Title: Implementing CAPABLE in Permanent Supportive Housing

NCT number: 04076319

Document Type: Study Protocol with Statistical Analysis Plan

Document Date: 26 February 2024

Specific Aims

Permanent supportive housing (PSH) using a Housing First approach is an evidence-based intervention to end chronic homelessness by providing low-barrier affordable housing paired with flexible health and social services.[1] In Los Angeles County (LAC), where the number of PSH units is expected to increase dramatically over the next 10 years,[2] clinical guidelines and standards for support services are lacking. This is especially problematic given that the target population is older and prematurely ageing. The chronically homeless population in the United States has an average age approaching 60 years old[3] and experiences accelerated aging,[4] including an elevated prevalence of geriatric syndromes such as functional impairment, falls, and urinary incontinence that can jeopardize PSH tenants' ability to live independently and age in place.[5–7] Current support services are not equipped to address these needs, which ultimately jeopardizes the success of PSH to maintain high rates of housing stability while tenants "age in place."[8]

We proposed conducting a pilot project to implement the CAPABLE model in PSH. CAPABLE, which stands for Community Aging in Place—Advancing Better Living for Elders, is a client-directed, home-based intervention that consists of time-limited services (no more than 6 months) from an occupational therapist (OT), a nurse, and a handyman working collaboratively with the older adult client.[9] CAPABLE was developed to support older adults who are returning to independent living after hospitalization and has been shown to improve functioning (activities of daily living [ADLs] and instrumental activities of daily living [IADLs]), decrease falls and nursing home admissions, and reduce health care costs based on multiple studies including several randomized controlled trials.[9–17] CAPABLE has the potential to be used in PSH as a model of support services that can address needs of prematurely aging tenants, which could help transform PSH from an intervention that ends homelessness to *an intervention that addresses homelessness and supports successful aging in place*.

The specific aims of this study were to:

1. **Examine the impact of CAPABLE on PSH client outcomes (e.g., ADLs, IADLs, falls).** This aim was accomplished using a pre–post design with a waitlist control group.
2. **Determine what adaptations, if any, need to be made to implement CAPABLE in PSH.** We accomplished this aim by using the dynamic adaptation process (DAP) implementation approach, which was designed to allow for an evidence-based practice to be adapted in a planned and considered, rather than ad hoc, manner.

Background and Significance

The chronically homeless population in the United States represents a stable, aging cohort whose functional age is significantly older than its chronological age.[3,18] Born at the end of the baby boomer generation, this predominantly male and African American population first became visible in the 1980s. More than three decades into the homelessness crisis, nearly half of homeless adults are aged 50 or older, a significant increase from only 11% in the early 1990s and 32% in 2003.[3,18] Homeless adults aged 50 or older have chronic disease rates like housed adults aged 65 or older.[4,19–21] Homeless adults also have a higher prevalence of geriatric syndromes (e.g., functional and cognitive impairments, frailty, depression, hearing and visual impairments, urinary incontinence) compared to population-based samples that are 2 decades

older.[4,22] Such premature aging has resulted in homeless adults having age-adjusted mortality rates three to four times higher than housed adults.[23,24]

PSH has become the leading homelessness policy in the United States regardless of age. PSH refers to immediate access to affordable, independent housing along with home- and community-based services that are intended to support a population with complex behavioral health and social needs.[25,26] PSH through a Housing First approach has been recognized as the "clear solution" to chronic homelessness by the U.S. federal government.[1] This represents a remarkable policy shift during the past decade from a previous focus on shelters and transitional housing. PSH has been shown to increase quality of life[27,28] and reduce overall public costs by removing people from the institutional circuit of hospitals, jails, shelters, and life on the streets[10,3] and placing them in independent community living.[29–31] In 2013, there were more than 280,000 PSH units across the country, a figure that has been increasing by an average of more than 10,000 units annually since 2006.[32,33] In LAC, local health service systems and tax initiatives are supporting the development of more than 20,000 units of PSH over the next 10 years.[2] To date, there has been limited research that considers whether and how PSH programs can help residents maintain independent living as they age (i.e., "age in place").[8]

A significant portion of the population that now resides in PSH is at high risk of premature onset of geriatric syndromes, which can jeopardize aging in place. Prior research with currently homeless adults suggested that PSH residents experience early onset of geriatric syndromes at disproportionately high rates.[7,22] This was confirmed in the only study to explore rates of geriatric syndromes among PSH tenants.[22] Geriatric syndromes, which are often multifactorial and cross discrete disease categories, can undermine the significant investment in PSH in cities across the United States.[34] High rates of geriatric syndromes among the increasing number of adults who have transitioned from homelessness to independent community living will likely result in higher health care utilization and increased morbidity, mortality, and institutionalization.[25-29] The recognition that PSH tenants will face challenges aging in place has only recently been articulated.[22,27] To date, research has not examined the capacity of PSH to address geriatric syndromes.

CAPABLE is an evidence-based practice designed to address many of the geriatric conditions experienced by PSH tenants. CAPABLE is approved by the National Council on Aging as an evidence-based falls prevention program and is recognized by federal and state agencies as an effective program for improving health and decreasing costs among older adults.[10] As of August 2018, CAPABLE is being offered through programs in 22 organizations across 12 states in the United States and Australia.[11] CAPABLE has the potential to be used in PSH as a model of support services that can address needs of prematurely aging tenants.

Preliminary Studies

Tenants Aging in Place (TAP) study (R21AG050009; PI: Henwood). As part of the PI's recently completed NIA-funded R21 study, 237 adults aged 45 or older were recruited from two PSH agencies in Los Angeles, California. Residents completed in-person interviews on demographics, housing and homelessness history, and overall health status. We also assessed common geriatric syndromes. Despite their average age of only 57 years old, we found 42% of respondents had difficulty performing ADLs (e.g., bathing, dressing) and 68% reported having

difficulty performing IADLs (e.g., taking transportation, managing medication). More than half of the sample (56%) had experienced one or more falls in the past year.22 Based on these findings and with the support of a planning grant from the Unihealth Foundation that covered staff time at our partner organizations, during the past 12 months, we have explored existing evidence-based practices that have potential to meet the needs of older adult PSH tenants. The CAPABLE model was determined to be the best fit given client needs and existing organizational capacity.

Methods

For this study, we worked with one of our existing community partners, the Skid Row Housing Trust (SRHT), to pilot the CAPABLE model. SRHT had the required staffing for CAPABLE, including an advanced practice OT staff member, nurses from LAC DHS who are assigned to SRHT tenants through their existing Housing for Health program, and existing handyman resources. CAPABLE training is required for nurses and OTs, which will be provided by our partners at Johns Hopkins University, where the intervention was developed. The training took approximately 20 hours to complete and included: five 60-minute on-line learning modules (self-paced, recommended to be completed over the course of two weeks); up to an 8-hour live (virtual) training; and five coaching calls or webinars. The implementation of CAPABLE over 6 months was used to accomplish both study aims.

The program was initially scheduled to begin in March 2020 but due to the onset of the COVID-19 pandemic was delayed until February 2021. During this time, study measures were updated to be maximally consistent with other CAPABLE studies in collaboration with Johns Hopkins School of Nursing (JHSN) that provided Electronic Data Capture (REDCap) data dictionaries. JHSN also provided on-line CAPABLE training to RNs and OTs along with ongoing technical assistance phone calls throughout the project. For this pilot, the trained OT was a full-time staff member at the PSH agency, and the two trained RNs worked part-time through an online scheduling platform with oversight from a local federally qualified health center.

Site description. SRHT is one of the largest providers of PSH in LAC. Founded in 1989, the SRHT operates nearly 1,600 housing units in 24 buildings, providing housing for nearly 1,200 adults aged 50 or older. SRHT predominantly serves adults with disabilities who are high utilizers of public health or mental health services. SRHT employs approximately 75 support and medical staff members, including case managers, program managers, paraprofessionals, substance abuse professionals, OTs, social workers, psychologists, psychiatrists, nurses, primary care physicians, and a hoarding specialist.[4]

Aim 1: Examine the impact of CAPABLE on PSH client outcomes.

Implementation of CAPABLE. We trained two registered nurses (RNs) and an OT to handle a caseload of 50 PSH tenants. In most cases, the OT made six visits, the RN made four visits, and a handyman made one to two visits to modify the client's home during a 6-month period. However, the program can be completed in fewer visits, with a minimum of four OT visits and three RN visits. CAPABLE home visits are key to meeting participants "where they are." The first visits for the OT and RN were usually 90 minutes each, and the later ones are usually an hour each. Visits are spaced to enable older adults to practice new strategies learned in the previous visit. Visits were allowed to be rescheduled given unforeseen circumstances. There was a clear conclusion or graduation, with the older adult understanding how to use their new

skills and apply them to future situations.[10] For this study, we planned to recruit 100 eligible SRHT tenants. As a result, a waitlist control design was used, for a case-crossover between- and within-subject comparison of the CAPABLE intervention effect.

Participant recruitment and data collection. Starting in December 2020, the PSH support staff began identifying eligible participants for the CAPABLE program. PSH tenants were eligible for the study if they were over the age of 50, had some or a lot of difficulty performing ADLs, and were cognitively intact or had only mild cognitive impairment. Tenants who were perceived to meet these criteria received details about the CAPABLE program from the trained OT, who also asked whether tenants would be interested in participating in a study. Interested tenants were referred to the research team to be screened to confirm eligibility status, obtain informed consent, and randomly assigned to either the intervention or waitlist control group using a random number generator.

Between December 2020 and January 2021, 75 PSH tenants were referred to the research team. Fifteen PSH tenants declined to participate, resulting in 60 individuals who answered a survey-administered baseline assessment and were randomized into the intervention or waitlist control group. The CAPABLE team then received the list of 30 tenants randomized to initially receive the intervention. Two tenants decided they no longer wanted to participate in the program and one could not be recontacted (the team later discovered this person had died), leaving 27 who received the intervention starting in February 2021. In June 2021, the 30 tenants in the waitlist control group completed a follow-up research assessment, along with the 17 who had finished the CAPABLE intervention at that time. By September 2021, the remaining 10 tenants all completed the CAPABLE program but only nine had completed the follow-up research assessment; one person declined to complete but was contacted 6 months later and completed the follow-up assessment at that time.

Most intervention visits occurred in person at the participant's residence (a few visits by the nurse were conducted by phone if the tenant was able to share progress and could follow guidance through this format). All research data collection was conducted by telephone as part of COVID-19 safety protocols. PSH tenants received a $20 gift card for completing the baseline assessment and a $25 gift card for completing the follow-up assessment.

All data were collected and managed using the REDCap platform. Measures collected only at baseline included demographic characteristics, years in current PSH unit, and cumulative years spent homeless. Tenants were also asked about history and number of falls, emergency room visits, and overnight hospitalizations within the last year at baseline; these items were asked again at follow-up but used only a 6-month retrospective. Additional health-related outcomes measured at baseline and follow-up included information on: ADLs and IADLs; falls efficacy; depression; pain interference with usual activities; self-rated health; and overall quality of life. A description of primary outcome measures are included in the following table:

Table 1. Description of primary outcome measures.

Measure	Description
Katz Activities of Daily Living Scale	The modified Katz ADL Scale was used to rate ability to bathe, dress, transfer, toilet, and eat using three categories: *no difficulty*, *a little or some difficulty*, or *a lot of difficulty or inability to perform*.[36]
The Brief Instrumental Functioning Scale	The Brief Instrumental Functioning Scale was used to assess ability to perform six IADLs on a scale similar to the Katz ADL Scale.[37]

Falls	History of falls during the past year was assessed by asking: "Did you fall to the ground in the past year?" [38] The number of falls in the past year was also assessed.
Falls efficacy	Participants rated their confidence they could do each of 10 activities without falling on a 10-point scale, with total scores ranging from 10 (not very confident) to 100 (very confident) using the Tinetti Falls Efficacy Scale.
Depression	Eight of the nine items in the Patient Health Questionnaire-9 were used to measure depression, rated on a 4-point scale of how frequently participants were bothered by the eight problems during a 2-week period (0 = not at all, 1 = several days, 2 = more than half the days, and 3 = nearly every day). [39] Items were summed to obtain a score with minimum and maximum values of 0 to 24, respectively, whereby higher scores represent greater depressive symptoms.
Pain interference with usual activities	Pain interference with usual activities was assessed using an item from the 3-item PEG to assess average pain intensity (P), interference with enjoyment of life (E), and interference with general activity (G) on a 10-point Likert scale from 0 (does not interfere) to 10 (completely interferes).

Statistical Analysis Plan. We conducted a power analysis using G*Power to estimate the power obtained with 100 individuals proposed for this pilot. When specifying an effect size of .30 and a correlation among repeated measures of .70, 70 participants across two groups were needed to achieve an exact power of .80. This allowed our study to have up to a 30% overall dropout rate while maintaining sufficient power.

The balance between the intervention and control groups at baseline was assessed using Fisher's exact test for nominal variables, the Cochran–Mantel–Haenszel test for ordinal variables, and two-sample *t*-tests for continuous and count variables. Given that the main analytic goal of this pilot study was to consider the effect size of the intervention, we calculated within- and between-group standardized mean differences (Cohen's *d*) between time points. These tests were also used to compare differences in falls, ER visits, and hospitalizations between the groups at follow-up. To consider statistically significant changes in key outcomes in each study group (i.e., intervention versus control) between baseline and follow-up, we also used paired *t*-tests. Between-group analyses included a two-sample *t*-test to test whether the mean change in outcomes between baseline and follow-up differed between the intervention and control groups.

Aim 2: Determine what adaptations, if any, need to be made to implement CAPABLE in PSH.

Adaptation of CAPABLE. Following the DAP implementation approach, which was designed to allow an evidence-based practice to be adapted in a planned and considered, rather than ad hoc, manner,[40] our investigative team monitored the implementation of CAPABLE and worked in conjunction with program leaders, clinicians, clients, county health systems, and model developers to make any adaptations to the model that would also preserve fidelity to core components. For example, we expected that within PSH, CAPABLE would need to include

collaboration with existing PSH case workers and social workers. DAP is a continuously iterative process, in that ongoing experience can inform continued adaptation as needed. Although DAP can be used during all four phases of the implementation conceptual model known as EPIS (i.e., exploration, preparation, implementation, and sustainment),[41,42] this study focused on two of the phases: preparation and implementation. The initial exploration phase was completed as part of our previous work (see Preliminary Studies section), and the implementation phase represents this next step.

Data collection and monitoring. The investigative team (Henwood and Pitts) had primary responsibility for monitoring the implementation of CAPABLE through weekly case reviews and note taking on any possible deviations from the model. The investigative team met monthly with the larger implementation resource team (IRT), which included the developers of the CAPABLE model, via a conference call to discuss fidelity to CAPABLE and consider adaptation needs. With DAP, adaptations were explicit and done in a planned way by the IRT, in conjunction with service providers and coaches, to preserve fidelity to core components. This was accomplished by reviewing weekly implementation monitoring with the IRT. Discussion and decisions were documented through an ongoing audit trail.[43]

Data analysis. At the end of the implementation phase, the IRT reviewed all implementation decisions documented in the audit trail and determined what adaptations of CAPABLE should be included for PSH. These decisions were formalized through a written manual to be used for future implementation and research projects.

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