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Impact of a Community-Based Frailty Intervention Among Middle-Aged and Older Prefrail and Frail Homeless Women: A Pilot Randomized Controlled Trial

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Abstract

Interventions are needed to address frailty and other behaviors (e.g., drug and alcohol use) among prefrail and frail homeless women (P/FHW). The purpose of this pilot randomized controlled trial (RCT) was to compare the efficacy of a Frailty Intervention (FI) versus a Health Promotion (HP) program among P/FHW (N=32). Structured instruments assessed sociodemographics, individual, situational, health-related, and behavioral factors. While program differences were not statistically significant with the main outcome variables, medium-to-large effect sizes were found in favor of the HP program as it relates to physical and overall frailty, as well as, any drug use, alcohol use, and drug dependency. Based on these findings, it is critical to strengthen the HP program to optimize all domains of frailty (e.g., physical, psychological, and social) and substance use for P/FHW.

Keywords

homeless; pre-frail/frail; middle-aged/older women; community health workers

INTRODUCTION

Middle-aged and older homeless women (HW) in metropolitan cities are increasing and African American women (AAW) are disproportionately impacted (Downtown Women's Action Coalition, 2016). A recent report found that 67.6% homeless women sampled were 41 to 61 years of age (Downtown Women's Action Coalition, 2016). Geriatric syndromes, such as frailty, defined as an accumulation of deficits (Rockwood & Mitnitski, 2007) in physical, psychological and social domains (Gobbens, van Assen, Luijkx, & Schols, 2012) may be a considerable issue among homeless adults (Brown, Kiely, Bharel, & Mitchell, 2012; Salem et al. 2013). Among older homeless adults (N=150, ages 40–73), of whom 50% were female and 53.3% were frail, older age, female gender, increased health care utilization, poor nutrition, and low resilience were significantly correlated with frailty (Salem et al. 2013). When compared to community-dwelling populations, homeless persons have distinct, more prevalent risk factors such as mental illness and substance use, all of which may contribute to premature development of geriatric syndromes, of which frailty is one (Brown, Kiely, Bharel, & Mitchell, 2013).

Mental health is likewise a critical area of need among homeless populations. About one quarter (24.9%) of homeless women reported their mental health as poor, while 27.6% reported their mental health as fair (Downtown Women's Action Coalition, 2016). Earlier life experiences with adversity may influence later life mental and physical health (Wolitzky-Taylor et al., 2017), anxiety, excessive anger and rage (Harris & Fallot, 2001), and individuals may self-medicate with drugs and/or alcohol (Harris & Fallot, 2001; Khantzian, 1985) as a means of addressing traumatic symptoms (Harris & Fallot, 2001) which have been unresolved.

Among homeless women surveyed (N=371) in a recent homeless service agency assessment, 43.9% had abused or been dependent on drugs in their lifetime and 64.2% had used or been dependent on drugs within the last year (Downtown Women's Action Coalition, 2016). Among older homeless adults (N=247), nearly one in five met criteria for drug addiction and a little less than one in three met the criteria for a binge drinking episode (Brown, Kiely, Bharel, & Mitchell, 2012). Alcohol and drug use have been found to be positively associated with a greater number of geriatric syndromes (Brown, Kiely, Bharel, & Mitchell, 2013); thus, screening and identifying those at risk for addiction is warranted.

Healthcare utilization is also an important area of focus among homeless populations as higher rates of emergency department utilization among frail middle-aged and older homeless adults have been associated with frailty (Brown, Kiely, Bharel, Grande, & Mitchell, 2013). Among 250 homeless adults, 50 years of age or older, 22% of those identified as frail had visited the emergency room at least four times within a one year period and 53.4% reported at least one fall within the past year (Brown, Kiely, Bharel, Grande, et al., 2013).

The purpose of this pilot randomized controlled study (RCT) was to compare the effectiveness of the Frailty Intervention (FI) program versus a Health Promotion (HP) program among P/FHW (N=32) at baseline and three-month follow-up.

Theoretical Foundations

The proposed study was guided by the frailty framework among vulnerable populations (FFVP) (Salem et al. 2014), the Integral Conceptual Model of Frailty (Gobbens et al., 2012), and formative qualitative work with P/FHW (Salem and Ma-Pham 2015) and homeless service providers (HSPs) (Salem et al. 2017) which helped us further explore and identify health, social service delivery needs, challenges experienced, and whom should deliver the program. The FFVP depicts individual-level, situational, health-related, and behavioral antecedent variables which contribute to frailty (Salem et al. 2014). In particular, individual-level factors (e.g., chronological age, race or ethnicity, marital status, and having children), situational factors (e.g., first time homeless), health-related factors (e.g., back pain, comorbid conditions, depressive symptomology and falls), behavioral factors (e.g., drug and alcohol use), resource factors (e.g., social support) were hypothesized to influence frailty (e.g., physical, psychological and social frailty).

Based on the FFVP model it is critical to address behavioral health and health-related factors when developing a program targeting the multidimensional triadic domains of frailty (e.g., physical, psychological and social). The Integral Conceptual Model of Frailty has also guided the program design; in this model, chronic disease is an antecedent to frailty (Gobbens et al., 2012). The Health Promotion (HP) program focused on chronic diseases; whereas the FI program focused on separate components related to physical, psychological and social frailty (Gobbens et al., 2012).

Program Design

Based upon the shared voices of focus group participants in formative focus groups (Salem and Ma-Pham 2015), we worked with the community-based partner to hire and train two community health worker group interventionists who were formerly homeless women who had successfully transitioned out of homelessness and developed the Frailty Intervention (FI) program and Health Promotion (HP) program. The FI program consisted of six health promotion education sessions which lasted up to 60 minutes and nurse case management (NCM) before or after each group session for up to 20 minutes. The FI program content was focused on the three components of frailty (e.g., physical, psychological and social) along with risky behaviors – these topics were described as areas of interest in prior formative focus groups (Salem and Ma-Pham 2015).

Physical frailty was addressed with sessions which focused on nutrition (e.g., goals of good nutrition, learning how to read nutrition labels, going over calories, portion control, and etcetera) and physical activity. Psychological frailty was addressed with sessions which focused on depressive symptoms, social support, and stress management. Other sessions which were of keen interest focused on basics of hygiene, Hepatitis A, B and C viruses and HIV/AIDS transmission and prevention. Group and one-on-one sessions strengthened and addressed social and psychological domains of frailty. The NCM-led one-on-one sessions included an assessment, community-based referrals and content which supported topics from the group sessions.

The HP program consisted of six group education sessions in which each session lasted up to 60 minutes and was led by a separate CHW interventionist. These session topics included: 1) general community resources, 2) safety, 3) hypertension, 4) diabetes, 5) arthritis, and 6) cholesterol. During the sessions, the CHW facilitator encouraged discussion related to content areas, answered questions and provided community-based resources and referrals. There were no individual one-on-one sessions in this group or nurse involvement.

We hypothesized that P/FHW in the FI program would decrease in physical, psychological, and social frailty, along with overall frailty as compared to the HP program participants because the program had specific sessions on triadic domains of frailty, along with complementary NCM support. Further, we hypothesized that P/FHW in the FI program would have reduced self-reported substance use (e.g., alcohol, drugs, and drug dependency) as compared to the HP program given the risky behavior topics were discussed in the sessions (e.g., HIV, Hepatitis A and B).

METHODS

Design, Sample and Setting

A pilot RCT intervention, which compared the effectiveness of the FI program versus the HP program at baseline and three-month follow-up, was conducted among P/FHW (N=32) in a large, urban, homeless day center in Central City East, Los Angeles (i.e., Skid Row) between July and November 2014. Eligibility criteria included a) P/FHW as defined by the Survey of Health, Ageing and Retirement in Europe Frailty Index (SHARE-FI) (Romero-Ortuno, Walsh, Lawlor, & Kenny, 2010) and Tilburg Frailty Index (TFI) (Gobbens et al., 2012), b) 40 years of age, c) English-speaking, d) homeless (self-report), and e) where they slept last night. The UCLA Institutional Review Board (IRB) approved this study.

Procedure

The Principal Investigator (PI) provided weekly information sessions; further, agency liaisons and designees used a standardized IRB-approved referral script for recruitment. Homeless women who expressed interest were located to a private area with the PI to review the full scope of the study. Next, an IRB-approved screening script was used to determine eligibility for those interested. Potential participants signed a screening informed consent (IC) and completed screening. In addition, a decision-making capacity tool evaluated each individual's ability to sign informed consent. Receipt of a certificate of confidentiality was explained to the participant as part of the IC process. Participants who were eligible and interested in continuing with the study were randomized into the FI or HP program using a random number assignment table. After the group assignment, the PI administered a second informed consent. Upon completion, a research assistant (RA) administered a 60-minute baseline questionnaire and conducted other assessments (e.g., blood pressure, height and weight). At that time, the six week meeting schedule was provided to each participant.

Community Health Worker (CHW) Facilitator Training

Prior to program implementation, over the course of six days, the PI trained two female CHWs with oversight from a senior faculty researcher. CHWs learned about managing and

conducting group education sessions and participated in mock sessions which focused on leading groups, making presentations, maintaining key session objectives and time, answering questions, managing side conversations and responding to challenges. Both CHW group facilitators completed the Collaborative Institutional Training Initiative (CITI) and obtained Health Insurance Portability and Accountability Act (HIPAA) certification. During the training, CHWs were evaluated based upon knowledge of content areas unique to the program they delivered, utilizing pre-and-post-exam content knowledge testing. During the CHW training, both the FI and HP programs were modified in order to be culturally-sensitive and relevant. Both FI and HP CHWs were not trained in each other's content areas and did not lead each other's groups. Throughout the study, compensation was provided which included \$2 (screening), \$20 (baseline and follow up food gift card) and \$10 (food gift card) for each of the six class sessions.

INSTRUMENTS

Individual-Related Factors

Demographic variables measured include age, race/ethnicity, marital status, and having children.

Situational Factors

First time homeless was measured by one item which asked if this was their first time being homeless. Responses included a "yes or no" (coded 1 and 0, respectively).

Health-Related Factors

Back Pain included one item which asked about self-report of back pain as a current problem. Responses included "yes or no" (coded 1 and 0, respectively) (Sangha, Stucki, Liang, Fossel, & Katz, 2003). Comorbid Conditions included a single item as to whether an individual had one or more self-reported health conditions (coded 1 and 0, respectively) (Sangha et al., 2003). Depressive Symptomology was measured by the 20-item Center for Epidemiologic Scale (CES-D) (Radloff, 1977) scale. Responses ranged from "rarely or none of the time" to "most of the time" and several items (4, 8, 14, and 16) were reverse scored. Cronbach's alpha (α) for CES-D scale was .79 in this sample. Falls included a single item which assessed falling in the past three months. Responses included "yes or no" and were coded as "1" if they had fallen.

Resource Factors

Social Support was measured using the MOS Social Support Survey (MOS-SSS) (Sherbourne & Stewart, 1991) which had four subscales on a 5-point scale ranging from "none of the time" to "all of the time." Alpha coefficients for the subscales included emotional support (8 items; $\alpha = .94$), tangible support (4 items; $\alpha = .94$), affectionate support (3 items; $\alpha = .92$), positive social interaction (4 items; $\alpha = .97$), overall (19 items; $\alpha = .96$). A total score was obtained by summing the scores; a higher score meant higher social support.

Outcomes

Frailty was assessed by the 15-item Tilburg Frailty Index (TFI) (Gobbens et al., 2012) asked about physical (8 items; $\alpha = .82$), psychological (4 items; $\alpha = .58$), social frailty (3 items; $\alpha = .45$) and overall frailty (15 items; $\alpha = .81$). Responses included “yes or no” and for select questions, “sometimes.” The total score ranged from 0 to 15 and those who had 5 or greater was considered frail.

Drug dependency, any alcohol use and any drug use were measured by the Texas Christian University Drug History (TCU) form (Knight, Simpson, & Morey, 2002), which assessed the frequency of alcohol use within the last three months. Responses were coded as “1” if individuals responded that they had used any alcohol or drugs (e.g., marijuana, crack, methamphetamine, amphetamine, tranquilizers) in the last three months (Knight et al., 2002). In this sample, cronbach’s alpha was .89; a score of 3 indicates a severe drug-related problems (Knight et al., 2002).

DATA ANALYSIS

SPSS Version 22 was used for data analysis. Descriptive statistics were computed including means and standard deviations or frequencies and percentages as appropriate to distributional characteristics. Differences between the program groups (FI versus HP) were examined using chi-square tests, Fisher’s exact tests, and two independent sample t-tests; these tests ensured that the randomized groups were comparable at baseline in terms of outcome measures (e.g., frailty domains and substance use) and characteristics from the FFVP domains (e.g., sociodemographics, health-related characteristic, and social resources), which might also predict the outcomes and serve as covariates when comparing program groups. Population average models were used to compare groups in terms of changes over time in frailty components, drug dependency, alcohol use and drug use, adjusting for levels of and changes in the potential covariates. In order to account for the correlation of observations within the same individual over time, generalized estimating equations (GEE) with an identity link function or a logit link function were used to estimate the model coefficients. A separate model was estimated for each outcome measure. The intervention group and time main effects were included in all models, as well as an intervention group by time interaction; this interaction effect is of primary interest in this analysis, in order to examine differential rates of change between the intervention groups. In addition to sociodemographic, health-related, and resource characteristics as covariates, the drug dependency score was included as a health-related potential covariate in models for frailty outcomes, and the overall frailty score was included as a potential covariate in models for substance use indicators.

To further examine the practical significance of the FI program, Cohen’s *d* or odds ratio effect sizes were calculated for the group-by-time interaction effect (Feingold, 2009, 2013). In this study, effect size for a continuous outcome was calculated by dividing the coefficient for the intervention group by time interaction term by the standard deviation of the outcome for all participants at baseline. Participants were randomized into one of two groups; for each outcome, within group, standard deviation is assumed the same for both groups. For

binary outcomes, the effect size was estimated by an odds ratio calculated as the exponentiated coefficient for the group by time interaction term.

RESULTS

Participant Characteristics

In total, 60 homeless women were screened and 32 were eligible to participate in the study. A total of 15 women were randomized to the FI program and 17 women were randomized to the HP program. Across both groups, there was a 78.1% session completion rate among those who completed the follow-up (FI = 73.3% and HP=82.4%); further, there was an 87.5% three-month follow-up rate (FI = 86.7% and HP=88.2%).

The mean age of participants was 54.78 (ages 41–72; SD 6.77). The majority was African American (84.4%), fewer were Anglo/White/Caucasian (9.4%), equal numbers were Mixed (3.1%) and Other Hispanic (3.1%). Approximately half of the sample slept in a shelter (46.9%), followed by those living in unsheltered environments (37.5%). Over half (53.1%) reported more than one time homeless. The majority of this sample had two or more comorbid conditions (87.5%), or back pain (65.6%); further, slightly more than one quarter used an assistive device (65.6%). A little less than half (43.8%) reported falling in the last three months, and a little more than three-quarters (77.4%) met the criteria for depressive symptomology. Over half of the sample (53.1%) consumed alcohol in the last three months, 21.9% had used marijuana, and 12.5% had used crack. Over a quarter (28.1%) had used any drugs (e.g., marijuana, crack, methamphetamine, amphetamine and tranquilizers) and 40.6% were drug dependent.

There were no significant baseline group differences between FI program participants in physical frailty (mean=5.07, SD 1.75), psychological frailty (mean=2.33, SD 1.23), social frailty (mean =1.93, SD 0.88) or overall frailty (mean=9.33, SD 2.61) and HP program participants in physical frailty (mean=5.53, SD 2.00), psychological frailty (mean=2.59, SD 0.71), social frailty (mean =2.18, SD 0.64) and overall frailty (mean=10.29, SD 2.62).

GEE Models of Change Over Time

The GEE results represent change in frailty components (i.e., physical, psychological, social, overall), any alcohol use, any drug use, and drug dependency over time, adjusting for other predictors as potential covariates.

Differences between FI and HP Group by Time Effect

The group by time interaction effect (controlling for covariates in the model) was not significant (at $p < .05$) for any of the outcomes, indicating that FI and HP programs did not differ significantly in their pattern of change from baseline to 3-month follow-up. However, several of the estimated effect sizes were in the medium-to-large range, suggesting potential impact of the HP program (if results are replicable in a larger sample): $d = .50$ (physical frailty), $d = .56$ (overall frailty), $d = .73$ (drug dependency), $d = .90$ (any drug use), respectively and $OR = 2.52$ for any alcohol use. It is also important to note that in the FI program,

although not significant, there was also a trend for a decrease of drug dependency between baseline (FI program, $\mu=1.8$) to three month follow up (FI program, $\mu=1.0$).

General Change over Time (Time Effect)

Irrespective of either group, there was a general decrease in overall frailty ($p=.012$), any alcohol use ($p=.009$), and drug dependency ($p<.001$) between baseline to three months.

Relationship of Covariates to Selected Outcomes

Within the multivariable model, higher levels of back pain ($p=.008$), falls ($p=.009$), drug dependency ($p=.038$) were associated with physical frailty; moreover, lower levels of social support were associated with physical frailty ($p=.048$), psychological frailty ($p=.018$) and higher levels of any drug use ($p=.012$). Higher levels of falls were associated with physical frailty ($p=.009$), social frailty ($p=.023$) and overall frailty ($p<.001$). Lower levels of comorbid conditions were associated with any drug use ($p=.023$). Lower levels of first time homeless were associated with drug dependency ($p=.032$) and higher levels of depressive symptomology ($p=.043$) were associated with drug dependency.

DISCUSSION

The aim of this pilot RCT study was to compare the effectiveness of the FI program versus the HP program over a three-month time, and determine acceptability and feasibility of the program, along with effect sizes for frailty and substance use outcomes. Regardless of group designation, while not statistically significant, there was a decrease in overall frailty, any alcohol use, and drug dependency from baseline to three month follow up. Moreover, medium-to-large effect sizes were found in favor of the HP program, suggesting potential impact of the HP program as it relates to physical frailty, overall frailty, drug dependency, any drug use and any alcohol use given a larger sample size.

It is conjectured that the presentation of health-related topics in both the HP and FI program sessions may have encouraged positive health behaviors, potentially influencing overall frailty. For example, while the FI program focused on the benefits of physical activity, psychological well-being, and reduction of risky behaviors (i.e., alcohol and drug use), the HP program also focused on frequently self-reported chronic health conditions (i.e., Hypertension, Diabetes, Arthritis and Cholesterol), along with physical safety as a concern among homeless women. The HP program sessions also allowed women to readily share in group sessions, which may have increased psychological well-being and social support indicators. Thus, the combination of existing benefits of the FI program, with the emphasis on chronic health conditions and safety as critical areas of need, may have influenced overall frailty.

As a pilot project, the small sample size from one homeless day center in an urban city threatens the external validity or generalizability of the study. Further, the relatively small sample size provides power to detect only moderate-to-large effects in group differences over time (Rochon, 1998). In addition, GEE results should be interpreted cautiously since the estimator can underestimate variance in small samples. Replication with a larger sample is recommended and more statistical power is needed in order to address differences

between groups. Because the majority of the data was self-reported by the population, misclassification and recall bias may have resulted; social desirability bias may have also occurred, in which participants may have over-reported social support and other frailty domains. While a random assignment table for randomization between groups was utilized, future randomization procedures should include stratification by frailty state.

Public Health Nursing Implications in the Development of Future Nurse-Led, Multidisciplinary Interventions

This pilot intervention study sheds light on an understudied population, namely P/FHW, and provides a greater understanding of feasibility and acceptability of this intervention. In terms of feasibility, a high session completion rate, high follow-up completion rate, and low attrition rate may indicate that this intervention was feasible and acceptable to the population. Results suggest that when refining the program for future use, the HP group can be reinforced with a harm reduction approach related to alcohol, drug use and drug dependency.

Additional opportunities to refine the physical frailty component of the intervention can include integration of exercise, balance training, and vision and hearing referrals. Further, components addressing personal and external fall risk factors and alcohol use may improve physical frailty outcomes among P/FHW. Likewise, incorporating a drug and alcohol addiction specialist and linkage to outpatient drug treatment can provide P/FHW access to needed resources and strengthen the program. Strategies to improve psychological frailty may involve care coordination for behavioral health referrals, assessment, and treatment, to improve coping and decrease emotional distress for participants. In terms of social frailty, building cohesive networks of social support can enhance social relations, emotional support, and pro-social interpersonal relationships. In terms of acceptability and feasibility, participants attended the program as intended; thus, it is possible to utilize this intervention to successfully engage women experiencing homelessness. Future development of multidisciplinary interventions in social and clinical services can more appropriately address health and social service delivery needs among this population.

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