Longitudinal cohort of HIV-negative transgender women of colour in New York City: protocol for the TURNNT ('Trying to Understand Relationships, Networks and Neighbourhoods among Transgender women of colour') study

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ABSTRACT

Introduction In the USA, transgender women are among the most vulnerable to HIV. In particular, transgender women of colour face high rates of infection and low uptake of important HIV prevention tools, including pre-exposure prophylaxis (PrEP). This paper describes the design, sampling methods, data collection and analyses of the TURNNT ('Trying to Understand Relationships, Networks and Neighbourhoods among Transgender women of colour') study. In collaboration with communities of transgender women of colour, TURNNT aims to explore the complex social and environmental (ie, neighbourhood) structures that affect HIV prevention and other aspects of health in order to identify avenues for intervention.

Methods and analyses TURNNT is a prospective cohort study, which will recruit 300 transgender women of colour (150 Black/African American, 100 Latina and 50 Asian/Pacific Islander participants) in New York City. There will be three waves of data collection separated by 6 months. At each wave, participants will provide information on their relationships, social and sexual networks, and neighbourhoods. Global position system technology will be used to generate individual daily path areas in order to estimate neighbourhood-level exposures. Multivariate analyses will be conducted to assess cross-sectional and longitudinal, independent and synergistic associations of personal relationships (notably individual social capital), social and sexual networks, and neighbourhood factors (notably neighbourhood-level social cohesion) with PrEP uptake and discontinuation.

Ethics and dissemination The TURNNT protocol was approved by the Columbia University Institutional Review Board (reference no. AAAS8164). This study will provide novel insights into the relationship, network and neighbourhood factors that influence HIV prevention behaviours among transgender women of colour and facilitate exploration of this population's health and well-being more broadly. Through community-based dissemination events and consultation with policy makers, this foundational work will be used to guide the development and implementation of future interventions with and for transgender women of colour.

Strengths and limitations of this study

- Focus on transgender women of colour, the population most-affected by HIV in the USA.
- Through close collaboration with communities of transgender women, recruitment methods, data collection tools and dissemination activities have been tailored to the lives of transgender women of colour.
- Objective measures (global positioning systems) of individual movements to more accurately assess spatial behaviour and neighbourhood-level exposures.
- Opportunity for exploration of the factors that support and undermine health and well-being specific to but also well-beyond HIV for transgender women of colour.
- Study is limited by inclusion of only some racial and ethnic groups and the focus on a large urban centre that may not reflect transgender experiences in other parts of the USA.

BACKGROUND

Around the world, transgender women (those assumed male at birth who come to understand themselves as female) face unique barriers to their health and well-being. In the USA, these barriers most commonly

include access to services, experiences of stigma and discrimination, lack of medical and cultural competency among healthcare providers and socioeconomic constraints.[1] Challenges such as these undermine many aspects of health but manifest profoundly in the odds of HIV, which among transgender women is estimated to be over 34 times higher than the general population of the USA.[2] From an intersectional perspective, HIV not only disproportionately affects transgender women but in particular those of colour: a recent meta-analysis estimated HIV prevalence to be significantly higher among Black (44.2%) and Latina transgender women (25.8%) when compared with White transgender women (6.5%).[3] Research has also found that transgender women of 'other' racial backgrounds (including Asian and Pacific Islander) have higher rates of HIV than their White peers (9.8% vs 6.7%)[3] and that Asian and Pacific Islander transgender women may be more likely to engage in practices that increase risk of HIV, like condomless sex and illicit drug use.[4]

Research from the USA has found that transgender women of colour often have less access to and uptake of HIV prevention activities than their White peers.[5] Notably, while HIV pre-exposure prophylaxis (PrEP) has emerged in recent years as a promising HIV prevention tool for transgender women,[6] research has consistently found low awareness and uptake of the medication among transgender women of colour.[7–10] Interestingly, one study of Black cisgender gay and bisexual men and transgender women found that only a small minority were using PrEP even though most participants were aware of and willing to use the medication,[11] further highlighting the need for more detailed understandings of the mechanisms for this disparity among transgender women specifically.

In recent years, researchers have paid increasing attention to HIV prevention and risk as it operates on many levels, including for relationships, networks of people and neighbourhoods.[12] Specific to PrEP, emerging research from the USA suggests that characteristics of one's social network can influence awareness and uptake among young cisgender gay and bisexual men[13 14] and young transgender women.[15] Similarly, another study found that PrEP awareness among young Black gay and bisexual men related both to their networks and also the density of health clinics in their home neighbourhoods.[16] The degree to which any of these relationships are relevant to transgender women of colour, however, remains unknown, especially given the tendency of previous research to conflate populations of transgender women with those of cisgender gay and bisexual men.[17 18] Further, research that permits causal inferences and accounts for the complexities of network and neighbourhoods is lacking; the existing literature, nevertheless, highlights the necessity of attending to network and neighbourhood predictors of PrEP uptake.

This paper describes the TURNNT (**T**rying to **U**nderstand **R**elationships, **N**etworks and Neighbourhoods among **T**ransgender women of colour) study, which aims to establish a prospective cohort of HIV-negative transgender women of colour in order to assess multilevel aspects of HIV prevention and risk. By employing an intersectional perspective[19] within the context of a social ecological model,[12 20] TURNNT will explore the complexities, practices and power dynamics of individual transgender women of colour as they live their lives within diverse networks and neighbourhoods of New York City.

METHODS AND ANALYSES

Study aims

The aims of this study are to (1) investigate cross-sectional and longitudinal associations (independent and interactional) between relationship, network and neighbourhood factors on PrEP uptake among transgender women of colour, and (2) investigate associations between relationship, network and neighbourhood factors and PrEP uptake and discontinuation among transgender women of colour.

Study design

This study comprises a prospective longitudinal 1-year cohort of transgender women of colour based in New York City.

Patient and public involvement

This project has been designed in close consultation with communities of transgender women of colour in New York City, adopting an explicitly community-based approach to research. During a 9-month consultation period, meetings were held with dozens of stakeholders representing different communities and organisations relevant to this study population. Organisations and individuals consulted included those providing health and other services to transgender women of colour, those involved with advocacy and support, social organisations, community groups and others. By holding these meetings early in the development of this project, the feedback was able to substantively inform all aspects of its design. For example, we amended survey questions around housing and home neighbourhoods after several community consultants made clear that housing stability was likely to be a significant challenge for a proportion of TURNNT participants. To ensure ongoing feedback and collaboration, a 'Community Advisory Board' comprising leaders of prominent transgender health, advocacy and support organisations in New York City was formed. This group will meet biannually over the course of the project to provide ongoing consultation on design, implementation, analysis, interpretation and dissemination, activities for which they are provided an annual stipend. At this project's close, several community-based research dissemination events will be hosted around New York City.

Participants

This study will recruit 300 transgender women of colour based in New York City. To be eligible for participation,

individuals must (1) be between 16 and 55 years old at baseline, (2) identify as a transgender woman, (3) be HIV negative, (4) identify as Black, African American, Latina, Latinx, Asian and/or Pacific Islander, (5) reside in New York City and (6) report no plans to move during the 12-month study period. Participant age restrictions reflect that, among transgender women in the USA, 98% of HIV diagnoses occur among those aged 54 years and younger.[21] Of our total targeted sample of 300 participants, we will employ stratified sampling to recruit 150 Black or African American transgender women, 100 Latina or Latinx women and 50 Asian and Pacific Islander women. Participants who report multiple racial or ethnic backgrounds will be counted as distinct from the categories outlined here and, as necessary, large groups of mixed racial backgrounds will be used to form additional strata. Further, current clinical estimates from a large community health service in New York City suggest that 26% of sexually active transgender women of colour access PrEP;[22] efforts will be made to slightly oversample PrEP users so that they comprise approximately one-third of the sample (n=100).

Recruitment and research interviews

TURNNT will undertake a multifaceted approach to recruitment. Recruitment will combine several different strategies in an effort to meet sample size targets and has been designed to reach diverse communities of transgender women of colour, including along the lines of geography, age and social interests (eg, house ball scene, a chosen-family and event-driven subculture popular among young gay, lesbian and transgender people of colour[23]). Specific recruitment activities will include (1) paid advertising on social media, (2) distribution via existing online social groups, (3) print advertising distributed in health services and venues, (4) event-based recruiting and (5) referrals from transgender health and support organisations. The TURNNT Community Advisory Board will provide guidance on venues and events most likely to reach the target population. All recruitment efforts will direct to a dedicated study website (www.turnnt.com) to assess eligibility and gather contact details, which will be used to arrange research interviews. To support those who may not have regular access to the internet, the eligibility survey will be completed as part of in-person recruitment efforts.

TURNNT interviews will be conducted in either English or Spanish by peers (ie, self-identified transgender women of colour) in a private interview space. To facilitate access, participants will be able to select where their interviews are conducted from among several geographically dispersed interview spaces located in offices, health services and community support centres around New York City. TURNNT has negotiated referral agreements with several primary care and sexual health services that specialise in caring for transgender women; in the event that participants express an interest in receiving PrEP, want clinical testing for HIV or other sexually transmissible infections, or have other healthcare related needs or requests, research interviews will work with them to ensure appropriate referral to a partner service.

Data collection

We will undertake three waves of data collection over 12 months with each wave separated by a period of 6 months (figure 1). At each point, participants will provide four types of data—survey responses, GPS data, network details and HIV testing—linked by a unique participant identifier assigned at baseline. Participants will have the option to conduct their interviews at locations in Manhattan, the Bronx, Queens or Brooklyn. Because GPS data will be collected over a 1-week period, each wave will be disaggregated into two visits separated by a period of at least 1 week, which means that each participant will undertake six research interviews in total. For their time and travel expenses, participants will receive 50USD per research interview in wave 0 (baseline), 75USD per interview in wave 1 and 100USD per interview in wave 2. Participants who complete all three waves will receive an additional 50USD at their final study visit (figure 1).

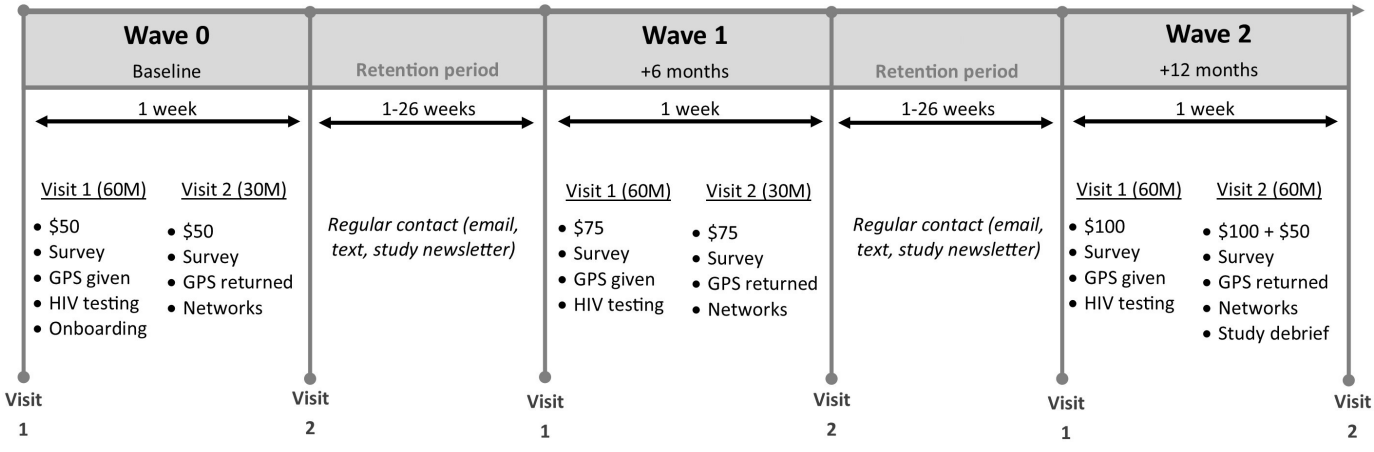

Figure 1 Overview of the TURNNT (Trying to Understand Relationships, Networks and Neighbourhoods among Trans women of colour) cohort study longitudinal data collection processes with 300 transgender women of colour in New York City, 2019–2021

Surveys

Participants will be invited to complete surveys administered during the first and second visits of each study wave. The first of these surveys will collect information on housing, perceptions of neighbourhood characteristics, stigma and discrimination, PrEP use, gender affirming processes, sexual practices, sex work, drug use and social capital. This same survey (excluding baseline demographic questions, like year of birth) will be repeated at each wave and, as such, all questions will be contextualised by 6-month timeframes (eg, 'In the previous 6 months, how often have you…'). The second survey of each wave will be completed a week after the first and will focus on residential and work locations and movement patterns over the period since the first visit, information that will be used to complement the study's GPS data. All surveys will be delivered via the digital platform *Qualtrics*, which facilitates skip patterns to avoid asking unnecessary questions. The surveys are disaggregated into sections, some of which are self-administered and others administered by a member of the research team. The survey instruments can be completed in either English or Spanish and if a participant wishes, the entire survey can be administered by a member of the research team. The survey instruments were developed in close consultation with the Community Advisory Boards and were focus tested with four transgender women of colour (two Black and two Latina), for which they were compensated 50USD.

Information on relationships and social and sexual networks

At the second visit of each study wave, close-ended questions will be used to elicit details on participants' relationships and specific members of their social and sexual networks. Participants will be asked about their platonic, romantic and sexual relationships, including if they have experienced intimate partner violence. For more detailed network analyses, we will employ a standard egocentric name generator approach whereby participants are asked to name as many of their friends and sexual partners as possible, which the interviewer will probe to get some sense of network sizes (ie, contacts) over the previous 6 months. Following, participants will be asked to provide more detail on their five closest friends and five most recent sexual partners.[24] This information will be used to define participants' social and sexual networks, including any overlap between each network. Network details will be collected using a tool known as *Network Canvas*, software designed to improve the collection of network data of these kind.[25] Table 1 details the information that will be collected (if known) about each social and sexual network member.

Table 1 Social and sexual network member information to be collected from a sample of transgender women of colour living in New York City (n=300)

	Network	
	Social	Sexual
Age	■	■
Race/ethnicity	■	■
Gender	■	■
HIV status	■	■
Discuss HIV	■	■
Discuss gender affirmation	■	
Discuss racism and/or transphobia	■	
Provide emotional support	■	■
Provide tangible support	■	■
Faith/religious status	■	
Frequency of contact	■	■
Length of relationship	■	■
On PrEP/HIV treatment	■	■
Condom use		■
Sex acts experienced		■
Type of partner		■

PrEP, pre-exposure prophylaxis.

GPS mobility details

At each wave, participants will also contribute data on their daily path areas via wearable GPS devices. GPS devices have been found to more accurately assess neighbourhood exposures than relying on participant recall[26] or the use of administrative neighbourhood units.[27] During the first visit of each wave, participants will be provided with a GPS device (*Qstarz BT-Q1000XT*, manufactured by Qstarz International Co., Ltd., Taipei, Taiwan), a charging cable and instructions on their use. Participants will be instructed to carry this device with them for 7 consecutive days, except when swimming and bathing, and to charge it overnight.

During the week between study visits, GPS devices will log participants' coordinates (latitude and longitude) every 10 seconds, an interval selected to collect a large number of location points while respecting battery and data storage constraints. At the end of the 1 week period, participants will return the device, at which point their data will be extracted from the device, encrypted and added to the study database. A short survey will be administered to collect some basic details on where participants lived and worked during the week as well as general information on their movement patterns (eg, travel outside New York City).

HIV testing

All HIV testing will be conducted in accordance with guidelines provided by the New York State Department of Health.[28] During the first visit of each wave, a point-of-care rapid HIV test will be administered. All participants with reactive rapid tests will be immediately supported in accessing a service that can provide confirmatory HIV testing; TURNNT has agreements with several HIV testing sites around New York City to ensure that this can be done immediately following a reactive rapid test result.

Any participant with confirmed HIV infection, including existing infection, will receive support to access HIV care. Participants will sign release of information forms that allows for sharing of clinic information (eg, linkage to care, treatment uptake, viral load) with the study team.

In-depth interviews for participants with HIV

Even though this project will employ an eligibility survey with information confirmed by a research assistant, it is possible that people living with a known HIV infection will present for participation. Participants with a known or new HIV infection will be invited to take part in an in-depth, semistructured interview on their experiences of being diagnosed and living with HIV, HIV care and management, relationships and networks, neighbourhoods and housing, experiences of stigma and discrimination and gender affirming care. Interviews will be audio recorded and transcribed, with participants compensated 50USD for their time and travel expenses. Interviews will be conducted until 30 have been completed. After an interview and for any other participants diagnosed with HIV during the study period, participation will be discontinued.

Participant retention and attrition

This study will employ several processes to support participant retention over 1 year of data collection, including (i) collection of multiple points of contact (eg, phone number, email, social media accounts), (ii) automated research interview reminder messages, (iii) check-in contact between study waves and (iv) text messages delivered every-other-day during the 1 week GPS period to reminder participants to carry and charge the devices. Despite these enhanced retention efforts, if approximately 10% of participants are lost-to-follow-up at each wave of data collection, then around 54 participants in total will discontinue participation. It is also expected that around 10% of participants at baseline will report with a known HIV infection (n=30) and that some people will be diagnosed with a previously unknown HIV infection at baseline or at subsequent study waves, which based on earlier HIV incidence estimates among transgender women (7.8 per 100 person years[29]) equates to approximately 46 people. The expected attrition is detailed in figure 2, which with a starting sample of 300 people will result in a final sample of around 200 participants at the study's close.

Timeline

Participants will provide 1 year of data over three time points. We will allow 18 months of data collection per wave, with the wave 0 baseline and recruitment period occurring from July 2019 to December 2020, wave 1 from December 2019 to July 2021 and wave 2 from July 2020 to December 2021. In total, data collection will span from 1 July 2019 to 31 December 2021.

Study exposures and outcomes

Neighbourhood-level variables

In addition to socioeconomic status, TURNNT will focus on several neighbourhood-level factors with potential relevance to the general and HIV-specific health of transgender women of colour: social cohesion, violent crime, the presence of transgender health services and the presence of PrEP providers. Neighbourhood-level *social cohesion* will be assessed via items from the New York City Community Health Survey, which included four statements (eg, 'People in your neighbourhood can be trusted') with Likert-scale response options used to create an average of social cohesion by neighbourhood.[30] Statistics on *violent crimes* (ie, assault, murder, rape and robbery) are publicly available from the New York City

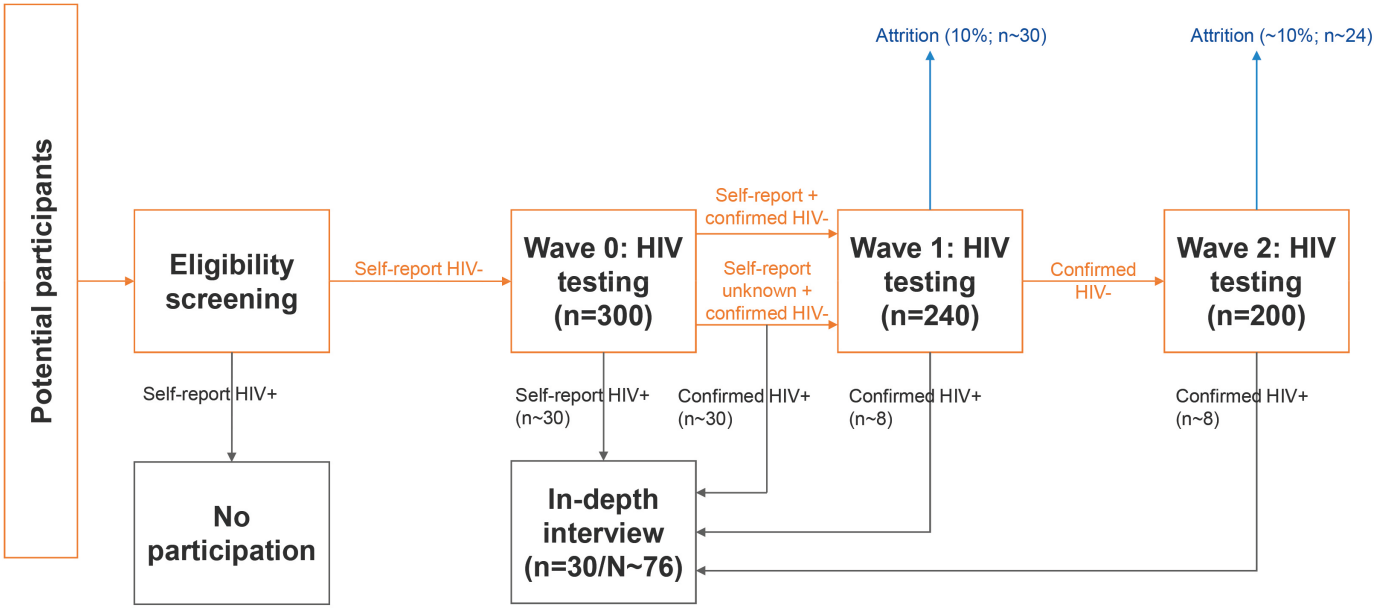

Figure 2 Participant recruitment and attrition over time among a sample of 300 transgender women of colour in New York City, 2019–2021

Police Department, which can be organised by neighbourhood or geocoded to specific locations and, therefore, allow us to use either random effect econometric models or spatial interpolation techniques to assess neighbourhood cohesion levels. The presence of *transgender support services* will be assessed using geocoded data compiled as part of *TransAtlas,* a location-based compendium of health and support services for transgender and gender diverse people in New York City.[31] Similarly, we will assess access to *PrEP providers* using geocoded data compiled by the Centers for Disease Control and Prevention (*AIDSVu*), which we have used previously to conduct spatial analyses.[32]

Neighbourhood-level factors will be assessed at the level of individual participants using their residential address or where they sleep most of the time (provided during the survey) and GPS-defined activity spaces (ie, the areas within which people move during their daily activities). 'Home neighbourhoods' will be created as a buffered area of 200, 400 and 800 m around each participants' home address. Additionally, data collected from a participant's GPS device will be used to define their neighbourhood exposures as determined by their activity space within the daily path area (ie, each participant's trajectory through the world). In the calculation of these indicators in the daily path area, neighbourhood-level exposures will be weighted according to the time spent in each place in order to generate a time-weighted daily path area indicator, reflecting that longer length of exposure is likely to have a greater impact on health and well-being.

Network-level variables

Several network-level variables will also be assessed for participant's social and sexual networks, including social capital, sociodemographic homogeneity, social/sexual network overlap and PrEP/HIV treatment access. Network-level *social capital* will be defined as the tangible and emotional support participants report is available from their network members (eg, 'If needed, I could borrow $100 from this person'). Sociodemographic *homogeneity* will be defined as the proportion of social network members who report a similar age, gender, race/ethnicity, HIV status and religious background to a participant. *Network overlap* will be defined for each participant as the proportion of network members who are both a confidant and sex partner. *PrEP/HIV treatment access* will be defined as the proportion of a participant's social and sexual networks who are reported as having accessed either PrEP or treatment for HIV.

PrEP outcome variables

This study will focus on two primary markers of PrEP access: uptake and discontinuation. PrEP uptake will be defined as participants who report using PrEP at any point during the study period, including at baseline. Incident PrEP uptake will be defined as participants who report not taking PrEP in wave 0 or 1 but subsequently report its use at wave 1 or 2. The second outcome, PrEP discontinuation, will focus on incident cases, defined as a participant who in wave 0 or 1 reports using PrEP but subsequently reports discontinuation in wave 1 or 2. PrEP use or discontinuation at each wave will also be analysed using repeated measure models, with the nested structure of successive measures for each participant accounted for with an individual random effect, thus increasing the overall power of our analyses. Other aspects of the PrEP continuum of care will be examined, including knowledge, interest in and awareness of new PrEP modalities (eg, episodic, long-lasting injectable), barriers to use, self-reported adherence, and, as relevant, reasons for discontinuation (including concerns of interactions with feminising hormones).

Additional variables and covariates

TURNNT survey items will collect information on a diverse array of additional covariates previously shown to be of particular relevant to transgender women[33] or likely to affect healthcare utilisation or health and well-being generally or specific to HIV. We will consider participant demographics (age, race/ethnicity, level of education, annual income, access to food), housing (stability, time spent on the streets or in a homeless shelter), residential self-selection and history and healthcare access (insurance status, general access to healthcare). Covariates relevant to gender affirmation will include the time since a participant started living as a gender other than was assigned at birth (or, as relevant, those who do not), access to transgender-specific healthcare and processes of gender affirmation.

TURNNT will also collect information on external stigma and discrimination, borrowing from existing measures for transgender women[34] and people of colour;[35] participants will also be asked some questions that assess internalised transphobia[36] and racism. Mental health will be assessed using the K10 mental health index,[37] while sexual practices will include involvement with sex work, sexual partner numbers, sexual partner gender(s) and condomless anal and vaginal sex. Drug use will be assessed in terms of frequency and drugs used, use of injecting drugs and in the context of sex. The survey will also include items on sleep quality and length from the widely used Pittsburgh Sleep Quality Index.[38] Finally, we will assess participants experiences of incarceration, including length of time, experiences of violence and access to care.

Analyses

To address this study's aims, the following analyses will be conducted. First, associations between relationship, network and neighbourhood factors and PrEP uptake will be evaluated by χ^2 tests for categorical variables and Wilcoxon rank sum tests for continuous variables. Those variables with a significance of $p<0.1$ in the bivariate analyses and other variables shown in the literature to be associated with PrEP uptake will be included as predictors in a subsequent, cross-sectional binomial regression

analysis. Third, we will conduct a Poisson regression analysis with the number of incident cases of PrEP uptake as the outcome variable while controlling for potential confounding variables, as described above. Fourth, another Poisson regression analysis will be conducted with the number of incident cases of PrEP discontinuation as the outcome. Because we expect that the GPS-defined variables will demonstrate some degree of spatial autocorrelation,[27] as appropriate we will employ spatial autoregressive models to account for the clustered nature of the neighbourhood-level factors described above. Further, with an appreciation for the intersectional nature of several key factors (among them age, race, ethnicity and incarceration status), additional analyses will seek to assess effect modification. Although there is no consensus among theorists and methodologists on the statistical approach that is most appropriate for approximating intersectionality,[39] our regression models will be modified through multiplicative interaction terms, stratification and by assessing the effect modification of theoretically grounded intersectional terms.

While the previous analyses will focus on individual-level outcomes (one outcome for each participant defined cross-sectionally on the basis on responses to at least one of three waves), the data will also be analysed using a repeated measure model, with the three repeated measures for each individual, accounting for spatial, network and temporal autocorrelation. The latter model will allow us to account for both baseline characteristics and time-varying characteristics (eg, wave-specific daily path area variables and network variables). Through the utilisation of two distinct approaches to analysis, TURNNT will be able to ask a diverse host of questions and compare/contrast outcomes between different analytic techniques.

ETHICS AND DISSEMINATION

A primary ethical concern for this project is the collection of highly sensitive, personal data from a population that often experiences stigma and discrimination. Specifically, we will collect information on their sexual partners and behaviours and some questions will likely capture details on activities that are illegal in the state of New York, notably sex work and drug use. Recognising these potential sensitivities, all data will be stored in a de-identified format with access restricted only to members of the research team. Further, access to the study datasets will be automatically logged as a way to enhance transparency and accountability. A 'certificate of confidentiality' has been issued by the National Institutes of Health, which further protects participants by prohibiting the disclosure of information to anyone not involved in the research. Participants will be thoroughly briefed on these protections as part of the study onboarding and consent process. This study's protocol and procedures have been reviewed and approved by the institutional review board of Columbia University (reference AAAS8164).

Through close and ongoing collaboration with communities of transgender women, TURNNT aims to produce research that is respectful and relevant while fostering pathways for disseminating findings directly to communities of need. Community-based dissemination events and forums will be held to share findings but also to engage participants and other members of New York City's communities of transgender and gender diverse people in interpreting the results and suggesting subsequent actions. TURNNT's approach to studying neighbourhoods will provide exciting new information that can be used to target interventions, improve service delivery and placement and characterise the neighbourhoods inhabited by transgender women of colour. Further, through partnerships with scientific and policy experts, this project is well placed to feed its findings directly into the development, implementation and evaluation of novel relationship, network and neighbourhood-based HIV interventions.

DISCUSSION

When taken regularly, PrEP has been shown to be highly effective at preventing HIV among transgender women,[6] but as a public health initiative, it is only effective if it is utilised by those most in-need. Transgender women of colour face some of the highest rates of HIV found in any population in the USA,[3] but PrEP uptake and persistence is inconsistent with this vulnerability.[6 11] By nesting an intersectional perspective within a social ecological model of health, TURNNT aims to generate new knowledge that can be used to address these gaps in PrEP uptake among transgender women of colour.

TURNNT will build on emerging literature that explores how the relationships and networks of transgender women can influence their health and well-being,[40–44] expanding it with an intersectional perspective and attention to new characteristics, including religiosity, gender affirmation, racism and social capital. Promisingly, information on social and sexual networks is already being using to inform PrEP interventions for cisgender Black gay and bisexual men,[45] suggesting that they may hold some potential for transgender women of colour if adapted to the specific needs of this population. Further, TURNNT's unique focus on the mobility of transgender women of colour will greatly expand our emerging understanding of the spatial aspects of HIV prevention. Relatedly, a key strength of this study is our use of GPS tracking to more accurately define the places where people spend their time, an approach that overcomes the issue of 'spatial polygamy' (ie, the idea that our lives are spread across many spaces beyond just the area in which we live).[46 47]

This study has several methodological limitations that warrant consideration. First, although we have described TURNNT as a study of 'transgender women of colour', its sample is limited to those of Black, Latina, Asian and Pacific Islander background. It is likely that other racial

and ethnic minority transgender women have different experiences and exposures that could affect their health and well-being; future efforts to expand TURNNT to include transgender women of other racial and ethnic backgrounds are planned. Second, data will be collected only from people living in a densely populated urban centre, with experiences—particularly in the realm of neighbourhood environments—that may not reflect their peers in smaller cities and rural areas. Similarly, the unique social and political climates of New York City may make it difficult to generalise our findings to transgender women of colour in other cities, but as it is a centre of sexual and gender minority life in the USA, conducting research with the transgender women who live in New York City is as useful as a starting point for research of this kind. Third, this study is focused on transgender women and does not address the complexities and experiences of non-binary and other gender diverse people. Research that specifically addresses the needs of these populations is lacking and needed. Fourth, several cohort studies in general populations have included longer time periods than a single year, but given the expected mobility of this population,[48] 1 year is deemed the most feasible in order to ensure retention and this study's overall feasibility.

There are many reasons to study the health and well-being of transgender women of colour, specific to and beyond HIV. Notably, the US Human Rights Campaign estimates that of the 26 known murders of transgender people in 2018, 20 were women of colour,[49] a disturbing statistic that underscores the considerable inequities faced by these populations and the work yet-required to improve individual and public health for transgender women of colour. While TURNNT will contribute to the growing body of literature on how PrEP can be delivered effectively and efficiently, it also aims to address inequities in research, specifically the paucity of reliable data that can be used to illuminate and improve the lives and health of transgender women of colour. To that end, the data collected through this study as guided by a collaborative of community stakeholders will have the potential to answer other questions about the positive and negative effects of neighbourhoods and networks on transgender women of colour, an important step towards improving diverse aspects of health and well-being for these women.

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