1) Abstract of the Study

This project proposes using a two-armed, waitlist controlled trial to test the effectiveness of peer-facilitated travel interventions and their ability to enhance community mobility and increase feelings of self-efficacy in individuals with serious mental illness (SMI). The first intervention arm is an 8-week bikeshare intervention, which consists of individual trainings on using a bike sharing program; the second intervention arm is an 8-week public transportation intervention, which consists of individual trainings for using public transportation in the Philadelphia area. We seek to enroll a total of 180 individuals from community mental health agencies in the Philadelphia area and expect recruitment to take 3 years. Eligible participants will be individuals who meet criteria indicating that they have an SMI, are between the ages of 18-65, and are both willing and able to learn to use public transportation and ride a bicycle. Data will be collected via face-to-face or web-based video call interviews at 3 time points: baseline, 2-months post-baseline, and 4-months post-baseline. Participants will also complete short surveys about their travel behaviors over the phone in the seven days after each interview. There will also be a subsample of participants who will provide additional GPS data- for full procedures related to GPS subgroups, reference the GPS protocol document, titled "Enhancing Community Mobility: GPS Subgroups."

GPS Subgroup Abstract:

This project is a subset of our study "Enhancing Community Mobility in Individuals wit Serious Mental Illness Through Peer-Facilitated Travel Training: A Two-armed Waitlist Controlled Trial," which uses a two-armed, randomized, waitlist-controlled trial to test the effectiveness of peer-facilitated travel interventions and their ability to enhance community mobility and increase feelings of self-efficacy in individuals with serious mental illness (SMI). This subset of the study aims to track 20 of the participants in both of the study's intervention arms by using GPS. Participants will be randomly assigned to the GPS subgroups after initial consent to participate in the main study and assignment to intervention arms. We seek to enroll a total of 40 individuals into GPS subgroups and expect recruitment to take 3 years. Eligible participants will have met the criteria to be in the main study. Location data will be collected via cell-phone capable of GPS tracking through the app FollowMee.

2) Protocol Title
3) "Enhancing Community Mobility in Individuals with Serious Mental Illness Through Peer-Facilitated Travel Training: A Two-armed Waitlist Controlled Trial"Investigators

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4) Objectives

The purpose of this two-armed, waitlist controlled trial is to test the effectiveness of two novel peer-facilitated transportation interventions on community participation and mobility among individuals diagnosed with serious mental illnesses (SMI). This project aims to address the following hypotheses:

1. Individuals with SMI receiving either of the two peer-mediated travel training transportation interventions will experience an increase in transportation self-efficacy and transportation skills.
2. Participants in the intervention arms will increase their transport utilization, participate in significantly more activities in the community, and make significantly more trips in the community
3. Individuals with SMI receiving peer-mediated travel training interventions will retain post-test levels of community participation and self-efficacy 2 months after intervention.

Intervention Acceptability
In addition to the proposed hypotheses, we will assess if peer-mediated travel interventions are deemed acceptable by individuals with SMI and explore the relationship between intervention outcomes.

GPS Subgroup Objectives:
The purpose of the GPS subgroups in this two-armed, waitlist controlled trial is to examine the possibility of detecting changes in mobility and participation using GPS data, as related to the main study's hypotheses. Doing so will allow us to more closely examine participants' transportation utilization, activity space, and trips in the community.

5) Rationale and Significance

Limited access to transportation is a barrier to independence and is identified by both individuals with SMI and service providers as a major obstacle to community participation. Individuals with SMI have indicated that their participation in the areas of social connectedness, exercise, fitness, and employment is especially impacted by the amount of transportation they have access to, and report that transportation is "an avenue to better jobs and more social involvement." In a previous research study exploring the importance of access to transportation for individuals with SMI, Salzer et al. found that when given the opportunity to use 'freedom funds' to purchase items to support recovery, individuals with SMI most frequently used funds to facilitate transportation.

Access to and use of transportation services is central to this project, which focuses on increasing participants' community mobility. Community mobility can be defined as "moving around in the community and using public or private transportation, such as driving, walking, bicycling, or accessing and riding in buses, taxi cabs, or other transportation systems." Public transportation includes transportation methods such as buses, trains, subways, and ferries which are accessible to the public and are designed to move groups of people. Personal transportation, on the other hand, involves travelling in the community using one's body and/or a private vehicle. This type of transportation includes travelling in a private automobile, using other motorized or non-motorized vehicles, or walking. Both public and personal transportation offer the opportunity for greater personal independence but may also pose unique challenges and barriers to individuals with SMI.

Financial limitations often act as barriers to community mobility, as they often make certain modes of transportation such as car ownership inaccessible to individuals with SMI. While there are other methods of transportation available for those who have financial issues, such as paratransit or reliance on members of one's social support network, these alternative methods come with their own set of problems. Individuals with SMI may not qualify for transportation services, as such services often have unclear eligibility standards. Even individuals who do qualify for transportation services often have unmet transportation needs, as these services are often costly and inconvenient, include a substantial time commitment, and provide undesirable scheduling options. In addition, these transportation services are limited in their own right as they are restricted to specific health-related services, prohibiting individuals from participating more fully in their community through non-health related activities. Relying on personal connections for transportation is also often not a viable option for individuals with SMI, as they may not have support networks which affords them the ability to ask for transportation whenever they need it.

Given that relying on others is often not satisfactory for individuals with SMI, personal transportation options may be more ideal for increasing independence and community mobility by allowing for more flexibility and autonomy in transportation. A subset of personal transportation is active transportation, defined as any form of transportation that utilizes human powered movement to get from one place to another. Active transportation is currently a hot topic among public health researchers, as it can be beneficial to the health of both individuals and the community. One form of active transportation that is increasing available and accessible across the country is bicycle sharing, as more than 100 cities in the United States have bikeshare programs.

Bikeshares introduce a new form of active transportation into public transportation. Bikeshares are one an affordable form of transportation since bike sharing programs allowing users to sidestep the costs of buying, maintaining, or safely storing a bike while still gaining access to transportation and health

benefits of bike riding. In addition, 24% of bikeshare programs in the US offer an income-based subsidy, making them accessible to those who might experience financial barriers in other forms of transportation. In a study completed by the Temple University Collaborative on Community Inclusion of People with Psychiatric Disabilities (TU Collaborative), 48 individuals with SMI completed a survey about their interests in using bikeshare. Of these individuals, only 10% currently had a bicycle but 95% expressed an interest in cycling and cited a variety of reasons for their interest.

In 2016, Americans took 10.4 billion trips on public transportation and 28 million rides through bikeshare programs, with both forms of transportation experiencing a significant increase in usage in the last 5 years. This is likely partially due to the high access to public transportation in major cities; in Philadelphia, 97% of people live within walking distance of public transportation, and it hovers around 90% in 13 of the 28 largest cities in the United States. The growing use of public transportation and bike shares among the general population indicates the need for a parallel intervention that specifically supports individuals with SMI to use these forms of transportation. Research conducted by the TU Collaborative has demonstrated that 92% of individuals with SMI believe that using public transportation is important for community mobility, and among the broader population of individuals with disabilities research has demonstrated the positive outcomes of training programs to increase transportation.

Regardless of how readily available transportation methods are, without training or experience individuals with SMI may avoid certain types of independent transportation, creating an additional barrier to community participation and mobility. In the summer of 2017, pilot work by the TU Collaborative team demonstrated success in travel training using bikeshare and public transportation for individuals with SMI. The group components of the bikeshare ensured that all participants were able to use bikeshare, identify destinations and routes, and ride safely, while the individual components of the bikeshare intervention supported the diverse needs of individuals with SMI, including those with physical disabilities. The public transportation peer-mediated travel training was piloted using the proposed curriculum to determine feasibility, refine the peer-interventionist training, and develop fidelity processes. After finishing the public transportation intervention, all participants were able to use public transportation independently on targeted routes.

Peer-mediated interventions are founded on social learning theories, which postulate both that behaviors and skills are learned when modeled and that this modeling enhances self-efficacy. Social Comparison Theory in particular suggests that people seek interactions and comparisons with others who have similar experiences, as upward comparison can foster the development of skills, an increase in hope, and a decrease in fear. It further posits that behavior change is more likely to occur when modeled by peers. Previous research has supported positive outcomes in self-efficacy for individuals with SMI in peer

support interventions, and has identified that peer support interventions as effective, possibly because they are reminiscent of those provided in natural social contexts. Further research suggests that peer support interventions enhance social support networks, which are a pivotal component in transportation training. Peers often act as intervention agents to model or reinforce particular skills that are essential for independent use of public or personal transportation. Peer-interventionists "enhance self-efficacy that one can change behavior," leading to the theory that the presence of peer-interventionists may serve to bolster self-efficacy and thus positively impact the mechanisms of change needed to improve transportation skills and community mobility.

This project proposes to pilot innovative peer support interventions with the targeted outcome of increasing independent use of either public transportation or bikeshare as a means to increase community participation and mobility. Since over 80% of the population in the United States resides in urban communities, a substantial portion of the population has access to both public transportation and bikeshare, making this research widely applicable. This project also has the potential to expand roles for peer support specialists and develop intervention strategies that better support individuals with SMI in their efforts to independently access transportation such as traditional public transportation and bikeshare.

GPS Subgroups:
    Documenting access to and use of transportation and community mobility is central to this project. Community mobility can be defined as "moving around in the community and using public or private transportation, such as driving, walking, bicycling, or accessing and riding in buses, taxi cabs, or other transportation systems." This project is complementary to the main study, "Enhancing Community Mobility Through Peer-Facilitated Travel Training: A Two-armed Intervention" in that it measures a subsample of participants' mobility in the community using Global Positioning System (GPS) technology. The TU Collaborative has used GPS technology two times in the past (protocol #'s 2015-07 and 2013-62) to successfully track individuals with psychiatric disabilities. During these studies there were no issues recruiting participants or with data privacy and confidentiality.

6) Resources and Setting
The interventions and data collection will be overseen by a PhD level recreational therapist and occupational therapist from the TU Collaborative, with assistance from Research Assistants, a Community Inclusion Specialist, and Certified Peer Support Specialists. All staff involved have completed training which includes: 1) the CITI social and behavioral health human subjects training, 2) the Center's interviewer training, and 3) the Center's confidentiality agreement. Beth Pfeiffer and Gretchen Snethen will offer guidance during ongoing weekly meetings in preparation for and execution of the study. Eugene Brusilovskiy will offer guidance for the GPS subgroups.

Recruitment will take place at mental health agencies in the Philadelphia area Research interviews will take place at a location agreed upon by both the participant and interviewer that allows for privacy. Such locations may include the agency where the participant receives mental health services, a community location, and Temple University. Otherwise, interviews will take place over a web-based video call (Zoom). Intervention groups will be facilitated at the recruiting agency or at Temple University.

GPS Subgroups
Recruitment of participants for the GPS subsample will take place within the participant pool from the main study and thus recruit from the same locations. If the participant is using a phone loaned by the research team, any meetings between participants and research staff for the purposes of giving or returning the phones used for tracking will take place at a location agreed upon by both the participant and research staff. Such locations may include the the agency where the participant receives mental health services, a community location, and Temple University.

7) Prior Approvals
IRB approvals will be requested from both Temple University and Philadelphia Department of Public Health.

8) Study Design

a) Recruitment Methods
We will enroll 180 participants with serious mental illness (SMI) between the ages of 18 and 65. 90 participants will be randomly assigned to both groups (bike share and public transportation).

Recruitment will occur from community mental health agencies in the Philadelphia area. Fliers including details on the study and study informational sessions will be available for agencies interested in the study or attendees who are interested in participating. Potential partnering agencies will be contacted with the recruitment massaging written in the document, "Transportation Recruitment Email - Providers". A sharable summary will also be sent to agencies interested in the study.

In working with provider agencies, we will offer a $10 coffee gift card (Starbucks, Wawa, Dunkin Donuts, etc.) for each staff member who commits to sharing study information with five potentially eligible individuals. Agency staff would have 1.5 months to complete this; however, additional opportunities may be offered in additional recruitment attempts. Agency staff would contact the research assistant to confirm that he/she/they shared the information; they will not, however, directly share the names or contact

information of the potentially eligible individuals without consent with research staff. Research staff will respond directly to the agency staff thanking them for sharing the information, confirming they will receive a gift card, and offering an opportunity and willingness to connect directly with the service recipient to discuss the study (see example staff response email). At the end of the 1.5 months, staff will mail physical gift cards with the list of participating staff to the agency contact. The agency will be responsible for distributing the gift cards directly to staff members.

An individual screening meeting will be scheduled for individuals interested in learning more about the transportation study. Interested individuals will complete a screening assessment with a research assistant which will contain a Travel Skills Assessment tool to assess readiness to complete a public transportation or bikeshare intervention program, a Bicycle Interest Survey to ensure they can ride a bike and are interested in using a bikeshare, and the MINI to confirm an SMI diagnosis. Eligible individuals will be invited to participate and schedule a time to consent to be in the study.

When going through the consent process, participants will be asked to complete the UCSD Brief Assessment of Capacity to Consent (UBACC) to ensure that they have an understanding of the research study. As indicated on the UBACC, potential participants need to score a 15 or higher in order to demonstrate understanding of the study they are consenting to. If score a 14 or lower, they may ask questions about the study and retake the UBACC. If they still cannot get a score of 15 or higher, they will not be consented and will not participate in the study. Once eligible participants are consented, the research staff will schedule the initial interview with participants. Participants will complete a shorter version of the UBACC at the second and third interview time points to ensure they maintain the capacity to consent at later time points.

40 of the participants from the total pool of 180 participants enrolled in the main study will be randomly selected to participate in the GPS subgroup. There are no additional eligibility criteria, but participants consenting to the main study will be given the option to opt out of being considered for a GPS subgroup at the time of initial consent. Participants in the GPS subgroup will also be asked to complete the UBACC and score a 15 or higher during the consent process.

Participant Payment
Participants will be offered an honorarium to complete the data collection. For each data collection point, (baseline, post-intervention, and follow-up), participants will receive up to $34 in cash - $20 for completing interviews and $2 for each National Household Travel Survey (NHTS) completion (up to $14). Payment will occur at the end of each data collection period. The total

amount participants can earn from this study is $102. Payments will be made in cash for in-person interviews, or virtual gift cards for web-based interviews.

Participants in GPS subgroups will be offered the same honoraria to complete the data collection as participants who are not in a GPS subgroup. In addition, participants in the GPS subgroups will receive $30 for returning the GPS device and charger (or $20 if they return only the device) at the end of each GPS data collection time period for a potential total of $60. Participants will not receive any compensation if they return the charger but not the device. Payments will be made in cash for in-person interviews or virtual gift cards for web-based interviews.

b) Inclusion and Exclusion Criteria

<u>Inclusion Criteria</u>
Individuals will be eligible to participate in the study if they:
- are between the ages of 18 and 65
- are diagnosed with a SMI (confirmed via the MINI)
- score at least an 8 on a travel skills assessment
- indicates that they can ride a bicycle
- have expressed interest in using a bikeshare and public transportation
- are able to provide informed consent

<u>Exclusion Criteria</u>
Individuals will be considered ineligible to participate in the study if they:
- score less than 8 on a travel skills assessment
- express no interest in independent transportation
- are non-English speaking individuals
- are unable to provide consent
- are living in a setting where mobility and participation is restricted
- have a limiting physical condition that would prevent their ability to ride a bicycle independently

The inclusion and exclusion criteria are the same for the GPS subgroup, so long as participants do not opt out of being considered for a GPS subgroup at the time of initial consent.

c) Study Timelines

Enrollment will begin October 2023 and is anticipated to run through April 2025. The intervention arms will run for 4 months. Because both intervention arms are individualized, enrollment will be rolling for participants. The staggered enrollment allows us to provide booster training for intervention staff in the winter months and avoid facilitating the intervention when travel

may be impaired by inclement weather. The estimated date for completion of the study is April 2025. Individual participants will be enrolled for 4 months, during which they will be participating in the interventions for 8 weeks and placed on a waitlist for 8 weeks. Participants are expected to complete 3 interviews at the baseline (pre-intervention), 2 month, and 4-month time points. They will also be expected to complete seven days of phone surveys following each of these interviews.

Enrollment timelines for the GPS subsample run concurrent to main study timelines and do not disrupt any main study activities. Participants will be recruited, consented, and assigned to their intervention group for the main study before GPS consent and activities begin. After participants are recruited and assigned, 20 of the participants from each arm will be randomly assigned to a GPS subgroup. These participants will meet again with research staff to go over the additional duties of being in the GPS subsample, consent to being in the subsample, and either receive a loaned phone from the research team or have a research assistant download the FollowMee software to the participants' personal cell phone for their first of two GPS data collection time periods.

The first data collection period occurs for 14 days during the time period between recruitment and the start of the intervention arms. Because of this two-week time requirement, we expect for there to be around a month between initial main study recruitment and the start of intervention arms to allow for sufficient time to consent and collect data from GPS subsample participants. The second data collection period will occur for 14 days after the intervention arms have completed all activities- approximately 1 to 2 weeks after the intervention arms finish their 8- week courses.

Participants in the GPS subgroups are expected to be enrolled for 4 months, the same as participants not in the GPS subsample. Participants will have to meet briefly with research staff at the beginning and ends of each of these time periods to either pick up and drop off the loaned cell phones or have the FollowMee software downloaded on their personal cell phones. GPS subsample participants are still expected to complete all interviews, surveys, and intervention activities as the participants not in GPS subgroups.

d) Study Procedures and Data Analysis
Data Collection Procedures.
Following consent, a research assistant will administer the baseline outcome questionnaires and collect demographic data. Outcome measure interviews will be completed via face-to-face or web-based video call interviews at three time points: baseline, 2-month, and 4-months follow-up. Participants will complete an additional outcome measure, the NHTS, over the phone for the seven days immediately following each interview. To complete the NHTS,

participants will be instructed to document their daily travel activities over a week's period by completing a daily travel log. A research assistant will then call the participant the following day and write down the participant's self-reported previous day travel data from their travel log. All participants will complete a skills evaluation related to the intervention assignment as well as a treatment acceptability questionnaire to assess the acceptability of the assessment and intervention process. Data provided by the SEPTA KeyCard/Monthly Pass and Indego Pass regarding trip history will also be collected.

GPS Data Collection

Participants in the study will either be given cellular phones or use their personal cell phones with GPS tracking capacity. Specifically, FollowMee (www.followmee.com) software will be used for tracking the locations and movement of study participants over the two-week period that they have the phones. FollowMee has been used by individuals, government agencies, businesses, and researchers in order to track the location of family members, vehicles, employees, or study participants in real time. The software has also been used in several published studies that have attempted to track individuals in space and time. The software is compatible with most modern cellular phones, including Android phones and iPhones, and does real time tracking of the cell phones' locations, which are stored as latitude and longitude coordinates or even actual street addresses. The locations are sent to a secure online database at one minute intervals, and the location at each recorded time is put on a map as a point. Information on battery level is also obtained at every measurement point. The online database may be accessed from a computer or any mobile device with an internet connection for monitoring purposes. With FollowMee's extended tracking plan, the data will be stored on the server for 45 days, and may be downloaded in KLM (Google Earth) or .csv format, from which it could be converted to ESRI's shapefile format.

Because we will have multiple participants using cell phones with the software at any given time, we will be able to track all participants in our study with the help of a master account that will be created. A phone can easily be added to the master account by entering the master account code into the app. This way, we will be able to view and download each participant's data through the master account, regardless of whether the participant chooses to use their own phone or a phone provided by the research team.

FollowMee does not require a cell phone with an unlimited data plan, which is offered by several cell phone providers, and in particular Mint Mobile, which has a reasonably priced service plan. No action is required from the individual being tracked other than keeping the phone on, charging it, and carrying it with them. FollowMee automatically starts whenever the phone is turned on, and runs in the background. However, if the phone is turned off the tracking will stop. While this may be viewed as a limitation, we believe that this gives the participants control and the ability to stop tracking in situations where

they do not want to be tracked. However, in order to make sure that tracking is taking place, we will be able to check the status of GPS data collection by logging into the FollowMee website. Furthermore, we will be able to set e-mail alerts to inform us when there has been no tracking for a certain amount of time (e.g., 6 hours). In order to reduce participant attrition, increase participant adherence, and address missing data, we will contact participants every two days to remind them to keep their phone turned on and to troubleshoot any technical problems.

As soon as the GPS data for every individual have been collected, and prior to the second interview, they will be downloaded as a .csv file and sorted by time. We will attempt to use the GPS data to determine the participants' destinations. This information is available through FollowMee, but other algorithms that study investigators have developed in the past decade, including those described below, will be used as well.

In past studies, GPS tracking often results in a substantial amount of missing data due to satellite, receiver, multipath and other errors that might occur with data collection (Brusilovskiy et al., 2016), and this necessitates thorough data cleaning before various mobility constructs may be created. Data cleaning involved three steps. The first was deduplication: in several instances, FollowMee data may have more than one GPS record per minute. Because those duplicate points were essentially indistinguishable from one another in terms of time and location, and could result in scenarios where there could theoretically be more than 60 points per individual per hour, only one record per minute was retained for each individual. The second step involved removing outliers. For a small number of participants there were occasional problems with GPS signal, such that a group of points that could technically be considered a cluster (i.e., a destination) would include one or more points that would be temporally part of the group, but spatially far away. For example, if points a, b and c were temporally consecutive points, then point b would be considered an outlier if: 1) the time between b and a (or b and c) was less than 20 min and the distance between them was more than 200 meters, 2) the time between b and c (or b and a) was 1 min and the distance between them was more than 200 m, and 3) the distance between a and c was less than 200 m. The third step involved imputing missing data. If two consecutive points d and e were within 20 min and 200 m of one another, then we imputed the locations of up to 19 new points (one for each missing minute) between d and e through linear interpolation of the latitude and longitude of d and e.

The same steps will be taken in the current study. Then, as in previous studies, we will exclude participants for whom the data cleaning and imputation procedures did not sufficiently enhance the completeness of their data to a point that was believed to be representative of their mobility based on the following: 1) they were missing at least 50% of the possible time points over the course of the tracking period, or 2) fewer than half of the days in the tracking period had at least 50% non-missing data.

In previous studies using GPS data, a spatio-temporal data mining algorithm, ST-DBSCAN (Birant and Kut, 2007) was employed to identify

destinations from GPS data using a custom-written R program. The algorithm depends on three parameters, set by the user, which are spatial distance, *eps1*, which we set to 200 meters, temporal distance, *eps2*, which we set to 20 min, and the minimum number of points necessary to form a cluster, *minpts*, which we set to 10. The algorithm forms density-based clusters; roughly speaking, this means that when there are at least 10 points which are within 200 m and 20 min of each other, the individual is in a cluster, or at a destination. Points which don't fall into a cluster are considered outliers, or transit points. A detailed study has been conducted on how these parameters are optimal and how the algorithm performs (Brusilovskiy et al., 2016). Because of missing GPS data, the number of clusters identified through ST-DBSCAN is usually an underestimate of the total number of destinations that the person visited over the tracking period. Brusilovskiy et al. (2016) also describe an additional algorithm that was developed to correct for this bias by modifying clusters generated by ST-DBSCAN and creating new ones in the presence of missing data; this algorithm was also implemented in this study (Brusilovskiy et al., 2016). The constructs calculated from GPS data are summarized in the table below. The same processes will be used here, and the same variables will be calculated for the current study.

Construct	Description
Destination Constructs	
Total number of destinations	The number of destinations over the course of 13 full days of tracking was determined with ST-DBSCAN and the additional algorithm fully described in Brusilovskiy et al. (2016).
Total number of non-home destinations	Destinations whose centroids were within 200 m of the individual's geocoded home address were considered home destinations. The number of non-home destinations was calculated as the number of home destinations subtracted from the total number of destinations.
Total number of unique destinations	Because a person could visit certain destinations (e.g., home, work) more than once over the course of the tracking period, unique destinations were also identified. This was done by subjecting the centroids of each destination cluster to the DBSCAN clustering algorithm. DBSCAN has two parameters: distance between the input points (in our case, destination cluster centroids), which we set to 200 m, and the minimum number of points needed for a cluster to be formed, which we set to 2. This way, destinations that occur more than once are put into a "super-cluster" which is indicative of a unique destination, and destinations that only occur once are outliers in the DBSCAN analysis, and are also considered unique destinations.
% days with 0 non-home destinations	We identified non-missing days as the days that had at least half of the data (720 min or more), and calculated the % of non-missing days that had 0 non-home destinations.
Temporal Scope of Mobility Constructs	

Construct	Description
Missing time	The total amount of missing data time (in minutes) for an individual was computed as the sum of 1) 1440 min for each day with no data and for each day with only transit points, and 2) the amount of time (in minutes) elapsed between each pair of consecutive points which are more than 200 m and 120 min apart on all other days. This variable was used to compute the time spent at home and time spent outside of home.
% Time spent outside of home	The total time at home was calculated as the time between the first and last points at each home destination. The time out of home variable was computed as (Total tracking time of 18,720 min) – (Time at home + Missing time). % of time spent outside of home was calculated as (Time outside of home)/(18,720 min – Missing time) = (Time outside of home)/(Non-missing time).
% Days where time spent outside of home is at most 25%	This variable was calculated as the number of days where the amount of time spent outside of home was at most 25%, divided by the total number of non-missing days (as defined above).

Geographic Scope of Mobility Constructs

Construct	Description
Total Distance Traveled (km)	The sum of distances between all temporally consecutive points, excluding the distances between points within a destination, was calculated.
Median Daily Activity Space Area (km^2)	We calculated the median of the activity space areas for each non-missing day. The activity space was the minimum convex polygon containing all of the individual's GPS points during that day. This variable is less affected by outliers than the total activity space area.

Group Assignment

Following baseline assessment, participants will be randomly assigned to either start the intervention program immediately, or be placed on an 8-week waitlist. Once randomized, the participant will again be randomized into a treatment condition: 1) peer-mediated bikeshare training intervention; or 2) peer-mediated public travel training intervention. 20 participants from each condition who have not opted out of being in the GPS subsample will be randomly assigned to be invited to a GPS subgroup.

Interventions

The interventions will utilize a common supports-technology. Intervention components will be facilitated by a certified peer support specialist and will support individuals with individualized route planning, modeling transportation behavior, skill development, and enhancing transportation self-efficacy.. For each intervention arm, the interventionists will complete a log of training

activities, instructional methods, problems encountered, and length of time for each session.

Six weeks following the 8-week intervention, intervention participants will participate in a 2-week booster comprised of discussing challenges and successes with the peer-support specialist. The 1-on-1 sessions will allow participants to plan additional routes, practice transportation skills, and navigate individualized issues. The individual interventions are explained in greater detail below.

Arm 1: Peer-Mediated Travel Training for Bikeshare
Participants in this intervention arm will participate in an 8-week bikeshare training program. To facilitate this, they will receive a 3-month membership card (valued at $5/month) to Indego, the bike sharing service in Philadelphia. The membership allows for unlimited hour-long rides and tracks various aspect of use including station location, trip frequency, and trip duration, allowing staff to monitor intervention and independent pass usage.

The first intervention sessions will be aimed at increasing knowledge of the bike share program and the procedures for utilizing it successfully. Sessions will review topics such as bike safety rules and cycling laws, and will include time for practicing cycling skills. Then participants will meet with a peer support specialist, who will help facilitate individualized route planning and independent ride support. The 1-on-1 component will utilize reflection questions, so the participant can evaluate their own experience, promoting cognitive appraisal and affective evaluation. Peer support specialists will use motivational interviewing during these individual sessions in order to help participants identify personally meaningful motivations for participation and to enhance their sense of self-efficacy.

Information from these 1-on-1 sessions will be recorded on individual cards which the participant can keep and use as a reminder and motivator to independently use bike share. Cards will include space to write down relevant Indego stations, important biking laws, a bike checkout checklist, and phone numbers of riding pals.

Table 1. Bike Share Group and Individual Intervention Components

Intervention Activity	Description	
Orientation to Using Bikeshare	Participants will be introduced to the bikeshare program. Topics include: bike rules & laws, safety issues, inspecting the bike, bikeshare program membership information and rules, street safety, and practical skills riding	

Facilitator-led Rides	The recreational therapist will facilitate rides in order to increase participants' competence using the bikeshare and raise awareness of community resources	
Participant-led Rides	Participants who have completed 5 rides will be invited to help plan and lead additional rides. These rides will be organized around areas of interest for the participant, such as trips to community events or locations like the movies and grocery store	
Route Planning	Participants will meet with the peer support specialist to identify key destinations. The peer support specialist will provide support to map bikeshare stations in relation to key destinations. Once key stations and destinations are identified, planning to identify safe routes will occur	
Ride Support	Participants will receive 1-on-1 support focused on practicing way-finding skills and increasing their overall increase confidence on bike rides	

Arm 2: Peer-Mediated Travel Training for Public Transportation
An established travel-training program developed for individuals with disabilities, including those with SMI, serves as the curriculum for the public transportation intervention arm. Participants will receive a 3-month pass (a Keycard, or 3 SEPTA Monthly Passes) to SEPTA, the public transportation provider in Philadelphia and surrounding areas. The Kennedy Center developed a comprehensive curriculum to teach the skills needed to be an independent traveler on public transportation using a sequence of basic competencies that are mastered through group and individualized instruction in real-life environments. The curriculum provides instruction in the following seven core areas, which are described in Table 2 below. We will offer an 8-week intervention which will include instruction on foundational skills needed to travel on public transportation and 1-on-1 direct training in using public transportation. Participants will meet twice weekly for direct instruction and role-playing sessions to cover the core components and the latter weeks of intervention will be focused on individual travel training instruction provided by the peer support interventionists, with participants and peer support interventionists meeting for two travel trips each week.

Table 2: Public Transportation Arm Group Intervention Components

Intervention Component	Description

Interacting with Individuals in the Community	Participants will learn to communicate with transportation staff and other riders. They will be taught how to act in an emergency including how to: • identify emergency workers/vehicles and strangers • identify situations that requires emergency help • contact an emergency number or 911 • provide personal contact information in an emergency
Pedestrian Safety & Awareness of Surroundings	Participants will learn to identify safe behaviors necessary for walking in the community, near streets, and while crossing the streets
Trip Preparation	Participants will discuss topics related to trip preparation, including: • identification of transit vehicles, signs/amenities at stops and on vehicles • Identification of weather appropriate dress and items appropriate to carry in community when travelling. • Understanding and identifying basic public transportation rules
Travel Practice	Peer support specialists will take participants on supervised public transportation rides, focusing on ensuring participants know how to follow basic transit rules, identify transit vehicles, and practice good transit etiquette.
Expect the Unexpected	Participants will work together to identify different types of situations encountered during community travel and identify/implement strategies for problem-solving transit-related challenges.
Route Planning	Participants will meet with a peer support specialist to identify key destinations. Once key stations and destinations are identified, planning to identify safe routes will occur.
Individualized Travel Training	Participants will receive individualized 1-on-1 support focused on what the participant's specific public transportation needs are in order for them to access self-determined community activities. The peer-interventionist will model skills and help in the travel planning process. When the participant feels confident, they will take the lead in travel activities with shadowing from the peer interventionists

Measures

Inclusionary Measures

1. The <u>Mini-International Neuropsychiatric Interview (MINI)</u> is a short diagnostic interview used to determine if an individual meets the DSM criteria for SMI, which is one of the study's main inclusion criteria. The MINI demonstrates good sensitivity and specificity for all diagnoses as well as inter-rater and test-retest reliability (Sheehan et al., 1998).

2. The <u>Travel Skills Assessment</u> tool, a modified version of the Kennedy Center's Pre-Screening Travel Assessment (2012), identifies pre-requisite and foundational skills deemed essential for safe travel. Participants with scores of 7 or below are considered not ready for travel training so 8 will be used as a cut score for study inclusion. The tool was originally used with a large number of individuals to determine a cut score of half the maximum # of points, and this scoring system has been maintained in our modified version, which has a reduced number of questions to reflect the eligibility criteria of this study.

3. Additionally, a <u>Bicycle Interest Survey</u> will be used to assess participants' bike skills and levels of interest in learning to use a bikeshare program. Those with no interest in using bikeshare and those who have never ridden a bicycle will be excluded.

Treatment Arm- Transportation Usage Data

1. <u>Indego Membership Card Data</u>*:* Each Indego membership card will be associated with a participant in the bikeshare intervention arm. Indego can generate a membership report for each bikeshare participant which will include trip origin location, trip destination, total number of trips taken, and trip durations.

2. <u>SEPTA Keycard/Monthly Pass Data:</u> Each SEPTA Keycard/Monthly Pass has a unique identifying number that will be connected to a participant in the public transportation arm. SEPTA will generate a report for each public transportation participant which will include transportation mode (i.e., train, bus, trolley, subway), trip origin location, and total number of trips taken.

Outcome Measures.

Outcome measures will focus on trips, community participation, activity space, and transportation self-efficacy. Trips for the whole sample will be assessed via the NHTS. Community participation for the whole sample will be assessed via the TUCP, NHTS, and through GPS for the GPS subsample.

In addition to the measures identified in the parent study, participant location and movement will be tracked with a GPS enabled cell phone, which

will enable the evaluation of community mobility and participation as pilot intervention outcome measures. Specifically, measures of community mobility and participation calculated from GPS data will include 1) the area of the participant's activity space (defined as the local areas within which people move around during the course of their day); 2) total distance traveled; 3) number of destinations, number of non-home destinations, and number of unique destinations; and 4) amount of time spent at home, outside of home, and in transit.

The study instruments will include:

<u>Primary Outcome Instruments</u>

1. The <u>Transportation Appraisal Scale (TAS)</u> scale measures transportation self-efficacy, the belief a person has that they are capable of successfully completing tasks needed to travel independently. The scale was developed for the purpose of this study based on guidelines from Bandura's Guide for Constructing Self-Efficacy Scales, along with the Kennedy Center's travel training curriculum. The TAS has 18 items with a 10-point interval rating scale ranging from 0 to 100. Rating descriptors range from "cannot do at all" (0) to "highly certain can do" (90-100). The scale provides a total raw score.

2. The <u>Temple University Community Participation Scale (TUCP)</u> assesses self-reports of community participation in 26 different areas including going to a supermarket, participating in a community social group (like a book club or recreational sports team), going to a movie, or working for pay. Participants are asked to indicate the number of days in the past 30 days that they participated in each of the 26 areas, whether each participation area was important to them, and whether they felt they participated in each area enough, not enough, or too much. Several measures of participation may be created using the data collected with this instrument, including 1) total number of participation days in all 26 areas (ranging between 0 and 26*30=780 days), 2) total number of different areas in which the individual participated at least once (ranging between 0 and 26 participation areas), and 3) total number of different areas that the individual considered important in which he or she participated at least once (ranging between 0 and 26 participation areas). Recent research has found the measure to be reliable and valid.

3. The <u>National Household Transportation Survey (NHTS)</u> is a survey used to assess destinations an individual visited during the day, the mode of transportation they used, the amount of time spent in transit, the number of individuals they traveled with, and the primary activity at each location. In addition to the standard form, the research assistant will ask about

instances where transportation was not available and what activities were prevented. Each day during the weeklong assessment period, a research assistant will call participants to complete the modified version of the NHTS. Participants will receive a NHTS travel log and will be instructed to document their travel on the identified days. The research assistant will then call the participant the next day to record the previous day's travel. While not designed specifically for individuals with SMI, this measure has been successfully used in the pilot bikeshare project.

4. The PERMA profiler assesses how an individual views their own life by asking questions designed to measure 5 different facets of wellbeing - positive emotion, engagement, relationships, meaning, and accomplishment. It consists of 23 questions, 15 of which are relevant to specific PERMA areas (3 per each domain) and 8 of which are general filler questions. The PERMA profiler has demonstrated acceptable validity and model fit to the PERMA framework. In this study, PERMA scores will be examined across time points to determine if travel training and increased mobility effect participants' own perceived well-being.

5. The UCSD Performance Skills Assessment (UPSA) is a tool designed to measure the functional capacity of individuals with serious mental illnesses. One section of the UPSA is a transportation skills assessment. An adapted version of the UPSA will be used to assess public transportation skills. Additionally, we have developed a similar measure to assess bicycle transportation skills.

6. Transportation skills: Using a series of public transportation skills assessments and bicycle skills assessments, we have developed a measure to assess an individual's perceived skills to use each mode of transportation.

7. GPS: GPS devices with tracking capacity will be provided to participants. Specifically, the FollowMee application is used for tracking the locations and movement of study participants. FollowMee collects data from GPS satellites in ten-second to ten-minute intervals and then uses cellular data networks to send the information to dedicated servers. During the daily phone calls to administer the NHTS use survey, research staff will also remind the participants to charge either their phone or the loaned phone and keep it with them, although they will not encourage the participants to travel. GPS data is collected during pre-test and the 2 month post-test periods to ensure feasibility related to costs and burden to participants.

Secondary Outcome Instruments: In addition to the primary outcome measures, a series of common assessment tools will be used to assess psychosocial and health related outcomes in areas such as: self-reported physical activity; self-reported sedentary activity; quality of life; coping skills; group identity; recovery; loneliness; and perceived health.

Additional Measures

In addition to the outcome measures, we will assess factors that may influence treatment outcomes. These include neighborhood factors; health status; stigma; demographics (age, race, gender, socioeconomic status, employment); and motivation to change.

Treatment Acceptability

In order to assess treatment acceptability, the following measures will be used to assess the experimental participant's perception of the intervention arms.

1. The <u>Treatment Acceptability Questionnaire (TAQ)</u> will completed by participants in the experimental arms at the last data collection point (6-mo). This 6-item questionnaire uses a 7-point scale and will be modified to reflect the peer-mediated travel training intervention. The TAQ was developed specifically for evaluating acceptability of behavioral health interventions and its internal consistency, reliability, and concurrent validity are all high.
2. Open-ended questions about the intervention: Perceived effectiveness, recommendations, and appropriateness for others with mental health conditions.

<u>Data Analysis</u>

The following variables will be calculated for each participant: 1) total number of destinations, 2) total number of unique destinations, 3) total number of non-home destinations, 4) area of the activity space (defined as the minimum convex polygon containing all of the individual's destination or in-transit points in the study period), 5) total distance traveled, 6) total number of days on which the participants left the house, and 7) total number of destinations that are more than 1 mile away from the participant's home address. Destination variables are considered a component of the community participation outcome, and distance traveled is grouped under the trips outcome.

Participants in the GPS subgroups will be included in any data analysis that calculates individual variables or looks across groups in the study. In addition, over-time differences (baseline—follow-up #1) on each GPS variable will be calculated for every participant being tracked with GPS. ANOVA tests will then be used to compare group means on each variable.

Treatment Outcomes

A random effects ANOVA on repeated measures data in PROC MIXED (SAS) will be used to compare intervention groups on the number of trips in the

community, community participation, and self-efficacy over time. ANOVA tests will then be used to compare group means on each variable.

In addition, we will attempt to examine whether self-efficacy mediates the relationship between the interventions and community participation over time by using an enhanced version of the techniques proposed by Baron and Kenny (1986). Consistent with the mission of and expertise available at our center, we will also conduct post-hoc exploratory analyses that look at how the effectiveness of the intervention is impacted by environmental factors, such as walkability, bike-ability, and availability of transportation. While such data can be obtained from various secondary sources based on the participant's address, we will likely not have sufficient power for these analyses.

Treatment Acceptability.
The mean of the total TAQ scale and the means of each TAQ item will be calculated. Means between 6 and 7 suggest high acceptability, means between 4 and 5 suggest moderate acceptability, and means less than 4 indicate an unacceptable intervention.

e) Withdrawal of Subjects

If a participant enrolls in the study and later choose to withdraw, they may do so without any penalty or consequences. They can withdraw by telling staff by phone, email, or in person that they are no longer interested in participating. The research coordinator will confirm the withdrawal request with the participant, and he or she will no longer be contacted about the study. Participants assigned to the transportation intervention arms will no longer be able to participate in the study-related intervention but withdrawal will not affect any other services the person may receive. Participants may choose to withdraw from a GPS subgroup and still participate in the parent study. If a participant withdraws during a data collection time period, they will be asked to set up a meeting to return the device and charger. The research coordinator will then confirm the withdrawal request with the participant, and he or she will no longer be contacted about doing the GPS portion of the study. Data collected prior to withdrawal or removal of participants will be kept on file and may still be used in data analyses. Participants who lose the loaned device will remain part of the main study but will be withdrawn from the GPS subsample.

Participants may be removed from the study if they appear under the influence of drugs or alcohol, or if they exhibit hostility toward others, including staff and peers, at any time during activities associated with the study, including recruitment, consent, interviews, and intervention classes. Data collected prior to withdrawal or removal of participants will be kept on file and may still be used in data analyses. This same

procedure for data storage will also apply to KeyCard/Monthly Pass and Indego Pass data, for which data collection will occur up until the point of withdrawal or removal of participants and cease thereafter.

f) Privacy & Confidentiality

The study team has placed safeguards to maintain the confidentiality of participants' personal information. Completed interviews will be labelled with a coded identification number and separated from any identifying personal information to prevent loss of confidentiality. Personal information will only be kept electronically in password protected files and hard copies will be stored in locked cabinets at the TU Collaborative on Community Inclusion, located at 1700 N Broad Street, Philadelphia. Research staff will be the only people with access to personal information, with the exception of authorized representatives from the Temple University Institutional Review Board (IRB), the office for Human Research Protections, and the Philadelphia Department of Public Health IRB, all of whom are required to have access by law. The same confidentiality protocols will be followed for participants' "Consent to Be Contacted About Future Research Studies" responses. Study files will be kept for seven years after the last publication of the data. Any information about child abuse or intent to harm self or others will be reported to authorities, as is required by law. Efforts will be made to limit personal information to people who have a need to review this information.

For the GPS subgroup, only authorized members of the research team will have access to participant location information during the data collection period. Since the Temple University Collaborative pays for the devices, and participant names are not on any online payments or contracts, there is no way for FollowMee to connect individual participants to their GPS data. Neither the research team nor FollowMee will disclose location information without permission, unless required by law, subpoenas, warrant, or court order. After the end of each two-week data collection period, a member of the research team will download the data from the FollowMee database and store it in a password protected file on a Temple University computer. FollowMee automatically deletes location data from their online database 1 year after service suspension, but the data can be cleared at any time at the request of the research team.

All published reports will contain data reported in aggregate form (where no individual responses can be identified), and individual examples will be presented so that identification is impossible. De-identified data may be shared with other researchers, research institutions, or research databases for use in other studies. Per funder regulations, at the completion of the study all deidentified data will be transferred to ICPSR (https://www.icpsr.umich.edu/icpsrweb/) so that data can be used by others for additional analysis. Participants may request to have their data destroyed, but are notified at consent that de-identified data that has already been

shared cannot be taken back or destroyed. Since there are no clinically relevant research results expected from this study, researchers will not be disclosing research results to subjects. Participants are notified in the consent form that publications using data from this study can be found online or can be requested from the Temple University Collaborative for personal use.

9) Risks to Subjects

All participant information collected for this study will be treated as confidential and protected by study staff to the best of their ability. To prevent disclosure of sensitive participant information, the study staff will follow the steps to ensure confidentiality which have been listed out in the "Privacy and Confidentiality" section above.

The outcome measures used ask about topics which might be distressing, triggering, embarrassing, or uncomfortable to some participants, including topics such as diagnoses, symptoms, and quality of life. Participants will be told at the beginning of each interview that such questions are included and that they have the right to decline answering any question or discontinue the interview at any point in time if it causes them too much discomfort. Participants who appear to be significantly impacted or distressed by questions will be encouraged to seek help from an emergency department or from their medical provider.

Participants will be given study related information, materials, and bicycle items, which may unintentionally reveal their participation in the study. As the transportation interventions take place in community locations, there is also a risk that participants may be seen by others during group rides and classes. To lessen this risk, staff will limit discussion the project to the transportation training aspects and omit discussion of mental health aspects when in a public community spaces. Staff will not disclose that the project is designed for people with mental health diagnoses to non-staff members.

Due to the inherent risks associated with riding a bike, using public transportation, being near traffic, and the potential for falls, there is a possible risk of injury for participants. Such risks will be decreased with safety classes and opportunities to practice skills in a safe/supervised environment. If participants are injured during intervention activities, intervention staff will work with the participant to evaluate the severity of the injury. When necessary, intervention staff will assist and/or encourage the participant to seek medical treatment. All injuries will be reported to research staff. There is no commitment by Temple University, Temple University Health System or its subsidiaries to provide compensation or free medical care to participants in the event of a research-related injury.

10)   Potential Benefits to Subjects

While benefits cannot be guaranteed, participation in the intervention arms may lead to increased skills and usage of public transportation and bike share, contributing to increased community participation, and improvement in recovery efforts and overall wellbeing.

11) Costs to Subjects

There are no required costs to participate in this study.

12) Informed Consent

Research specialists will be responsible for obtaining consent from individuals who wish to participate in the study. In addition to being a part of the main study, GPS subsample participants will go through a secondary consent process to become part of a GPS subgroup. Research specialists will be responsible for obtaining consent from individuals who wish to participate in a GPS subgroup. Research staff will meet with interested individuals and read over the consent form with them at an approved study site or over a web-based call. Interviews will be conducted in private rooms to ensure confidentiality. Research specialists from the TU Collaborative receive extensive training related to data collection activities including completion of the CITI online trainings and assessments, TU Collaborative human subjects training, and signed confidentiality agreements. TU Collaborative training includes ethical principles in research (including a review of the Nuremberg Code, Belmont Report, and HIPAA), cultural competency, and project management (including procedures for recruitment, data collection, data entry, and data storage).

Our informed consent procedures make it clear that study participation is completely voluntary and that participants may withdraw from the study at any time. After reviewing the consent form, the research specialist will make an assessment of their ability to understand and recall the following issues: what participants are asked to do, data collection procedures, and the nature of confidentiality. Perfect recall is not expected and prompts are given to facilitate recall. Poorly recalled information will be targeted when reviewing the informed consent form and study procedures. Once the potential participant is able to recall pertinent information about the study without prompts they are viewed as being able to give informed consent. If following a review of the consent and study procedures and multiple prompts the participant is still unable to grasp the nature of the study then they will not be consented or allowed to participate in the study.