

**COMMUNITY NETWORK DRIVEN COVID-19 TESTING AMONG MOST VULNERABLE  
POPULATIONS IN THE CENTRAL UNITED STATES (C3)**

Lead Investigators:

JOHN SCHNEIDER, MD, MPH  
ASSOCIATE PROFESSOR  
THE UNIVERSITY OF CHICAGO  
CHICAGO, ILLINOIS

KAVITA BHAVAN, MD  
CHIEF INNOVATION OFFICER  
UNIVERSITY OF TEXAS, SOUTHWESTERN  
PARKLAND HEALTH & HOSPITAL SYSTEM  
DALLAS, TEXAS

JEROME MONTGOMERY  
DIRECTOR  
PROJECT VIDA,  
CHICAGO, ILLINOIS

REV. SAMUEL ASHLEY  
ORDAINED MINISTER  
FELLOWSHIP OF AFFIRMING MINISTRIES  
BATON ROUGE, LOUISIANA

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## **BACKGROUND**

Existing COVID-19 testing and prevention strategies are failing many communities in the United States.<sup>1</sup> COVID-19 testing uptake, social distancing, and contact tracing, all face significant acceptability and implementation challenges among those most impacted in the US.<sup>2</sup> COVID-19 testing has had technical and diagnostic challenges since its inception; however, these challenges are overshadowed by significant implementation challenges. First, messaging of testing importance is complicated because of stigma related to subsequent social isolation, employment loss and potential illness and death.<sup>3,4</sup> Second, testing has been perceived by many community members to be futile. In C3 focus groups, participants have described that it is not safe to go out and seek testing without private transportation and further there is no reason to test as there is nothing that can be done (July 2020 C3 FGD, Chicago). Third, messages about the importance of testing are most often delivered by public health authorities. These messages (and the messenger) do not resonate with community who often are facing significant racism/stigma, lack resources to meet basic needs, and structural violence in the form of law and immigration enforcement.<sup>5</sup> Finally, community members who are disenfranchised from health insurance are concerned about costs of testing or that their data will be used by government. Because of these factors, community faces significant real and perceived barriers to testing.<sup>2,5</sup>

COVID-19 has disproportionately impacted disenfranchised communities.<sup>6</sup> Disenfranchisement is a status that results in distrust of public institutions and therefore individuals do not participate in services, resources, and benefits.<sup>7,8</sup> Disenfranchisement generates, maintains, and propagates vulnerability both directly and indirectly.<sup>7,9</sup> Poverty, limited opportunity for prevention or other health services and racism all contribute to the COVID-19 inequities that are similar in magnitude to other socially determined outcomes, such as kidney disease, violence and death due to AIDS.<sup>10,11</sup> Two key disenfranchised populations where significant COVID-19 transmission occurs is among criminal justice involved (ie. arrest, history of jail/prison, probation/parole) and low-income Latinx community members.<sup>6,11,12,13,14</sup> Both of these populations, and the overlap between them, have some of the highest rates of COVID-19 infection and death in the US.<sup>13,15</sup> These stark COVID-19 inequities are driven by several factors that the communities share.<sup>15</sup> First, both are often disenfranchised from employment, social services and health-care, all critical to supporting those impacted most by COVID-19. In addition, if employed, most are part of the essential low-wage workforce where transmission is high, and frequent outbreaks occur within multi-generational working households.<sup>12,16,17</sup> There often can be limited agency and self-determination in such contexts (ie. inability to self-isolate) which can be disempowering and thus requires interventions that are self-affirming. Finally both CJI and Latinx communities often have considerable distrust in institutions including public health<sup>18</sup> and lack access to accurate and contextually/linguistically appropriate COVID-19 information.<sup>19</sup> Misinformation around testing impedes efforts to effectively engage these communities.<sup>10,20</sup> Therefore, we utilize theory-driven self-affirming message framing as well as misinformation correction in order to fully engage communities around COVID-19 testing.<sup>11,21-23</sup>

Criminal justice involved populations include diverse non-incarcerated people with history of arrest/jail/ prison, community supervision (probation/ parole), mandated drug court attendance and are susceptible to distrust in public health institutions. One in five American adults has had justice exposure including arrest, incarceration, being on supervision, and/or being subjected to a number of liberty restrictions including the right to vote, right to live with family members, and employment limitations.<sup>24</sup> CJI populations' differential experiences with justice systems, and other social institutions like child welfare and Medicaid, impact willingness to engage in testing. In NIDA's first JCOIN data product developed by the C3 team we used NORC's AmeriSpeak Panel,<sup>25</sup> a probability-based panel of about 35K households designed to be representative of the US to examine COVID-19 among CJI people. We found that respondents with a history of CJI are 18x more likely to have a household member pass away from COVID (9% to 0.5%) than those without such history. Those respondents with a history of CJI are also less likely to be able to follow important preventative health measures recommended for COVID-19 (e.g., wearing a mask, social distancing). Complicating these relationships are that CJI individuals are more likely to have higher rates of legal cynicism and perception of procedural injustice which affect trust in social institutions. Legal cynicism often translates into anti-authority attitudes that affect willingness to engage in health or self-care activities, and given the higher rates of substance use, mental health, and infectious diseases among CJI populations,<sup>26,27</sup> COVID-19 test promotion messaging must be tailored to address the justice experience, distrust of justice agencies, and self-efficacy.

Low-income Latinx people (250% at or below FPL) have some of the highest rates of COVID-19 in the US and require testing interventions that address unique cultural factors and engage familial support systems. Latinx and Hispanic people (hereafter Latinx) include a diverse set of communities and several intersectional factors: country of origin, duration of time in US, and documented status. Nearly 25% of Latinx people are employed in essential service industries<sup>28</sup> (e.g., food service, factory processing) and are exposed to a greater likelihood of contracting COVID while working.<sup>29</sup> Additional barriers to consider for non-citizens are that they are more likely to experience barriers to social distancing due to household size,<sup>30</sup> and few roles in the low-wage, essential workforce have the option to work fully or even partially remotely. Latinx are also more likely to have three generations reside in a household,<sup>31</sup> which requires different approaches to promote public health messages for testing and preventing the spread of COVID-19 within a household. Latinx who are undocumented or who are in mixed-status households are more likely to be uninsured and less likely to access and utilize healthcare services<sup>32</sup> including COVID-19 testing. The existence of multi-generational and other mixed-status households are examples of the collectivistic culture that places a prominent role on familismo, which is an important protective factor for an individual's well-being.<sup>33,34</sup> Family network based approaches that integrate household members play a critical role in promoting well-being for oneself as well as others.<sup>35</sup> The social network strategy is an example of a testing approach that can leverage existing family network structures to promote and engage even the most marginalized communities in testing.

The Social Network Strategy (SNS) was developed for HIV and is adapted to accelerate COVID-19 testing to identify networks most at risk. Social network interventions are recognized as highly potent testing interventions that move beyond individual-level "risk"<sup>36</sup> which are key to COVID-19 elimination efforts. Network mobilization/induction is a Type III intervention strategy that stimulates peer-to-peer interaction to create behavioral diffusion through existing social pathways among network members.<sup>37</sup> This Type III intervention<sup>37</sup> represents a class of network interventions that have been found to be effective in HIV prevention (i.e., CDC's EBI—Social Network Strategy).<sup>38</sup> Past research has shown that individuals who are members of the same social network are more likely to have similar HIV risk potential.<sup>39</sup> SNS identifies HIV positive individuals and/or individuals at risk for acquiring HIV and motivates them to recruit persons from their social network for testing and provides modest compensation for referrals. In so doing, the reach of the testing program increases as does the volume of people tested. In a recent study conducted by members of C3,<sup>40</sup> the social network strategy (SNS) was superior in HIV case identification when compared to standard testing approaches, such as those in health care settings (i.e. emergency department) or contact tracing. These findings are not surprising given that social network theory, such as homophily (i.e. birds of a feather)<sup>41</sup> suggest that subsequent waves of referred network members will resemble an index client's attributes.

## **STUDY DESIGN**

The scientific premise of C3 is to engage disenfranchised people in COVID-19 testing through social network referral combined with theory-driven COVID-19 prevention messaging. Eligible CJI and Latinx clients (and the overlap between the two) will be enrolled into C3.

Using a two-arm randomized controlled trial design, participants will be enrolled into the SNS arm (involves social networking referrals only) or the SNS+messaging arm. The latter includes affirmation/misinformation correction messaging (discussion tools and coaching). SNS and SNS+messaging arms will both include an initial group of index study participants who will refer their network members into the study and the process will repeat itself one more time for a total of 3 waves.

The University of Chicago site will enroll a total of 350 participants (estimated n=42 index seeds, n=308 1<sup>st</sup> and 2<sup>nd</sup> degree network referrals). A total of 2400 participants will be enrolled (estimated n=300 index seeds and n=2100 1<sup>st</sup> and 2<sup>nd</sup> degree network referrals) across eight sites in the Central US: Dallas County, TX (n=600); East Baton Rouge, LA (n=200); Pulaski County, AR. (n=200); Marion County, IN (n=200); Porter County, IN (n=200); and Cook County, IL (n=800).

## **AIMS**

This study aims to evaluate the implementation of a combination Social Network testing Strategy (SNS) with COVID-19 prevention messages (SNS+) to engage disenfranchised populations such as criminal justice

involved (CJI) and low-income Hispanic/Latinx (hereafter Hispanic) community members in COVID-19 testing and prevention strategies across eight sites in the Central United States. Accordingly, the SNS+ team aims to:

***Test intervention efficacy (numbers tested - COVID-19 test results will be collected as part of study data) and community factors that may moderate efficacy. Secondary analysis to compare numbers tested in SNS strategies and COVID-19 contact and determine whether COVID-19 status within social networks impacts the referral process.***

## **STUDY SITES**

This multi-site study will be completed at eight sites as shown in Table 1 below. No research will take place at these sites at this time. After IRB approval of the University of Chicago site, the UofC study team will amend this protocol to include a request to rely for the following listed sites as well as details regarding the conduct of research activities at each location.

After IRB approval, these sites will participate in the same research activities, including recruitment, participant engagement and interviews. University of Chicago will provide pre-programmed tablets to all study sites. These tablets have been programmed by the Research Computing Group within the Department of Public Health Sciences (leadership Phil Schumm) at the University of Chicago to ensure data protection and enable data transfer. All data collection will be conducted electronically via tablets and data will be uploaded into databases hosted by University of Chicago. These are similar procedures as have been developed with Schumm for NIDA's Methodology and Advanced Analytics Research Center (PI Schneider).

The University of Chicago BSD IRB will act as IRB of Record for all sites.

**Table 1: Breakdown of study sites**

Study Sites	Site PI	Stakeholders	Key Community Populations	Sample Size(n)	Scholarly Contribution
<b>South Cook Cnty., IL</b> <i>University of Chicago</i>	John Schneider	<ul style="list-style-type: none"> <li>Illinois Dept. of Public Health</li> <li>Cook County Jail</li> </ul>	Black CJI	350	Network science, COVID-19 testing
<b>West Cook Cnty., IL</b> <i>Howard Brown Health</i>	Aniruddha Hazra	<ul style="list-style-type: none"> <li>Chicago Dept. of Public Health</li> </ul>	Latinx	500	LGBTQ, COVID-19 testing implementation
<b>Jackson Cnty., IL</b> <i>TCAP, Inc.</i>	Mai Pho	<ul style="list-style-type: none"> <li>Jackson County. Health Dept.</li> <li>Jackson County. Jail</li> </ul>	Rural, CJI, substance users	200	Rural Health
<b>Marion Cnty., IN</b> <i>Indiana University</i>	Matthew Aalsma,	<ul style="list-style-type: none"> <li>Indianapolis Juvenile Correction Facility</li> <li>Marion Superior Court</li> </ul>	Juvenile CJI	200	Law, ethics
<b>Porter Cnty., IN</b> <i>Indiana University</i>	Matthew Aalsma	<ul style="list-style-type: none"> <li>Indiana Dept. of Public Health</li> </ul>	Juvenile CJI	100	Adolescent health
<b>Pulaski Cnty., AR</b> <i>University of Arkansas</i>	Nickolas Zaller	<ul style="list-style-type: none"> <li>Pulaski County. Health Unit</li> </ul>	CJI	200	Criminology, faith-based engagement

for Medical Sciences		▪ Central AR Community Correction Center			
<b>Baton Rouge, LA</b> Capitol Area Reentry Program (CARP)	Russell Brewer	▪ Orleans Health Dept.	CJI, substance users	250	Implementation science
<b>Dallas Cnty., TX</b> University of Texas SW	Kavita Bhavan	▪ Parkland Hospital	Latinx	550	Predictive analytics, vulnerability index, COVID-19 testing

## **METHODS**

***AIM: Test intervention efficacy (numbers tested – COVID-19 test results will be collected as study data) and community factors that may moderate efficacy. Secondary analysis to compare numbers tested in SNS strategies and COVID-19 contact and determine whether COVID-19 status within social networks impacts the referral process.***

We hypothesize that participants randomized to receive SNS+ (SNS+COVID-19 messaging) will be more likely to have their network members successfully tested. We also hypothesize that both SNS and SNS+ will generate more people tested per index as compared to COVID-19 contact tracing. Finally, we anticipate that there may be differential intervention effects across sites, by CJI status, prior COVID-19 testing history, race/ethnicity, and network composition, and will formally evaluate these differences as part of analyses.

**Recruitment of Index and Network Member study participants.** We will enroll 42 index seeds (12% of sample) ages 18 and over who are CJI or low-income Latinx across eight collaborative sites. Index clients and their social network referrals will be recruited by local Research Assistants (RAs) embedded within community-based agencies and community health care settings that provide a number of in person and remote social and care services, including community COVID-19 testing. Participants will also be recruited from individuals from previous studies who have indicated interest in being contacted for future work or from existing community programs.

They will also be recruited through other study participants through compensated referral. Each study participant will be given a referral code that will be used for identification purpose. The study participants will distribute flyer and the referral code to people who are eligible for the study. People who are eligible and provide the referral code can be enrolled in the study. Participants will also be recruited from participants in other studies who have agreed to be contacted for future studies.

A two-step referral process will be utilized whereby index seeds will refer 308 first- and second-degree social network members (88% of sample). So indexes will refer network members (1<sup>st</sup> degree) and then those network members will refer one more round (2<sup>nd</sup> degree). Index seeds will meet the eligibility for index community members while the first and second-degree network members will meet the social network member eligibility (see inclusion and exclusion criteria below). Based upon previous experiences with SNS recruitment, we expect on average two social network members to be referred per study participant. Thus, first-degree network members (n=84) will refer second-degree network members (n=168). We will supplement the sample with index seeds and network members until the full 350 have been enrolled.

Each study participant will be given a referral code that will be used for identification purposes. The study participants will distribute the referral code to their network members who are eligible for the study. People who are eligible and provide the referral code can be enrolled in the study. Network members will also have the

option to bring others into the study visit with them or link them to the RA at a study site that is recruiting for this study.

### **Site Specific Recruitment Plans and Facilities**

#### **University of Chicago**

Interactions with participants will be conducted at the Chicago Center for HIV Elimination (The Village/CCHE) at the University of Chicago. The Chicago Center for HIV Elimination provides services to clients from vulnerable populations (including Latinx and criminal justice involved) and has enrolled participants in current and previous research studies. Research Assistants located at The Village will recruit participants in person. Recruitment will be conducted at the Village, during regular drop-in and community-based services and events occurring at the Village and its outreach programs. Interested subjects would be consented either using paper, or via RedCap electronic consent in-person using a tablet.

Additionally, we will recruit subjects remotely from subjects who have provided consent to be contacted for future studies will be approached. These include studies such as BARS(IRB16-1430), LINK2(IRB16-1419), JPrEP(CIRB18-1769) and N2(IRB19-0632). For these subjects, we would contact via telephone and/or email to gauge interest. If the subject is interested in participating, the study team will ask the potential subject to come to the Village to consent and engage in the initial study visit.

### **Inclusion and exclusion criteria**

#### **Index community members** will be:

- (1) 18 years or older;
- (2) spend majority of their time in the metropolitan area or county where recruited;
- (3) have access to a phone for 10-day follow-up call; and
- (4) primary communication in English or Spanish (based on site chart above) AND at least one of the following:
  - (i) CJI in the previous three years (operationalized as any jail, prison, arrest, parole, probation, drug court during this timeframe);
  - (ii) lower-income Latinx (operationalized as at or below 250% of FPL).

#### **Social network referrals** will be:

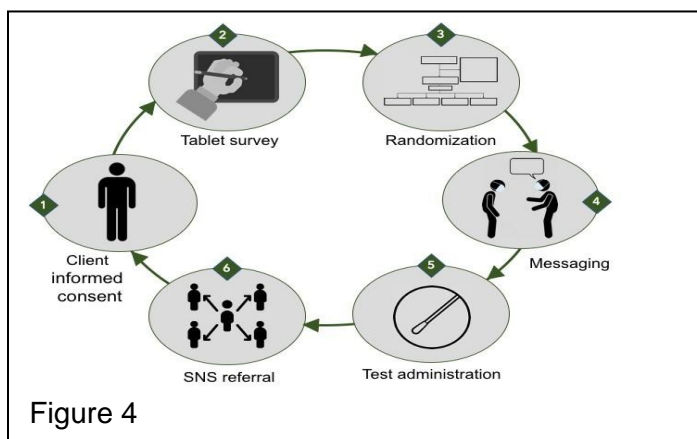
- (1) linked to the index as a “friend, family, coworker or someone you spend time with on a regular basis”;
- (2) visit within two weeks of index visit;
- (3) 18 years or older;
- (4) spend the majority of their time in the metropolitan area or county where recruited;
- (5) have access to a phone for 10-day follow-up call; and
- (6) primary communication in English or Spanish (based on site chart above).

#### **Exclusion criteria include:**

- (1) inability to provide informed consent; and
- (2) active COVID-19 symptoms per CDC. Participants with COVID-19 symptoms will be referred for free testing at existing partners for each of the study sites.

**Study visit procedures.** All study participants (index and referral) will go through the following study procedures (Figure 4) include:

- (1) Informed consent;
- (2) Day 1 survey;
- (3) Randomization;
- (4) Messaging intervention (for SNS+ only);
- (5) COVID-19 testing and
- (6) Social Network referral
- (7) Day 10 Follow-up



**1. Informed Consent.** Eligible participants will be asked to participate in written informed consent using either a paper consent or electronic consent in RedCAP using a tablet. The RA located at each site will administer consent in a private room prior to any study procedures taking place. Potential subjects who are recruited remotely will be asked to come to the Village to consent (and engage in the initial study visit). In addition, all study participants will be asked to sign a release of information so that the study team receives the COVID-19 testing results.

**2. Day 1 Survey (Tablet).** Following consent, study participants will complete a tablet survey that includes social network inventory (identifying information of contacts (First name and last initial and address/cross streets) is collected through self-report in the context of covid-19 risk and exposure questions). Day 1 Survey (Tablet) is found in Appendix A. This will survey will be completed on the day of recruitment and will take 45-60 minutes. The RA can interview participants who have difficulty self-administering the survey.

**3. Randomization.** Will occur following the survey, and participants in the SNS+messaging arm will receive the messaging intervention (discussion tools and coaching). Study participants will be randomized to receive no messaging (i.e., SNS only) or SNS+messaging with equal probability. Randomization will be performed at the participant level, meaning that in general, participants within a recruitment cluster will be assigned to different groups. Random assignments will be provided via a web-based API, with the touchpads programmed to retrieve an assignment at the appropriate time and deliver the messaging (or not), as appropriate.

Indexes and first-degree referrals will be randomized as described above. Second-degree referrals will also be randomized, however, we will not ask for additional SNS referrals from them if the study sample size has been reached.

- 4. Messaging Intervention.** Study staff will be notified of group allocation and provide the in-person message reinforcement and will address questions related to messaging.
- a. *C3 Study Conditions.* Trained community engagement coordinators (CEC) that exist across C3 sites will deliver the study conditions. The CECs will have capacity to support multiple participants simultaneously in the self-administered portion of the study visit: clarifying any survey items, troubleshooting any technology/data collection issues, and transitioning to interviewer administered for people with limited literacy. CECs will provide the appropriate scripted messaging strategy based upon condition assignment (see conditions below) and will follow with describing and motivating the SNS network referral process.
  - b. *SNS Study Condition.* Study participants in the SNS condition will receive the SNS intervention. This will occur towards the end of the study visit when CEC staff describe the SNS, construct a plan for

successfully referring network members into the study, and discuss compensation for the recruitment efforts. CECs will specifically discuss network members of interest: “friend, family, coworker or someone you spend time with on a regular basis”. Walkthrough and scenario play will be strategies to assist with planning regarding: (1) how the conversation will be raised, (2) how potential barriers to testing will be addressed, (3) how the screening by phone or web survey will be conducted, (4) how network members will have the option to bring others into the study visit with them, (5) what information about the study will be shared. Information from the client providing referrals will be kept confidential. Participants will be compensated \$20 per successful test completed per network member and up to six referrals, consistent with our previous work.<sup>42</sup>

- c. *SNS+Messaging Condition*. The SNS+ condition will include everything described in the SNS condition above. In addition, a scripted message (Appendix B) and interactive activity in the participant’s preferred language will be deployed via the tablet in written and audio format.

5. COVID-19 Testing. All study participants, irrespective of symptoms, will be tested for COVID-19 by the clinical team at CCHE/The Village. Clients, irrespective of symptoms, are routinely offered COVID testing at CCHE/The Village. Testing procedures will follow existing SOPs utilized at CCHE/The Village, utilizing FDA-approved tests. COVID testing at CCHE/The Village is covered by the Illinois Department of Public Health. Test result provision will be provided by the testing/clinical team and not the research team. All participants will be asked sign release of information forms for study team members to obtain test results. COVID test results will be collected as part of study data and will be needed to determine the effectiveness of the intervention.

6. Social Network Referral – Network referrals will be conducted as outlined above (See SNS Study condition). A study information card (Appendix C) will be given to all enrolled subjects to share with their network referrals. The information card contains information about the study and study team contact information. Linkages between study participants are collected through a code/code word process that our team has used in previous network referral studies.

7. Day 10 Interview - Study participants will be contacted 10 days following the initial study visit via phone or Zoom, depending upon client preference. Data will be captured electronically by the research coordinator using a study tablet. This interview also includes social network inventory (identifying information for contacts is collected in the context of covid-19 risk and exposure questions). Day 10 Interview is found in Appendix B. The 10-day follow-up (Day 10 Interview) has two purposes:  
(1) administering perceived message effectiveness surveys and post-intervention COVID-19 knowledge assessment; and 2) check-in on network member referral (Appendix D).

**Subject Compensation.** Compensation will be provided for study participation - \$50 after the first visit and \$20 after the 10-day follow-up. Participants will be provided a \$20 incentive for each network referrals initiated (up to six referrals, up to \$120 for referrals). Payments will be in cash or e-payments such as CashApp, PayPal or Venmo.

**C3 Study Conditions.** Trained community engagement coordinators (CEC) that exist across C3 sites will deliver the study conditions. The CECs will have capacity to support multiple participants simultaneously in the self-administered portion of the study visit: clarifying any survey items, troubleshooting any technology/data collection issues, and transitioning to interviewer administered for people with limited literacy. CECs will provide the appropriate scripted messaging strategy based upon condition assignment (see conditions above) and will follow with describing and motivating the SNS network referral process.

**Primary Outcomes.** We focus on two primary outcomes:

- (1) Total number of tests among network members referred for COVID testing (network tested) - Network tested is measured at the participant level by the number of network members that are tested through the SNS
- (2) proportion of network members tested (tested proportion).



**Other Important Variables:** Age, race, ethnicity, gender, sex at birth, and CJI history; as well as COVID-19 knowledge, testing history, infection history, substance use history, beliefs around mask efficacy, treatment/prevention history, vaccine knowledge/attitudes, prior contact by contact tracer, experiences of racism, housing status, food insecurity, employment, experience of violence, workplace resources, PPE availability, and known COVID-19 contact.

**Analytic overview.** Two types of analyses will be performed.

The first will focus on the likelihood that a participant's network members are referred for testing. This will be modeled using logistic regression, with each network member treated as an observation (tested versus not). A three-level hierarchical model will be used, with random effects at the level of the study participant (level two) and the recruitment cluster (level three, all participants referred by the same index participant).<sup>43</sup> We shall also consider adding site as a fourth level to permit us to estimate between-site variability both in the outcomes and in the effectiveness of the interventions.

The second analysis will focus on the total number of individuals referred by a participant for testing, including both network members and additional referrals not initially named as part of the participant's network. The total number of referrals will be modeled using negative binomial regression.<sup>44</sup> A random effect at the level of the recruitment cluster will again be included to capture potential within-cluster correlation in the number of referrals. To ensure correct inferences even in cases where our models do not fully capture the within-cluster correlation in the data, we shall use the clustered version of the robust (i.e., sandwich) variance estimator throughout.<sup>45</sup>

**Primary outcome analysis (overall comparison of SNS vs. SNS + messaging).** The primary outcome analysis will compare the likelihood of testing among network members and the total number of referrals tested between those assigned to SNS and those assigned to SNS plus messaging. Our initial analysis will not adjust for covariates, relying instead on the randomization to justify the comparison. We shall then incorporate covariates—measured at both the level of the network member (e.g., member characteristics and the nature of the relationship to the participant) and of the participant—to improve the precision of our estimates and to identify demographic and social characteristics associated with differences in referral yield. In addition, we shall consider interactions between intervention group (SNS vs. SNS + messaging) and participant characteristics to determine whether messaging is more effective in certain groups than others. Since we shall consider several possible interactions, we shall use partial pooling within a Bayesian estimation framework<sup>46</sup> to avoid bias and address the issue of multiple comparisons.

**Secondary outcome analyses:** We shall use negative binomial regression to compare the average number of referrals tested per index client between those recruited to C3 and assigned to the SNS condition and a comparison group of clients at the same sites receiving standard contact tracing only. This analysis will be performed first using only those contact tracing clients who visited the sites on a day randomized to no C3 recruitment, since these individuals should, on average, be similar to those recruited into the study. A subsequent analysis will be performed using a larger set of non-study clients to increase precision; this will use covariates capturing demographic and other client characteristics to adjust for potential differences between the C3 SNS group and the non-study comparison group. Analyses will use generalized linear mixed models similar to those described above, as appropriate.

**Power calculations:** In order to estimate our power, we performed the following simulation. We assumed that index participants generate network members according to a negative binomial distribution with mean 4 and SD 2.8 (to match the study design, networks larger than 6 were truncated). Each network member comes in for testing with a probability determined by the group to which they are assigned, and we conservatively assume intraclass correlations of 0.46 within a participant's network and 0.37 within a recruitment cluster. If we assume that the overall likelihood of testing among network members is 0.44 among the SNS group and 0.52 among the SNS plus messaging group, then an overall sample size of 2,400 participants will provide approximately 87% power to detect the difference at the 0.05 level (twosided). We shall have approximately 80% power to detect an interaction between the intervention and a binary participant characteristic (Groups A and B) such

that the overall probability of testing for those receiving SNS only (both A and B) is 0.44, the probability of testing for those in Group A receiving SNS plus messaging is 0.50, and the probability of testing for those in Group B receiving SNS plus messaging is 0.63 (i.e., messaging is more effective among Group B).

**Attrition and missing data:** All participants enrolled in the study will be included in our analyses; since the primary outcomes will be measured based on referrals coming in to get tested which does not require additional participation by the participant, we anticipate very little missing outcome data (referrals who come in for testing and decline to identify the person who referred them will not be counted). Any missing data will be addressed using multiple imputation<sup>47</sup> or by using a fully Bayesian approach to estimate the model<sup>48</sup> (in which missing data are essentially treated as additional unknown parameters).

## **POTENTIAL RISKS AND BENEFITS TO SUBJECTS**

**Study Risks.** Interviewed subjects will be exposed to minimal risk: loss of confidentiality and discomfort from the questionnaire. Subjects will be told they do not need to answer any questions that make them uncomfortable. Linkages between study participants are collected through a code/code word process that our team has used in previous network referral studies. All survey data will be collected using a tablet and linked through the subject's study code instead of name. Tablets will be encrypted and data will be password-protected and HIPAA compliant. At all sites, COVID infection control procedures will be in place. These will include a COVID symptom screener (Appendix E), temperature checks, mask-wearing requirement and at least six feet apart during in-person interactions.

**Benefits:** The primary potential benefits of this research will accrue to participants of this study and their networks. Participants will be linked to COVID-19 testing and treatment services as needed. The results of this study may lead to future interventions which can support COVID-19 prevention messaging, linkage to testing and treatment services for disenfranchised populations.

## **DATA STORAGE AND SHARING**

Each site will upload their respective study data into the study database hosted by the University of Chicago. The study database will be maintained on a secure server and will be managed by the Research Computing Group within the Department of Public Health Sciences at the University of Chicago. Data is uploaded through a Secure Shell File Transfer Protocol (SFTP). The SSH protocol supports encryption and other security methods used to better protect file transfers. During file transfer, sensitive information will be encrypted and made unreadable when being transferred between the UChicago server and data recipient. Only the recipient with the required decryption key will be able to see the original content. This prevents any unauthorized access during file transfer.

Raw data stored in the study databased will include subject PHI, including subject name, address, date of birth, dates of visit, dates of covid test. Additionally, the study data will include all responses to study survey and interview (these include first names and address/location of contacts), as well as the covid test result.

The Research Computing Group will de-identify the raw dataset before it is accessible to the University of Chicago study team. The University of Chicago study team will not have access to the identifiers within the raw data. Study analysis will be done using the de-identified dataset. This de-identified dataset may be shared between participating C3 centers (who have entered into data use agreements) for collaboration and analysis purposes.

After study termination once the final data analysis and study manuscript are complete, identifiers will be removed from the raw study data and the de-identified data will be maintained for up to 10 years after IRB termination.

## **REFERENCES**

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