use 311 data as a proxy for neighborhood-level propensity to participate do not commit an ecological fallacy (as all arguments are made at the neighborhood level), but are still problematic because of key features of 311 data. In particular, the ceteris paribus assumption is unlikely to hold, and as we demonstrate below, adequate controls for neighborhood condition are not easy to identify or obtain. The following are a few considerations that complicate the use of 311 data as a proxy for propensity to participate.

First, 311 calls are jointly determined by a citizen’s propensity to participate *and* by the occurrence of a concrete problem that the citizen can report to a 311 line (Minkoff 2016). Problems that can be reported to 311 occur unevenly across neighborhoods (and even across individual citizens), resulting in unobserved variation in the number of opportunities to contact the
government in this way. Second, the number of times an individual can call 311 is not limited, and call totals are only observed on the neighborhood level, which makes it impossible to know how many citizens in the neighborhood engaged in 311 calls even when the total number of calls is known. In particular, there is a risk that a few heavy users ("superusers") of 311 in a neighborhood could have a significant influence on the total number of calls.5

The uneven occurrence of reasons to call 311 and the simultaneous ability to call 311 numerous times together complicate how we can interpret high numbers of calls: These may signal high levels of propensity to participate among citizens, a high number of problems that require government attention, the presence of a few particularly engaged individuals, or some combination of each of these.

Because individual-level data are typically unavailable, the issue of "superusers" can usually not be addressed with empirical adjustments such as exclusion of outliers or using median rates of contact. Any interpretations of findings based on 311 data therefore need to be explicitly agnostic about how propensity to participate is distributed within the observed neighborhood unit.

However, when it comes to neighborhood-level variation in reasons to contact 311, it may theoretically be possible to control for neighborhood condition. Good control variables could soak up some variation in need for services and improve the quality of 311 call data as an indicator of propensity to participate. In this article, we will empirically address the feasibility of using preexisting neighborhood-level data for this purpose.

In the remainder of the article, we will refer to opportunities to place 311 calls as "need for services," with the understanding that we refer specifically to services for which requests can be called in to a 311 line. Need for services will be distinguished from "propensity to participate," which (as defined above) will refer to the individual tendency to take part in political and civic activities, given that a reason to participate exists.

Outline

This article proceeds as follows. Our overall aim is to characterize 311 data and evaluate their suitability for use as a measure of political participation and propensity to participate. We start by situating 311 calls in a theoretical typology of political participation activities and develop hypotheses about how 311 data should behave if our expectations about its place in the typology are correct.

We then empirically compare 311 data with two measures of political participation (voting and making political donations), and with one measure of civic-minded but not explicitly political participation (returning census
forms). Finally, we address efforts to use 311 data as an indicator of citizens’ propensity to participate. We summarize existing research in this area and empirically consider whether controlling for “need for services” allows us to identify neighborhood-level variation in propensity to participate.

We find that 311 calls exhibit a counterintuitive relationship with other measures of participation. On a geographic-unit level, per capita rates of placing 311 calls are negatively correlated with election turnout, but positively correlated with the rate of political donations. 311 calls are also negatively correlated with rates of returning the census. Controlling for reasonable proxies of need for services (poverty levels, median household incomes, and neighborhood racial composition) does not change these patterns. Furthermore, these proxies themselves exhibit unreliable and specification-dependent relationships with rates of 311 calls.

We conclude with some implications for how to use 311 data in social science research. First, we point out that 311 data are by definition a measure of demands for service, as made by different neighborhoods on the city government. As such, these data may be useful to social scientists seeking to understand how cities look to the authorities that govern them. Second, the use of 311 data as a measure of political participation is more complicated. Theoretically, 311 calls qualify as political participation, as they involve a request from a citizen to a government entity. However, the unexpected empirical attributes of these data suggest that we do not have a good understanding of the micro-level determinants of 311 calls. In the absence of good qualitative evidence on how citizens view and come to make 311 calls, we encourage researchers to not assume that 311 calls can act as a more convenient substitute for other measures of political participation. Third, we conclude that 311 data are not a reliable measure of citizen propensity to participate in political and civic life, at least not in the absence of direct (and not proxy) measures of neighborhood need for government services.

311 Calls as Political Participation

In this section, we situate the activity of placing a 311 call in a theoretical framework of participatory activities and derive hypotheses about the patterns we would expect to observe if 311 data are a good measure of either political participation or tendency to participate.

We choose to primarily treat 311 calls as a form of political participation because placing a 311 call entails communicating a concrete request to the government, akin to other activities that communicate preferences to the government (such as voting, letter writing, or petition signing). However, it may be the case that citizens think of 311 calls as a nonpolitical civic activity,
more reminiscent of interacting with a bureaucracy than of contacting a politician. We also address this possibility below.

In their classic book on participation in American politics, Verba, Schlozman, and Brady (1996) defined political participation as acts that are intended to influence what the government does. These acts include activities such as voting, signing petitions, contacting elected officials, and making political donations. Acts of political participation vary in the demands they place on citizens; Verba, Schlozman, and Brady classified acts of political participation based on the resources required to perform them (time, money, and skills) and the types of output that the acts produce (volume of activity and message specificity). Below and in Table 1, we consider how 311 calls fit into the Verba, Schlozman, and Brady typology of participatory activities.

In terms of the inputs required from citizens, placing a 311 call primarily requires skill: knowledge that a 311 line exists and awareness of the types of queries that can be directed to it. Placing a call also requires time: to place the call and explain the situation. These requirements are highlighted in Table 1, which contrasts 311 calls to the relatively more money-intensive activity of making campaign contributions and the relatively more time-intensive activity of voting. Based on this theoretical classification, the act of placing a 311 call seems a relatively low-cost form of political participation; Lerman and Weaver (2013, p. 207) described a 311 call as “very low cost; it is easy, fast, and anonymous.” As a low-cost form of participation, we expect it to behave similarly to voting, which is another relatively low-cost form of political participation.

In terms of message specificity, 311 calls produce a very specific message; they are certainly more specific than voting, and arguably as specific as other direct communications with the government, like contacting an elected representative.

In terms of the volume of activity that can be produced, 311 calls are a mixed case. As mentioned above, unlike voting, where the maximum level of

### Table 1. 311 Calls Situated in a Typology of Participatory Activities from Verba, Schlozman, and Brady (1996).

| Activity         | Capacity for Conveying Information | Variation in Volume Requirements |
|------------------|------------------------------------|----------------------------------|
| Vote             | Low                                | Low, Time                        |
| Campaign contribution | Mixed                            | Highest, Money                   |
| 311 call         | High                               | Medium, Time, skill              |


engagement is strictly defined as one vote per person per election, 311 calls can theoretically be placed an unlimited number of times. However at the same time, 311 calls are also constrained by the occurrence of reasons to place a call, or what we term need for services. This makes 311 calls an interesting intermediate case: Although there is an upper bound on the number of legitimate calls that can be placed, this limit is not universal but rather fluctuates by neighborhood and even by individual citizen. This fluctuation in the upper bound of messaging volume becomes particularly important for assessing whether and how 311 calls can serve as a proxy for propensity to participate. We engage this issue more fully in the empirical section, where we discuss the feasibility of controlling for need for government services in analyses of 311 call patterns.

In sum, 311 calls look like a relatively low-cost form of political participation that is partially constrained in volume and produces specific messages for the government. Insofar as cost is a key determinant of participation, rates of 311 calls should look similar to rates of other low-cost political activities (especially after including reasonable proxies for need for services). On the flip side, patterns of 311 calls should not look as similar to high-cost political activities such as the making of political donations. We base this expectation on the observation that high-cost forms of participation exhibit a strong income-based gradient; this gradient is still present but notably muted when it comes to low-cost forms of participation (Verba, Schlozman, and Brady 1996). We therefore expect that the neighborhood-level relationship between political donations and 311 calls should be smaller in magnitude than the relationship between electoral turnout and 311 calls.

Based on these characteristics, we hypothesize that rates of 311 calls should be positively correlated with the low-cost activity of turnout. In addition, we hypothesize that the relationship between 311 calls and political donations should be smaller in magnitude than the relationship between 311 calls and turnout.

As we mentioned above, it is possible that citizens think of 311 calls as a civic activity and do not perceive it as political. One could think of 311 calls as a form of coproduction of public knowledge, that is, a form of civic cooperation between the citizen and the government. If this is the case, then we should expect patterns of 311 calls to instead be similar to other forms of civic participation.

We test this possibility by comparing patterns of 311 calls with patterns of census mail returns, which we select as a variable that captures nonpolitical but civic-minded participation. Census mail returns are similar to 311 calls in that they are another instance of an individual engaging in information exchange with a government agency, which arguably results in the coproduction of knowledge and the ultimate provision of a public good. Previous researchers have characterized census mail returns as a “powerful proxy...
measure of community norms of social trust and reciprocity” (Martin and Newman 2015) and used it as a measure of social capital (Knack 2002) or collective action that generates public benefits (Vigdor 2004; Yamamura 2008). Couper, Singer, and Kulka (1998, p. 59) argued that the motivation underpinning census returns is similar to the “sense of civic obligation that also motivates such behavior as voting, serving on juries, and paying taxes.” Using census return rates allows us to explore whether 311 calls are better conceptualized as a nonpolitical but nonetheless civic-minded and public-good oriented behavior.

We therefore hypothesize that if 311 calls are a measure of civic participation, then neighborhood-level rates of 311 calls should be positively correlated with neighborhood-level rates of census returns.

In the next section, we compare 311 calls with our other measures of civic and political participation, to assess whether they behave in similar ways. If 311 data do not exhibit the hypothesized patterns, then we suggest that some of the unique concerns about 311 data that we identified above may help explain the surprising findings. In particular, the potential for one person to generate many 311 calls in any given time period may be a key confounder here, as the presence of “superusers” could cause the 311 call patterns to resemble political donations (the only other measure used in this article that is not capped at one instance of participation per person per observation period).9 We will return to this possibility in the “Discussion” section.

**Characterizing 311 Calls**

We start our empirical exploration of 311 data by describing its usefulness as a measure of demands for city services on a neighborhood level. We focus on 311 call data from New York City from January 2010 through October 2014.10 We begin by illustrating the volumes of calls over time and by category, followed by mapping the density of 311 calls and illustrating how different parts of the city use the system to place different levels of demand for services on city government.

**Call Volume and Dispersion**

The New York 311 system has a fairly high call volume, averaging over 4,500 calls per day between 2010 and 2014, for a total of over 8 million calls in this time period. Figure 1 presents daily call volumes during this period. The data display notable day-to-day changes as well as seasonal patterns: Call volumes drop off during the summer and on weekends.
Figure 1. Call volumes from New York City’s 311 system.

Note. Vertical lines indicate the midpoint of the calendar year; call volumes are lower in the summer and on weekends.

Calls are fairly widely spread across the city, though there is a substantial geographic variation in call volume. The upper map in Figure 2 shows per capita 311 calls measured at the census tract level. For comparison, the lower map shows poverty rates, also at the census tract level. The map of per capita calls illustrates that 311 calls are not clearly mapped on to neighborhood socioeconomic status, as neighborhoods that place more 311 calls per capita have a range of incomes. For example, the wealthy areas of lower and mid-Manhattan as well as low-income parts of the Bronx and Queens exhibit high per capita call volumes.
Figure 2. (Top) Tract-level call volumes (per capita) from New York City’s 311 system, 2010 to 2014. (Bottom) Tract-level poverty rates from 2010 Census.
Table 2. Top 25 Call Types, January 2010 to October 2014.

| Complaint                          | Frequency  |
|-----------------------------------|------------|
| HEATING                           | 887,675    |
| GENERAL CONSTRUCTION              | 501,514    |
| Street Light Condition            | 479,226    |
| Street Condition                  | 450,064    |
| PLUMBING                          | 449,728    |
| PAINT–PLASTER                     | 361,449    |
| Water System                      | 288,098    |
| Blocked Driveway                  | 271,912    |
| NONCONST                          | 260,405    |
| Traffic Signal Condition          | 227,231    |
| Sewer                             | 187,824    |
| Illegal Parking                   | 179,958    |
| Noise                             | 176,797    |
| ELECTRIC                          | 171,960    |
| Dirty Conditions                  | 165,447    |
| Damaged Tree                      | 149,405    |
| General Construction/Plumbing     | 145,311    |
| Building/Use                      | 129,602    |
| Sanitation Condition              | 124,521    |
| Noise—Commercial                  | 115,751    |
| Noise—Street/Sidewalk             | 111,077    |
| Broken Muni-Meter                 | 109,879    |
| Rodent                            | 107,782    |
| DOF Literature Request            | 95,043     |
| Taxi Complaint                    | 91,203     |

Note. Complaint types are presented verbatim (including capitalization) from the 311 dataset.

Call Types

The calls cover a range of topics: The 311 call database includes 239 different “complaint types” used to describe calls’ content. Table 2 presents the 25 most common call types in the 311 database from January 2010 through October 2014, exactly as they appear in the database. Some of these frequent call types are about the condition of public goods such as “street light condition.” Calls about public goods may be particularly relevant as measures of political participation as these calls are subject to the free rider problem, like many other political acts are. There are also numerous call types that appear to represent more private concerns such as people calling because of heating problems in their homes. In addition, 311 also accepts
calls that are information requests: See, for example, “DOF Literature Request,” which covers requests for information related to the Department of Finance (DoF).

When 311 data are used as a measure of civic and/or political activity, some authors choose to subset the data to calls about “public” matters (Levine and Gershenson 2014; Minkoff 2016), whereas others consider all calls (Lerman and Weaver 2013). In the analysis below, we will present results by three different subsetting approaches.

First, we include all calls regardless of topic. Next, we limit the calls to a set of “public” calls that omits clearly individual requests for services (like large appliance pickup, benefits cards, or information requests), keeping 94% of the total call volume or about 7.6 million calls between 2010 and 2014. Finally, we use an even stricter filter to focus on “street-level” calls that are specifically about public infrastructure such as roads, sidewalks, subways, or streetlights (omitting things like noise complaints, messy yards, and landlord or building maintenance problems). These calls represent about 21% of all calls, or 1.7 million calls in 2010 to 2014.

311 Calls and Patterns of Political Participation

Above, we classified 311 calls as a low-cost form of participation that is partially constrained in volume. We hypothesized that aggregated 311 data should correlate positively with turnout, and that their correlation with political donations should be smaller in magnitude than their correlation with turnout. We also noted that if 311 calls are better conceptualized as a form of civic participation, they should correlate positively with rates of returning the census mail form. In this section, we empirically assess these hypotheses.

Aggregating Variables to Geographic Areas

We begin by aggregating 311 calls to the level of precincts (for comparing with election turnout) and census tracts (for comparing with political donations and census returns). We use the geographic coordinates provided for each call in the city’s dataset to allocate each call to one of 5,586 New York City voting precincts using precinct shapefiles from New York’s redistricting task force, and to one of 2,169 New York City tracts using tract shapefiles from the Census Bureau.

We do this over the three different call types (defined above as all calls, street-level calls, and public calls) and over a range of time periods, depending on the comparison measure. All geographically aggregated call counts are adjusted by population estimates, to produce a measure of “311 calls per capita” over a period of time.
At the census tract level, our comparison variables are political donations and rates of census mail returns. We use publicly available records of political donations made by New York City residents during the 2010 state election cycle. These data include all political donations that must be reported under New York State election law, which means all donations over US$100. Because the minimum donation visible in this dataset is US$100, the contrast in the monetary costs between placing a 311 call and making a political donation is significant. Each political donation record reports the address of the individual making the donation; we use this address to allocate every donation to a census tract following the same procedure as for 311 calls.

For census mail return rates, we use data from the 2010 Census. Census forms were sent out beginning March 15, 2010, with the reference date for counting persons set on April 1, 2010. The mailings encouraged recipients to complete and return the census form as soon as it was received. We look at 311 calls from each census tract in the one-month period immediately after the initial census form distribution (March 14 to April 15), and also in the three months leading up to the census (January 1 to April 1). As both time windows show essentially the same pattern, we present the three-month estimates for the 2,154 census tracts in which 311 calls were made in this time period.

Our final comparison variable is precinct-level electoral turnout (as the share of registered voters) in the 2010 elections. This time we have access to full call data at a longer time interval surrounding the event of interest (election), so we add a six-month measure of 311 calls, capturing the six months leading up to the election. We thus measure calls per capita at three time intervals calculated with respect to the November 2, 2010, election: one month around the election (October 18 to November 16), three months leading up to the election (August 1 to November 2), and six months leading up to the election (May 1 to November 2). The inclusion of a longer time interval does not alter the pattern we find in the data; again, the results are substantively identical for all time periods considered. We therefore present data for the three months leading up to the election.

Comparing 311 Calls with Other Forms of Participation

Our theoretical classification suggests that 311 calls are a relatively low-cost form of political participation. Below, we plot the per capita rates of 311 calls against our three comparison variables. First, we compare 311 calls with voter turnout rates: We hypothesize that per capita rates of 311 calls should correlate positively with turnout rates. Second, we compare 311 calls with a
relatively high-cost form of political participation: political donations over US$100. The significant difference in resources required to engage in this form of participation, compared with placing a 311 call, suggests that the behaviors should be less strongly correlated than turnout and 311 calls. Finally, we include a comparison of 311 calls and census returns, expecting these to be positively correlated if 311 calls are a form of civic rather than political participation.

We start by plotting the per capita rates of 311 calls against our three comparison variables and calculating the unadjusted correlations between the variables. The results are shown in Figures 3 to 5. Each panel in the figures represents a different subset of 311 calls (all calls, “public” calls, or “street-focused” calls), and 311 calls are aggregated over the three-month periods leading up to the census and the election, respectively.

As Figure 3 illustrates, there is not a strong relationship between voter turnout and per capita 311 calls in these data, across any of the three subsets of 311 calls. The correlation between turnout and the 311 call rate in the three months leading up to the election is −.18; when subsetting to public calls, the correlation is −.18, and when subsetting to street-focused calls, the
correlation is −.01. The 311 call data therefore do not seem to be capturing a form of political participation that is similar to voting. We thus do not find support for our first hypothesis, that geographically aggregated 311 calls are positively correlated with electoral turnout.

Next we turn to our contrasting variable, the high-cost activity of contributing to a political campaign; Figure 4 plots the relationship between per capita rates of political donation and 311 calls. Across all subsets of 311 calls, the relationship with political donations per capita is positive: .33 for all calls, .24 for public calls, and .47 for street-focused calls. This finding also contradicts our theoretical expectation: The correlation between campaign donations and 311 calls is positive. Per capita 311 calls thus look more similar to a distinctively high-cost political activity than to a low-cost political activity.

Finally, Figure 5 compares 311 calls with census return rates. The pattern here looks similar to the relationship between 311 calls and turnout: The correlation between the census return rate and the 311 call rate (for all calls) in the three months before census collection is −.23; when subsetting to public or street-focused calls, the correlation is −.24 and −.06, respectively. We conclude that per capita 311 calls do not behave similarly to a measure of civic participation. On the contrary, 311 calls are negatively correlated with two
The raw correlations between these different forms of participation are counterintuitive within a theoretical framework that predicts that making a 311 call is low cost by virtue of being easy and fast. Wealthy individuals are significantly more likely to live in high-income neighborhoods and to make political donations (Verba, Schlozman, and Brady 1996); the fact that 311 calls positively correlate with political donations therefore raises the possibility that the activity is higher cost than we anticipated. Furthermore, overall rates of turnout tend to correlate more strongly with the turnout of low-income individuals than with the turnout of high-income individuals (due to most of the variation in overall turnout originating in low-income turnout; Schlozman, Verba, and Brady 2012). Again, this is consistent with the possibility that 311 calls are disproportionately made by individuals with a lot of resources. Due to the absence of individual-level call data, we cannot examine this possibility in more detail.
Alternatively, this pattern is consistent with the theory that average numbers of neighborhood-level calls are driven by a relatively small number of heavy users, who in turn are concentrated in wealthier neighborhoods (these individuals may or may not be relatively wealthy themselves). Of course, these are preliminary suggestions, as we have not yet addressed the issue of uneven need for services across our units of observation; we turn to this task next.

311 Calls and Propensity to Participate

As outlined in the theoretical section of this article, we anticipate that researchers may want to use 311 data as a proxy for propensity to participate (which is composed of difficult-to-observe variables such as resources, political efficacy, and trust in government). As we discussed above, to use 311 data to study neighborhood variation in propensity to participate, it is necessary to engage with the problem of uneven need for services leading to uneven opportunities for participation.

A small literature that uses 311 data for social science purposes already exists, and much of it is devoted to the use of 311 data as an indicator of some form of propensity to participate. The difficulties involved in using 311 data for this purpose are acknowledged at least briefly by most authors who work with these data (Feigenbaum and Hall 2015; Lacoe and Ellen 2012; Legewie and Schaeffer 2016; Lerman and Weaver 2013; Levine and Gershenson 2014; O’Brien, Sampson, and Winship 2015), but are discussed at length in Minkoff (2016).

Minkoff (2016) demonstrated that 311 calls are jointly determined by need for services and propensity to participate, showing, for example, that variables, such as median age of the housing stock, ratio of workers to residents, and population growth, are all associated with the frequency of 311 calls that originate in a given geographic area.

Other research has gone further, developing direct ways to account for variations in need for services. O’Brien, Sampson, and Winship (2015) developed a direct measure of need by observing the rates of broken streetlights in the communities studied, whereas Levine and Gershenson (2014), Minkoff (2014), and Feigenbaum and Hall (2015) limited their analysis to only calls regarding issues that can be presumed to occur evenly across the city (e.g., snowplow request calls). Lerman and Weaver (2013) relied on neighborhood-level fixed effects to absorb most of the variation in need.

These designs are inventive and interesting, but in many potential research designs involving 311 data, they may be infeasible or inapplicable.26 The development of a direct measure of need, as in O’Brien, Sampson, and
Winship (2015), is likely the single best way to account for variations in need. Unfortunately, it is not possible to go back in time to create measures of need for most 311 data, and even where a research design engages with 311 data in real time, collecting detailed information on need will be prohibitively expensive for most researchers. Restricting the universe of calls to issues that arise evenly across a city results in significant reductions to the dataset (and may rely on the occurrence of severe snowstorms). Using neighborhood-level fixed effects will not only absorb time-invariant geographic variation in need but will also absorb time-invariant geographic variation in propensity to participate, therefore restricting feasible analyses to those examining changes in propensity to participate, as in Lerman and Weaver (2013).

When these inventive research designs are not feasible for practical or theoretical reasons, researchers will (rightly) hope to control for variation in need with readily available, preexisting indicators of neighborhood condition. Below, we present empirical evidence on the feasibility of this strategy, introducing poverty rates and median household income as proxies for neighborhood-level need. We conclude that controlling for need for services with these widely available proxy variables does not result in 311 data behaving any more similarly to turnout data: The negative correlation persists. We urge researchers to exercise caution when performing analyses of 311 data where successfully controlling for variation in neighborhood need for services is important.

**Attempting to Control for Need for Services**

In this section, we empirically explore the feasibility of controlling for need for services with intuitive and readily available control variables. We are best able to add meaningful covariates at the level of census tracts, as more demographic information is available about census tracts than about electoral precincts. We therefore present analyses adding covariates to our tract-level analyses. In particular, we ask whether accounting for reasonable proxies of the condition of the neighborhood changes the negative association between census return rates and 311 calls or the positive association between political donations and 311 calls.

We first run a regression predicting 311 call volumes using census return rates, to which we gradually include covariates. We start with the raw relationship between call volumes and census returns, then add tract-level household median income and poverty rate, and then also add percentage of tract residents with a college degree, percentage Black, and percentage foreign-born. Figure 6 shows the coefficient predicting the relationship between census returns and 311 calls (all variables measured...
on a tract-level, per capita, three-month basis) obtained with each successive specification. As can be seen in the figure, the changes in the coefficients are small and insignificant. This finding does not necessarily mean that more directly accounting for need would leave the observed negative relationship between turnout and 311 calls unchanged. But including seemingly reasonable (and readily available) covariates, such as median household income or poverty rate, does not change the dissimilarity between these two forms of participation.

Figure 7 repeats the multivariate analysis for the relationship between 311 calls and political donations. This relationship is also unchanged by the inclusion of covariates: It remains large and positive in all three specifications. Thus, in our data, including median household income and poverty levels to account for the level of need does not change the surprising relationship between political donations and 311 call rates.
To further explore the reliability of these proxy indicators as potential controls for the level of need, we examine the direct correlation between the proxies and 311 calls. To serve as reasonable proxies for level of need, these proxies should show a raw relationship with 311 call rates that is relatively unaffected by methodological specifications. We therefore examine whether the time period over which 311 calls are collected affects the observed relationship between rates of 311 calls and either median household income or poverty rates. (Recall that choosing different time periods over which to aggregate calls does not change the relationships between 311 calls and our other measures of participation.)

The results are plotted in Figure 8 (poverty rates) and Figure 9 (median household income). The results are discouraging: The relationship between income or poverty and 311 calls can look dramatically different depending on which time period the researcher chooses to aggregate calls over. The
The relationship between tract-level poverty and the number of calls is small and positive for the one-month time period around the census and the three-month time period leading up to the census, but reverses and becomes negative for the six-month aggregation leading up to the census. The reverse is true of the relationship between tract-level median income and 311 calls: The correlation coefficient is small or zero for the one-month and three-month aggregations, but becomes significant and positive for the six-month aggregation. It is unclear from these data what causes the unreliability; for example, it is possible that seasonal fluctuations matter for the relationship. Although the precise reason for the unreliable relationship is not clear from these data, the implication is that researchers should be careful when using readily available data as a control for “need for services.”

In light of these results, we suggest that poverty rates and household incomes are not good proxies for need for services and advise researchers to

\[ Figure 8. \text{ The relationship between poverty rates and 311 call rates at the census tract level (2010) across different time aggregations.} \]
be mindful when designing research that involves such proxy controls. When use of proxies is unavoidable due to practical or theoretical or both considerations, researchers should provide evidence showing that their chosen variables are robust to different specifications and reasonably stand in for neighborhood-level need for services.

**Discussion**

In recent years, 311 phone lines have become increasingly common across the United States, providing citizens with a new opportunity for interacting with the government. In many cities, including New York City, detailed datasets with information about these calls is available online, providing an easily accessible, continuous measure of citizen requests to the government. The Open311 initiative promises to make similar datasets available from an increasing number of cities going forward.
Although 311 data have some unique benefits, such as being continuously measured, detailed, and geocoded, they also have some key downsides such as a lack of individual-level data, variation due to unobserved differences in neighborhood condition, and the potential for frequent users of the system to influence neighborhood-level statistics.

In this article, we have examined the potential usefulness of 311 data for research in the social sciences. We observe that 311 data are by definition a measure of neighborhood-level realized demand for services and provide information about the relative intensity with which different parts of the city vie for the attention of the government. Theoretically, 311 calls can also be thought of as a form of political participation, but we show that patterns of 311 calls exhibit surprising relationships with other, more common, measures of political (and civic) participation. Finally, we show that it is not straightforward to identify readily available, preexisting neighborhood-level variables that could serve as controls for variation in need for services.

We hypothesized that 311 calls may be a low-cost form of political participation, and would thus look more similar to turnout (another form of low-cost political participation) than to political donations (a high-cost form of political participation). However, we demonstrate that 311 calls are in fact more common, on a per capita basis, in neighborhoods where more political donations are made, and less common in neighborhoods where turnout is high. We also demonstrate that 311 calls are negatively correlated with rates of returning the census, which serves as a measure of civic participation.

The specific reasons for these correlations are unclear: They may occur because there are more high-frequency users of the system in wealthy neighborhoods, or because unobserved variation in neighborhood condition causes unexpected correlations. We suspect that the occurrence of high-frequency users may be a key explanation for why 311 calls correlate with rates of political donations: The most obvious similarity between these two forms of participation is that they are not constrained to one participatory act per person per time period (unlike voting and returning the census form). Unfortunately, we cannot empirically evaluate this suspicion, due to the absence of individual-level identifiers in 311 data. In addition, we demonstrate that while controlling for neighborhood condition is theoretically possible, it is not easily accomplished using readily available neighborhood covariates. We conclude that, at least in the absence of a research design that allows for strong (preferably direct) controls for need for services, 311 calls are not a reliable tool for studying the determinants of political participation.

More generally speaking, our findings suggest that the micro-level determinants of 311 calls are not well understood. Intuitively, 311 calls appear to be low cost, but this interpretation, although shared with other researchers, is based on introspection rather than solid qualitative research into the
motivations and perceptions of individuals who place 311 calls. Our results do not warrant dismissing 311 data as a potential source of information about citizens’ political activity; rather, we suggest that before using 311 data in this capacity, we need to develop a better understanding of the mechanisms by which these calls are produced by individual citizens.

Several limitations apply to our conclusions. First of all, we have been narrowly concerned with the uses of 311 data in research questions that directly address the determinants of political participation. Our conclusions and caveats may not apply to other types of research that could be done with 311 data. In addition, we do not rule out the possibility of research designs that account for variation in the neighborhood condition, and reference several existing studies that have done so, for example, by measuring need for services by direct observation. We also acknowledge that there may be other reasonable proxies for the neighborhood condition that show more promising results, for example, accounting for building conditions, daytime populations, or other relevant variables. However, even with appropriate controls for need, we emphasize that concerns regarding the risk of ecological fallacy, and the problem of potential high-frequency users, remain and will always pose a problem for (anonymous) 311 data.

We conclude that 311 data are a good measure of aggregate demand for public services, but as a tool for studying the determinants of political participation, they should be approached with caution.

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Authors’ Note
All shortcomings of the work remain our own.

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Notes

1. See https://nycopendata.socrata.com/.
2. See https://data.cityofboston.gov/.
3. See http://www.open311.org/.
4. See O’Brien (2015) for an example of individual-level data gathered from people who opted in to having their 311 use tracked.
5. See O’Brien, Sampson, and Winship (2015) for evidence of a few users of Boston’s 311 system calling in over 100 issues in a single 15-month period.
6. Johnson (2010) suggested that “[f]or millions of Americans, dialing 311 has become almost as automatic as 411 or 911,” but we are not aware of a more systematic and/or recent assessment of how widespread awareness of 311 is among New Yorkers or among Americans more broadly.
7. 311 calls are not costless to make: Using up phone minutes costs money, which is realistically a concern for a subset of potential callers. However, the amount of money required to place a 311 call is small in comparison with the amount of money (typically) required to make campaign contributions. The aim of Table 1 is to highlight the relative cost of activities, rather than to imply that phone costs are negligible for all citizens.
8. We thank one of the anonymous reviewers for suggesting this distinction, in particular the use of the term coproduction.
9. Political donations are also capped in some cases, due to limits on donation amounts. However, the key contrast we are drawing here is between cases where a citizen can strictly participate only once per time period versus cases where multiple instances of participation are possible.
10. The data were accessed at https://data.cityofnewyork.us/Social-Services/311-Service-Requests-from-2010-to-Present/erm2-nwe9 on October 23, 2014. Although some information is available from calls placed as early as 2003, the dataset appears incomplete until 2010.
11. Geocoded calls were aggregated to the tract level as described in the next section.
12. Additional maps, of raw 311 call counts and median household incomes, are available in the online appendix.
13. We choose to treat information requests as an individual activity, because the direct benefit (receipt of a document) is confined to the individual. At the same time, we acknowledge that sometimes the content of information requests may ultimately be public oriented; for example, an information request to the Department of Finance (the most common type of information request) may relate to a civic desire to fulfill a public duty such as filing taxes accurately. Because we cannot reliably distinguish between public-minded and strictly individual-minded information requests, we choose to classify all such requests as private. Note also that ultimately, our results are very similar regardless of whether or not we restrict our attention to “public” calls.
14. In the analyses below, we also apply some geographic and time restrictions, reducing the number of calls analyzed.
15. Precinct shapefiles and demographic data were downloaded from the state redistricting commission at http://www.latfor.state.ny.us/data/; voter turnout and
registration data were downloaded from the Election Data Archive at https://dataverse.harvard.edu/dataset.xhtml?persistentId=hdl:1902.1/16320. Tract shapefiles and demographic data were downloaded from the Census Bureau at https://www.census.gov/geo/maps-data/data/cbf/cbf_tracts.html

16. Complete longitude and latitude data are unavailable for 8.5% of all calls, or just under 690,000 of the 8 million calls made in the time period from January 1, 2010, to October 22, 2014. The calls without a complete geocode are disproportionately likely to be “street-level” calls in our categorization: 22.6% of “street-level” calls lack a complete geocode, partly because calls about traffic lights and streetlights are less likely than other calls to be geocoded. This could potentially create problems for interpretation of the results, because it means that “street-level” calls are more likely to be missing from the dataset than other types of calls. As we demonstrate, our substantive conclusions do not depend on the subset of calls used in the analysis, which somewhat allays the concern that missing “street-level” calls significantly affect the results. The analysis presented here thus excludes the calls without complete geocoding. In addition, a small number of calls were geocoded as originating outside New York City tracts; these calls were also dropped from analysis. All remaining calls that have a complete geocode were successfully assigned to a tract. When aggregating to the precinct level, we omit several hundred precincts for which there are missing data on per capita 311 requests, either because the precinct did not have any calls placed in the time period examined, or because there was no recorded population in that precinct. Calls from dropped precincts represent a very small proportion of the data reported here, with such precincts producing fewer than 6,300 calls in the 2010 calendar year (out of roughly 1.6 million geocoded calls placed throughout the city in that year).

17. We use the adult population (over 18 years of age) for these calculations. The analysis excludes 73 tracts with zero population (23 tracts) or population below 250 (50 tracts) in the 2010 Census; these are public spaces, such as parks, and entertainment areas like the Barclays Center, airports, or industrial areas. In these areas, we can less reliably assume that calls are made by people who live (and therefore vote and return the census) in the same area. In these low-population areas, per capita call measures have particularly high variance (maximum estimate of 45 calls per capita with a standard deviation of 1.29 in a three-month period; this maximum estimate occurs in a tract with a census population of 2 in 2010), probably because a high proportion of calls is attributed to locals when they may be made by outsiders. Restricting the analysis to tracts with over 250 population removes outliers in the data (resulting in a maximum estimate of 0.56 calls per capita in a three-month period with a standard deviation of 0.04). See also Minkoff (2016) for a similar restriction. For more populated areas, we feel it is reasonable to assume that most calls are placed close to home: O’Brien, Sampson, and Winship (2015), for example, found that about 80% of calls made by registered 311 users in Boston are placed within a two-block radius of home.

18. Donation data was downloaded from http://data.influenceexplorer.com/bulk/. We accessed the data for state-level political donations in the 2010 cycle, which influenceexplorer.com sources from http://followthemoney.org/.
19. In our analysis, we compare the number of per capita political donations made during the entire 2010 election season and during the three-month period leading up to election. The results are broadly similar, so we report the results for the three-month period before the election for consistency with the other analyses.

20. Census mail return data comes from the Census Bureau’s 2012 Planning Database, accessed at https://www.census.gov/research/data/planning_database/2012/

21. In this three-month time period, these census tracts had a total of 428,549 calls, out of which 414,563 were “public” calls, and 87,663 were “street-level” calls.

22. See also Minkoff (2016) for a similar observation.

23. This figure, and the results shown, focuses on census tracts that saw at least one political donation during the time period studied (omitting tracts with zero donations) for ease of interpretation. Including these zero observations does not substantively change the relationship between turnout and calls, as we demonstrate in the online appendix.

24. When we remove some of the extreme values visible in the plots, the correlations become smaller but remain positive. If we examine per capita donation amounts in dollars, rather than the number of political donations, the correlations are similar: .26, .19, and .34 for all, public, and street-focused calls, respectively.

25. We note that different ways to restrict the universe of 311 calls, with the intent of narrowing down to calls related to public goods, do not make a substantial difference to the results here. This may be reassuring news for researchers who are debating different ways of subsetting the data: Based on our analysis, it is unlikely that small differences in the definition of, for example, “public” calls would make a significant difference to research results.

26. These designs are also unable to solve the issue of the data not telling us what share of the population participated, so the concern about “superusers” remains relevant even with these approaches.

27. As discussed in the “Introduction” section, we distinguish “need for services” (the presence of concrete problems that could be reported to 311) from the actual number of problems called in to 311, as actual call volumes are jointly determined by the presence of problems and people’s tendency to call.

28. The regression tables underlying this figure are available in the online appendix.

29. The regression tables underlying this figure are available in the online appendix.

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