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Correlates of Physical, Psychological and Social Frailty among Formerly Incarcerated, Homeless Women

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Abstract

Frailty is a deficit accumulation in physical, psychological and social domains. Correlates of frailty were explored among formerly incarcerated, homeless women (N=130, $M_{age} = 38.9$). Significant correlates of physical frailty were age, years homeless, prior violence, witnessing less violence, drug dependence, PTSD symptoms and tangible support. Significant correlates of psychological frailty were age, years homeless, witnessed violence, jail time, divorced less, drug use/dependence, prison time, methamphetamine use, and bodily pain. Significant correlates of social frailty were drug use, emotional regulation, and daily alcohol use. Reentry interventions are needed for formerly incarcerated, homeless women who experience physical, psychological and social frailty.

Keywords

frailty; homeless; formerly incarcerated; substance use; women

Background

Over the last few decades, the number of women in state and federal penitentiaries has exponentially increased (Carson, 2014). For women with a history of incarceration who have experienced significant stress-associated life events (e.g., incarceration, homelessness,

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trauma, alcohol and drug use), age-related geriatric syndromes may often be present at younger ages as compared with the general population across the lifespan.

An 'older' prisoner can be defined as an individual who is at least 50 years of age and older (Anno, Graham, Lawrence, & Shansky, 2004) which is 10–15 years younger than what is generally considered an 'older' adult. Those in the criminal justice system undergo premature aging (Williams & Abroades, 2007; Williams, Goodwin, Baillargeon, Ahalt, & Walter, 2012). Given that the majority of prisoners are eventually released into the community (Williams et al., 2012), reentry becomes an even more critical time to address their age-related and geriatric needs, such as frailty.

Defining Physical, Psychological and Social Frailty

Frailty is a clinical syndrome which leads to an increased risk for falls, hospitalization, and mortality (Fried et al., 2001; Kulmala, Nykanen, & Hartikainen, 2014; Wolf et al., 1996; Xue, 2011). Physical frailty can be defined as a decline in nutrition, mobility, physical activity, strength, endurance, balance and sensory functions (Gobbens, van Assen, Luijkx, & Schols, 2012). Food insecurity among homeless populations is a significant issue (Tong et al., 2018) as the lack of choices and food options presents a particularly challenging circumstance, which leads to nutritional inadequacy and physical frailty. In one study among older homeless adults (N=350), approximately 79.7% reported food insecurity or very low food insecurity (Tong et al., 2018).

Reintegrating back into the community requires adequate mobility to manage health and social service appointments; however, challenges with mobility and transportation can affect successful reintegration and contribute to recidivism. Physical activity (PA) may be limited among formerly incarcerated, currently homeless women due to the lack of access to safe parks, neighborhoods, and gyms. Yet, regular physical activity has been found to delay the onset of frailty, defined as a gait speed < 0.60 m/s and or inability to rise from a chair without using one's arms (Peterson et al., 2009). Among Medicare beneficiaries enrolled in the Health ABC Study (N=2,964), data revealed the sedentary participants had significantly increased odds for developing frailty as compared with those who were active (Peterson et al., 2009). In a pilot study among offenders in a rehabilitative program, among offenders participating in regular PA, 75% reported improved mental and physical health (Nelson, Specian, Tracy, & DeMello, 2006).

Psychological frailty can be defined as a decline in cognition, coping and mood (Gobbens et al., 2012). Among homeless adults, cognitive deficits may have various etiologies which can include maladaptive coping mechanisms such as substance use and trauma (Burra, Stergiopoulos, & Rourke, 2009) which can lead to victimization and offending (Turunovic & Pratt, 2013). In a study among older homeless adults, data revealed that high severity of alcohol use was associated with global cognitive impairment (Hurstak et al., 2017). Formerly incarcerated women may have also experienced negative social networks, which include intimate partner violence (Cobbina, 2010). Among formerly incarcerated women who are in the community, serious and persistent mental health issues were noted such as post-traumatic stress disorder (PTSD), depression, and mood problems (Richie, 2001).

Social frailty can be defined as a decline in social relations and social support (Gobbens et al., 2012). Among substance-using women, social support can be rooted in people who provide positive and negative support (Falkin & Strauss, 2003). Among the formerly incarcerated, limited informal support from spouses and peers is a notable issue. Many may have had strained relationships due to substance use and other criminal justice interaction (Falkin & Strauss, 2003). Some authors charge that one of the guiding principles of women's growth is connection with other women; in particular, women find a sense of self and worth from their relationships with other women (e.g., mothers, wives and daughters) (Covington, 2008). Formerly incarcerated persons oftentimes experience stigma and discrimination as they prepare to reenter their communities; however, social bonds has been found to be a protective mechanism (LeBel, 2012).

Premature Aging during Reentry: Earlier Onset Geriatric Conditions

During reentry, formerly incarcerated older adults may face both social and medical challenges which include navigating crime-concentrated neighborhoods whilst frail (Williams & Abraldes, 2007). Frailty has been studied primarily among community-dwelling, non-incarcerated older adults, but few investigators have studied geriatric syndromes among homeless adults (Brown, Kiely, Bharel, & Mitchell, 2012; Salem, Nyamathi, Brecht, et al., 2013) or among homeless middle-aged and older women (Salem & Ma-Pham, 2015). In one seminal study utilizing data from the Cardiovascular Health Study in which 5,317 men and women, 65 years and older participated, the prevalence of frailty among community-dwelling, housed older adults was 6.9% (Fried et al., 2001). Utilizing a similar frailty criterion, in a separate study among homeless adults (N=247) 50 to 69 years of age, 16.4% met the frailty criteria (Brown et al., 2012). More recently, in a Los Angeles-based study which enrolled 150 middle-aged and older homeless adults, 53% met the criteria for frailty utilizing the Frailty Index (Salem, Nyamathi, Brecht, et al., 2013). Data revealed that age, gender, healthcare utilization, nutrition and resilience were significantly related to frailty (Salem, Nyamathi, Brecht, et al., 2013). Among prefrail and frail, middle-aged and older homeless women, several areas of need included vision and dental care, and pain management (Salem & Ma-Pham, 2015).

Physical and Mental Health-Related Needs during Incarceration and Reentry

For those incarcerated, health status is often worse (Schnittker & John, 2007) as compared with non-incarcerated, community-dwelling populations. During incarceration, many individuals are managing chronic health conditions such as hypertension, diabetes mellitus, asthma, kidney problems and hepatitis (Wilper et al., 2009). Pre-existing diagnoses of mental illness, including depressive disorder, bipolar disorder, schizophrenia, PTSD, anxiety disorder, personality disorder, or other mental health condition are also prevalent among federal (14.8%), state (25.5%) and jail inmates (25.0%) (Wilper et al., 2009). Among older jail inmates, 40% had a positive PTSD screen (Flatt, Williams, Barnes, Goldenson, & Ahalt, 2016).

Health inequities may persist during reentry (Freudenberg, Daniels, Crum, Perkins, & Richie, 2008); in fact, women report lack of access to affordable medications, lack of access to healthy food options, challenges managing chronic health conditions (e.g., diabetes or

obesity and etcetera), functional limitations, pain management and substance abuse (Colbert, Sekula, Zoucha, & Cohen, 2013; Williams & Abralles, 2007). Lack of continuity of physical and mental health care has also been found to be an unmet need (Binswanger et al., 2011). Older adults with a history of incarceration may also be managing multiple chronic illnesses with combined functional limitations and/or lack of medical insurance or prescription drug benefits (Williams & Abralles, 2007).

Experienced Life Events among the Formerly Incarcerated

Among formerly incarcerated individuals, a cyclical pattern exists between life events such as incarceration, homelessness, trauma and violence, which may lead to physical and psychological frailty and maladaptive coping mechanisms such as substance use and dependence. Trauma can be considered one's response to an overwhelming event (Covington & Bloom, 2007), which can include interpersonal or domestic physical, sexual or emotional abuse or neglect resulting in PTSD. Some estimates suggest that over three quarters of incarcerated women have experienced some level of physical violence by an intimate partner (Moloney, van den Bergh, & Moller, 2009) and these life events can contribute to physical, psychological and social frailty. A number of researchers have investigated aging prisoners (Maschi, Morgen, Zgoba, Courtney, & Ristow, 2011; Maschi, Viola, & Morgen, 2014; Williams et al., 2006) and found that a large proportion had experienced trauma. However, less understood is the fact that prior violent offenses may lead to physical and psychological frailty.

Among former prisoners, homelessness is a common experience (Greenberg & Rosenheck, 2008) and may continue beyond jail and prison walls. In particular, homeless women are often exposed to traumatic experiences while homeless and unsheltered (Downtown Women's Action Coalition (DWAC), 2016; Wenzel, Leake, & Gelberg, 2001). In a needs assessment conducted by DWAC which surveyed 371 homeless women between the ages of 20 to 85, more than half (55%) of these women self-reported domestic violence, over one third (39.4%) were survivors of sexual assault, and more than half were survivors of child abuse (67.5%) (Downtown Women's Action Coalition (DWAC), 2016). Among a sample of 974 homeless women, those with violent experiences in the last 12 months were more likely to have lived on the street during the past 60 days compared to those without violent experiences (Wenzel et al., 2001).

Maladaptive coping mechanisms such as illicit drug or alcohol use can be approaches to coping with depression, hypomania and hyperactivity (Khantzian, 1985). In a New York based study of 967 adolescents and adult women, the majority (91%) of adult women reported use of crack, cocaine, or heroin in the six months prior to arrest and the remaining 19% averaged three or more drinks in the last month (Freudenberg et al., 2008).

Purpose

During reentry, formerly incarcerated, homeless women experience physical and mental health needs, which are compounded by previous life events placing them at greater risk for physical, psychological and social frailty as compared to community-dwelling populations. While frailty is thought to increase the likelihood for premature morbidity and mortality

(Szanton, Seplaki, Thorpe, Allen, & Fried, 2010), there is a paucity of data focused on this vulnerable population in relation to specific correlates of frailty. Further, it is important to understand the unique characteristics of this population to inform the development of complex interventions which need to incorporate physical, psychological and social domains of this vulnerable population. In the future, this research could be replicated among other vulnerable populations, both domestically and internationally. The purpose of this cross-sectional study was to explore physical, psychological and social frailty among formerly incarcerated, currently homeless women enrolled at baseline in a randomized controlled trial intervention study.

Theoretical Framework - Frailty Framework among Vulnerable Populations (FFVP)

The Frailty Framework among Vulnerable Populations (FFVP) theoretical framework guided the selection of variables and correlates of tripartite frailty domains (i.e., physical, psychological and social domains) (Salem et al., 2014) for this analysis. The FFVP was modified from several frameworks (Bergman et al., 2004; Flaskerud & Winslow, 1998; Gobbens et al., 2012) to guide interventions among vulnerable populations (Salem et al., 2014). Understanding antecedents to frailty will enable a greater understanding of how and where to intervene to reduce the impact and adverse events is critical given the unique circumstances of these populations (Salem et al., 2014).

In the FFVP model, antecedents to physical, psychological and social frailty include factors which are individual-level, situational, behavioral, health-related, biological, environmental, and resource-related (Salem et al., 2014). These physical, psychological and social domains often increase the likelihood for adverse outcomes, which include disability, hospitalization, health care dependency, and death (Salem et al., 2014).

In this study, the FFVP (Salem et al., 2014) was applied to guide the selection of variables as possible antecedents of physical, psychological and social frailty. Individual-level factors included age, race/ethnicity, income, and education, and number of times divorced. Situational factors included length of time homeless, age at first arrest, prior violent offenses, number of times arrested, and witnessing violence. Behavioral-level factors included daily use of alcohol, marijuana, cocaine, heroin, methamphetamine, number of drugs used, drug dependency. Health-related factors included bodily pain, depressive symptomatology, and PTSD symptoms. Resource factors included tangible support, emotional support, emotional regulation, and coping. These factors were hypothesized to be associated with increased physical, psychological and social frailty. Please see Figure 1 depicting these interrelationships.

Hypotheses

Guided by the FFVP (Salem et al., 2014), we hypothesized that among formerly incarcerated, homeless women, individual-level, situational, behavioral, health-related and resource-related factors would be positively associated with physical, psychological and social frailty.

Methods

Design and Sample

The sample for this study included 130 homeless, female ex-offenders enrolled in a larger interventional study, which randomized participants into one of two programs (i.e., Dialectical Behavior Therapy versus Health Promotion) aimed at reducing drug use and recidivism. Power analysis indicated this sample size would allow detection of a small effect sizes ($r=.22$ for bivariate correlations and $f^2=.05$ for a coefficient in multivariable regression) with one-tailed alpha of .05 and power of .80. Eligibility criteria for the larger intervention study included: a) previously incarcerated, b) 18–65 years of age, c) currently homeless, and d) past drug use. This study was conducted in four community-based sites serving homeless women in Los Angeles and Pomona, California.

Procedures

A multipronged, multi-site recruitment approach was used (e.g., flyers, information sessions, referrals, and direct recruitment) at four participating community-based sites in Los Angeles and Pomona, California. The research staff held informational sessions during the prearranged data collection days and times. Potential participants who expressed an interest in being involved in the study were further screened individually by a brief consent script in a private room at the research site. Then, the research staff informed the individual of the purpose of the study and asked for permission to continue. All eligible participants were given an appointment card with a date/time to meet the research staff to complete an informed consent. In total, 178 were screened and 130 were eligible and enrolled. Forty-six women were ineligible based on screening criteria of age, history of drug use or time since paroled. Ineligible participants were thanked for their time and informed that the research team will record the reason for ineligibility; however, no other data were saved based on the screen script. After determining eligibility, the research staff administered an in-depth baseline questionnaire.

All data were collected and managed using Research Electronic Data Capture (REDCap) hosted at UCLA a secure web application which provides: a) validated data entry, b) tracking data export and downloads for analyses, and c) procedures for importing data from external sources (Harris et al., 2009). At baseline, participants were asked to provide a urine sample in order to test for several street drugs (e.g., marijuana, heroin, amphetamines, opiates, etc.).

Participants received \$3 for the initial screening and \$15 for the baseline survey. Data were collected from February 2015 to May 2016. Baseline data were used for the current analysis.

Instruments/Variables

Guided by the FFVP (Salem et al., 2014), representative individual-level, situational, behavioral, health-related, and resource factors were selected that are hypothesized to be associated with physical, psychological and social frailty. Below is a description of the instruments and variables included in the analyses.

Individual-Level Factors

Sociodemographic questions elicited information on age, race/ethnicity, and education. Number of times divorced was assessed by asking about relationship status. Responses included “never divorced/single/no children,” “one divorce/unmarried with children,” and “two or more divorces.”

Situational Factors

Length of Time Homeless was measured with one item, which asked about the total amount of time homeless. Possible responses included days, weeks, months, or years. For this analysis, reported time was translated into number of years homeless.

Age at First Arrest was measured using an item from the Lifestyle Criminality Screening Form (LCSF) (Walters, White, & Denney, 1991) which assessed age at first time of arrest. Possible responses included a) ≤ 14 years, b) > 14 but < 19 years, or c) ≥ 19 years of age.

Number of **Prior Violent Offenses** was measured by one item from the LCSF (Walters et al., 1991) which assessed number of times a violent offense has been completed. Possible responses were: a) none, b) one or two, and c) three or more.

Number of Times Ever Arrested was measured with one item from the LCSF (Walters et al., 1991). Possible responses included the following: a) one or none, b) two to four, and c) five or more.

Personally Witnessing Violence was measured by an item from the LCSF (Walters et al., 1991) which assessed if the participant had ever witnessed violence. Responses included “yes” or “no.”

Behavioral Factors

Alcohol and Drug Use were measured using the Texas Christian University (TCU) Drug Screen Form II, which assessed the use of 16 substances in the past six months (Institute of Behavioral Research, 2007). Responses include “yes” or “no.” If the participant stated “yes,” they were asked the frequency and possible responses included “only a few times,” “1–3 times a month,” “1–5 times a week,” and “about every day.” For this analysis, we focused on the five most frequently used substances in this sample: alcohol, marijuana, cocaine/crack, heroin, and methamphetamine. For each substance, a dichotomous variable (1=yes, 0=no) was created to indicate daily use in the past six months. In addition, a variable was included to indicate the number of substances (i.e., across five most prevalent) used in the past six months. Others have used this measure among a homeless population (Nyamathi, Salem, Farabee, & Zhang, 2016; Salem, Nyamathi, Brecht, et al., 2013).

Drug Dependency prior to the last incarceration was measured using the TCU Drug Screen Form II (Institute of Behavioral Research, 2007). The possible total score ranges from 0 to 9 with higher scores indicating greater severity of problems related to drug use and dependence (Institute of Behavioral Research, 2007). A score of ≥ 3 indicates relatively severe drug-related problems and corresponds to a DSM-IV drug dependence diagnosis (Institute of Behavioral Research, 2007). In the current sample, Cronbach’s $\alpha = 0.82$. Others

have used this measure among a homeless population (Nyamathi et al., 2016; Salem, Nyamathi, Brecht, et al., 2013).

Health-Related Factors

Bodily Pain was measured by one item from the RAND 36 Health Survey (MOS 36) (Ware & Sherbourne, 1992) which assessed amount of bodily pain during the past month. Responses ranged along a 6-point ordinal scale from “none” to “very severe” with a lower value indicating greater pain severity.

Depressive Symptomology was measured by the 10-item Center for Epidemiologic Studies Depression Scale (CESD) (Andresen, Malmgren, Carter, & Patrick, 1994) which assessed how individuals have felt or behaved in the past week. Item responses ranged from “rarely” to “most of the time.” In this sample, a total score was obtained by summing the item scores, with higher values indicating greater depressive symptomology. In this study, Cronbach’s $\alpha = 0.82$.

Post-Traumatic Stress Disorder (PTSD) was measured using four items from the Women’s Risk Needs Assessment Trailer Probation Interview (WRNA-TPI) (Wright, Van Voorhis, Bauman, & Salisbury, 2007), which considers experiences in the last month which were frightening or upsetting. Item responses included “yes” or “no” (1 or 0, respectively). The total PTSD score had a possible range of 0 to 4, with higher values indicating greater levels of PTSD. In this study, Cronbach’s $\alpha = 0.84$. Others have used this instrument (Cameron & Gusman, 2003).

Emotional Regulation was measured by the 36-item Difficulties in Emotion Regulation Scale (DERS) which assessed feelings related to coping since last incarceration (Gratz & Roemer, 2004). The DERS aims to determine: a) awareness and understanding of emotions, b) acceptance of emotions, c) the ability to engage in goal-directed behavior, and refrain from impulsive behavior, when experiencing negative emotions, and d) access to emotion regulation strategies perceived as effective (Gratz & Roemer, 2004). Item responses ranged from “almost never” to “almost always.” The scale had a possible range of 0 to 140, with higher scores indicating greater difficulties in emotion regulation (Gratz & Roemer, 2004). In this sample, the Cronbach’s $\alpha = 0.93$.

Resource Factors

Tangible Support was measured by four items from the 19-item MOS Social Support Survey (MOS-SSS) which assesses different types of social support (Sherbourne & Stewart, 1991). **Emotional Support** was measured by eight items from the 19-item MOS-SSS (Sherbourne & Stewart, 1991). For both tangible and emotional support, item responses were measured on a 5-point ordinal scale from “none of the time” to “all of the time” (Sherbourne & Stewart, 1991). Higher scores indicate a greater perceived level of tangible and emotional support (Sherbourne & Stewart, 1991). In this study, the Cronbach’s α for tangible support was 0.89 while the Cronbach’s α for emotional support was 0.95.

Outcomes

Physical Frailty was measured by eight items from the Tilburg Frailty Indicator (TFI) (Gobbens et al., 2012), which assessed difficulty walking, maintaining balance, poor hearing, poor vision, lack of strength in hands and physical tiredness daily (Gobbens et al., 2012). Item responses were “yes” or “no” (1 or 0, respectively) (Gobbens et al., 2012). The subscale score had a possible range of 0 to 8, with higher scores indicating greater physical frailty, which could indicate a decline in nutrition, mobility, physical activity, strength, endurance, balance and sensory functions (Gobbens et al., 2012). In the current study, Cronbach’s $\alpha = 0.72$. Others have used this measure (Salem & Ma-Pham, 2015).

Psychological Frailty was measured by four items from the TFI (Gobbens et al., 2012), which assessed problems with memory, feeling down, feeling nervous or anxious or problems coping well (Gobbens et al., 2012). Item responses were “yes,” “no” and “sometimes” (Gobbens et al., 2012). The subscale had a possible range of 0 to 4, with higher scores indicating greater psychological frailty, which could indicate a decline in cognition, coping and mood (Gobbens et al., 2012). In this study, the Cronbach’s α for psychological frailty was 0.47.

Social Frailty was measured by three items in the TFI (Gobbens et al., 2012) which assessed living alone, missing having people around you, receiving enough support from others. Responses included “yes,” “no” and “sometimes” (Gobbens et al., 2012). The subscale had a possible range of 0 to 3, with higher scores indicating greater social frailty, which is indicative of a decline in social relations and social support (Gobbens et al., 2012). In this study, the Cronbach’s α for social frailty was 0.13. Despite the low Cronbach’s α coefficient, we believe this subscale is important to consider conceptually.

Data Analysis

Initially simple relationships (using Spearman correlation) of each possible correlate with each of the three frailty measures (i.e., physical, psychological and social) were considered. Then multivariable models were estimated for physical, psychological and social frailty measures. Due to the somewhat overlapping correlates, a backward elimination process was used to produce parsimonious models. The final models contained correlates retaining p-values of less than .10. Given that the frailty measures were counts of endorsed frailty characteristics and non-normally distributed toward the lower count end of the distribution, Poisson regression was initially applied. However, these Poisson models produced under-dispersion indices for psychological and social frailty primarily because of their limited distribution; thus, for these two measures, an ordinal logistic regression was used. Non-significant chi square statistics for the score test indicated that the assumption of proportional odds was acceptable for these two ordinal logistic models ($\chi^2=37.692$, $df=33$, $p=0.263$ for psychological frailty; $\chi^2=3.295$, $df=6$, $p=0.771$ for social frailty). Poisson regression was used for the physical frailty model.

Results

Individual-Level Factors

The average age of participants was 38.9 (SD 11.4, age range 19–64). A little less than half of the sample (40.8%) were African-American. A little less than half (46.9%) had obtained a high school degree, over half (63.1%) of the participants had never been divorced/single or had no children. In this sample, 13.4% self-reported being married.

Situational Factors.—On average, the sample participants had been homeless for 5.4 years, had been in jail 12.9 times and had been in prison 2.0 times. The majority of the sample reported having witnessed violence (85.3%) with the majority being arrested 5 or more times for violent crimes (73.9%). Nearly half (47.7%) had been arrested before or at the age of 14.

Behavioral Factors.—Methamphetamine was the most frequently reported substance used on a daily basis in the past six months (23.9%), followed by marijuana (18.5%), alcohol (17.7%), cocaine (13.1%), and heroin (4.6%). Further, the majority of this sample met the criteria for addiction prior to their last incarceration (93.7%; data not shown).

Health-Related Factors.—Over one quarter of the sample self-reported experiencing no pain in the past four weeks (30.8%), while 20.8% self-reported moderate pain, followed by mild pain (18.5%) or very mild pain (16.9%). The average emotional regulation score was 82.5 (range 40 to 140).

Resource Factors.—The average tangible support score was 3.4 (range 1 to 5) and emotional support was 3.4 (range 1 to 5). A mean of 3.4 (SD=1.2) across participants indicates that tangible support is available on average “some of the time.” This average is slightly lower than reported by Sherbourne and Stewart (1991) for a study which enrolled 2,987 healthy participants for validation of the instrument (Sherbourne & Stewart, 1991).

Outcomes.—The average physical frailty subscale was 2.0 (range 0 to 8), psychological frailty subscale was 1.7 (range 0 to 4) and social frailty subscale was 1.1 (range 0 to 3).

Frailty Mean, Standard Deviation, and Median by Age Quartile

Table 2 reports the frailty mean, standard deviations and median by age quartile. Even in this young to middle-aged sample, we see an increase in physical frailty by age group; however, that pattern did not occur for psychological and social frailty. Thirty-five percent of the sample had frailty domain scores at or below the respective median for all three frailty domains. Thirty-seven percent had one frailty domain with a score above the median. Twenty-one percent had two frailty domains with domain scores above the median and 7% had all three domains with scores above the median. The number of domains with scores above the respective median was not significantly related to age quartile.

Bivariate Unadjusted Associations

Table 3 depicts baseline bivariate results using Spearman r correlations with select variables and physical, psychological and social frailty.

Physical frailty was associated with older age ($r=0.411, p .001$), greater length of time homeless ($r=0.334, p .001$), higher depressive symptomology scores ($r=0.260, p .01$), higher total PTSD score ($r=0.251, p .01$), greater pain [i.e., lower pain score] ($r=-0.391, p .001$) and higher emotional regulation difficulty scores ($r=.193, p .05$). Individuals who had witnessed violence ($r=-.204, p .05$) or had more emotional support ($r=-0.231, p .01$) had lower levels of physical frailty.

Psychological frailty was associated with higher depressive symptomology scores ($r=0.522, p .001$), greater total PTSD scores ($r=0.417, p .001$), greater emotional regulation difficulty scores ($r=0.538, p .001$), and greater pain in the past four weeks [lower pain score] ($r=-0.191, p .05$).

Social frailty was associated with higher levels of depressive symptomology ($r=0.216, p .05$) and emotional regulation difficulty ($r=0.273, p .01$). Lower tangible support was associated with greater levels of social frailty ($r=-0.231, p .01$) and daily alcohol use ($r=-0.189, p .05$) was associated with less social frailty.

Multivariable Analyses

Table 4 shows results of multivariable analysis predicting physical, psychological and social frailty. Results are shown only for correlates which remained in the backward elimination process with $p<.10$ for at least one frailty measure. All three models were significant: physical frailty ($F_{(11,115)}=8.61$, accounting for a high proportion of variance with $R^2=0.452$); psychological frailty ($\chi^2=37.692$); and social frailty ($\chi^2=3.295$).

Physical Frailty

Formerly incarcerated, homeless women who were older or who had a greater number of years homeless had greater physical frailty scores ($p=0.001$ and $p<0.001$, respectively). Further, those who had greater number of prior violent offenses ($p=0.001$) and those not having witnessed violence ($p=0.021$) had higher levels of physical frailty. Additionally, those who had a higher drug dependence score ($p=0.047$), a higher PTSD symptom score ($p=0.012$), or lower tangible support score ($p=0.001$) had higher levels of physical frailty (model $F=8.61, df = (11,115), p<.001, R^2=0.452$).

Psychological Frailty

Formerly incarcerated homeless women who were older or who had been divorced fewer times had lower levels of psychological frailty ($p=0.025$ and $p=0.007$, respectively). Further, those who had experienced more years homeless, had been in jail more frequently, or had been in prison less frequently had higher levels of psychological frailty ($p=0.039, p=0.025$ and $p=0.006$, respectively). Formerly incarcerated homeless women who had witnessed violence had lower levels of psychological frailty ($p=0.018$). Those with a higher drug dependency score or had used a greater number of drugs had higher odds of psychological

frailty ($p=0.033$ and $p=0.045$, *respectively*). Further, those with use of methamphetamine daily use had lower levels of psychological frailty ($p=0.035$), and greater bodily pain was associated with greater levels of psychological frailty ($p=0.036$) (model $\chi^2=37.692$, $df=33$, $p=0.263$).

Social Frailty

Formerly incarcerated, homeless women who used a greater number of drugs had a higher odds of greater levels of social frailty ($p=0.009$); however, those who used alcohol daily had a lower odds of greater levels of social frailty ($p<0.001$). Further, higher emotional regulation difficulty scores were associated with a higher levels of social frailty ($p<0.001$) (model $\chi^2=3.295$, $df=6$, $p=0.771$).

Discussion

To our knowledge, this is the first exploratory study to investigate physical, psychological and social frailty among formerly incarcerated, homeless women exiting California jails and prisons, who have a history of drug use and addiction. While frailty is generally studied among chronologically older adults (Gobbens, Krans, & van Assen, 2015; Uchmanowicz, Wleklík, & Gobbens, 2015), this study illuminates factors associated with frailty among a chronologically younger population of homeless adults. Our hypotheses were partially supported, but not all factors were consistently related across the three frailty domains. Consistent with our previous study among middle-aged and older homeless adults (Salem, Nyamathi, Brecht, et al., 2013) and other studies (Fried et al., 2001), these study findings demonstrate that older age predicted physical frailty. However, age had an opposite relationship to psychological frailty. As it relates to psychological frailty, it is important to understand that across the lifespan, psychological frailty may cause considerable physical and mental healthcare need, regardless of chronological age.

Our findings also demonstrated that greater number of years homeless predicted both physical and psychological frailty. Individuals who were “on the streets” for longer periods, not only had to contend with managing physical and psychological healthcare needs, and accessing necessities, but also have to manage frailty. During reentry, resources need to be tailored for those with higher physical and psychological frailty scores. Structural-level programs are those that are designed at the systems level, and provide support for those who are physically and psychologically frail. Thus, providing shelter accommodations, transportation, access to on site healthcare providers (i.e., nurses, physicians, etcetera), and supportive personnel to assist in accessing health and social service resources is critical. Previous qualitative studies have found that women exiting jails and prison desire to learn how to manage chronic healthcare conditions and have healthcare providers on site (Salem, Nyamathi, Idemundia, Slaughter, & Ames, 2013). The Transitions Clinic (TC) model has been successfully applied to those exiting jail and prison (Wang et al., 2010). The TC model was tailored for formerly incarcerated, chronically ill individuals and was designed to improve reintegration, healthcare utilization and decrease recidivism (Wang et al., 2010). In particular, at TC, patients received care from a physician with experience working with formerly incarcerated individuals, community referrals, and community health worker

(CHW)-led case management (Wang et al., 2010). The CHW has lived experience of incarceration, attends weekly parole meetings, and has helped to establish care with the provider at that clinic or a nearby clinic, and provided case management services (Wang et al., 2010).

Likewise, those who were in jail more times were more likely to be psychologically frail. It is difficult to ascertain if psychological frailty increased during the time individuals were incarcerated; however, conditions behind bars can be violent, tense and problematic triggering and exacerbating mental health symptomology.

Higher drug dependency scores were also associated with greater levels of both physical and psychological frailty, which is a critical finding as the majority of the sample met the DSM-IV criteria for addiction. Without doubt, illicit drug use precipitates interaction with the criminal justice system. Interestingly, those who used methamphetamine daily were more likely to have lower levels of psychological frailty. Behavioral lifestyle choices (i.e., drug use) have been hypothesized as antecedents to frailty (Salem et al., 2014). As mentioned previously, 16.4% of homeless adults met the criteria for frailty (Brown et al., 2012) as compared with community-dwelling populations ranging from 4% to 17% (Collard, Boter, Schoevers, & Voshaar, 2012); in fact, it is plausible that drug use and addiction increase the likelihood for frailty. The present study demonstrates that a history of addiction is independently associated with physical and psychological frailty necessitating comprehensive frailty screening is warranted.

In a cross-sectional study among homeless adults (N=38) between 40 to 64 years of age, 47% were frail and 16% were very frail (Hadenfeldt, Darabaris, & Aufdenkamp, 2017). Psychological, social, and environmental factors influenced health and the majority of the participants met the criteria for either being frail or very frail (Hadenfeldt et al., 2017). In the sample, 60% had difficulty with one or more physical activities and one fourth were unhappy and depressed (Hadenfeldt et al., 2017). Due to the prevalence of frailty, interventions need to be developed and implemented (Hadenfeldt et al., 2017).

There was also a positive relationship between number of drugs used and higher levels of psychological frailty, suggesting that drugs may be used as a coping method or means for self-medication (Khantzian, 1985). By addressing the underlying causes and consequences of addiction and drug use, physical and psychological frailty, along with recidivism may be mitigated.

Our findings indicated that those with higher PTSD symptoms also had higher levels of physical frailty. To our knowledge, this is the first time that PTSD symptoms and physical frailty have been correlated. This is an important finding as PTSD symptoms may influence physical frailty, which could lead to a decline in nutrition, mobility, physical activity, strength, endurance, balance and sensory functions. Screening for PTSD symptoms and a more comprehensive referral process may assist with addressing physical frailty.

Physical involvement in violence affects the musculoskeletal system. Our findings indicated that the experience of a greater number of prior violent offenses was related to physical frailty. This is an important finding because it sheds light on the unique predisposing factors

that place individuals at greater risk for frailty in this community as compared to other communities which do not have this frequency of violence or interaction with the criminal justice system.

There was also an inverse relationship between tangible support and physical frailty; in particular, those who had greater tangible support had lower levels of physical frailty. These findings point to the importance of providing tangible support for individuals who are physically frail, which may include helping them to go to their healthcare and social service appointments. In fact, providers working with this community needs to integrate tangible support in the delivery of their interventions. Future programs should include more comprehensive frailty assessments, which are feasible to implement in the community setting.

Likewise, bodily pain was associated with greater levels of psychological frailty which is an important finding and demonstrates the interrelationships which exist between pain and psychological domains. Other researchers have found that chronic pain is a significant issue among homeless populations; in a previous study which enrolled 152 participants, over half of the single homeless adults screened had level 3 or 4 pain (Hwang et al., 2011). Providers who see patients reentering society should screen for bodily pain, conduct further chronic pain assessments and referral into care.

Significant correlates of social frailty included greater difficulties with emotion regulation. Women may have used drugs and/or alcohol to manage their emotions prior to incarceration. While in prison, women may use various methods to manage emotions (i.e., diversions, self-reflection, humor, etc) (Greer, 2002). Moreover, as women exit these institutions, learning new ways in which to cope with emotions is critical and future programs should aid in emotion identification and regulation. In terms of social frailty, participants using more drugs were more socially frail; however, those using alcohol daily, were less socially frail. This interesting finding suggests that those who may be using drugs may be doing so independently, while those who drink may be doing so socially. It is critical to develop interventions which will that not only assist women during reentry to manage emotions, but also a substance use, harm reduction approach, which will improve social frailty.

Limitations

A convenience sample of women who were on probation and parole was enrolled from our community-based, Los Angeles and Pomona sites, which limits the generalizability of the findings. The social frailty subscale may not adequately characterize social frailty due to the low internal consistency. It is plausible that due to the type of living conditions (e.g., RDT sites, homeless shelters) from which participants were enrolled, characterizing the living environment and social support was not comprehensive. In particular, women may be living with others for a short duration or in homeless communities; however, may still be socially isolated. In short, many women may report having many people around them, but may still be and feel socially isolated.

Community-Based and Future Research Implications

Our study findings shed light on the fact that physical, psychological and social frailty are a significant issue among formerly incarcerated, currently homeless women regardless of chronological age. However, there is a lack of comprehensive screening, follow-up, and referral into care for frail women. Providers caring for frail populations are faced with intensive daily work helping this population navigate health and social services during reentry. First, frailty screening and referral to follow up would benefit the population and providers during reentry. Second, trauma-informed and specific care, along with case management, which is tailored to help frail women learn self-care strategies as they simultaneously learn to navigate social service systems and transition into the community, would be beneficial. Furthermore, it is important to develop, implement and evaluate interventions which integrate physical, psychological and social frailty components due to the complexity of the syndrome as the integration of these domains may improve intervention effectiveness.

While resources and time are limited for reentry providers, extending RDT contracts so that women can have a greater length of time and support during reentry would be beneficial. In particular, given that formerly incarcerated, currently homeless women may meet the criteria for being frail, intervention intensity needs to be tailored. Future research is needed to understand the contributions of primary age-related, versus secondary, disease-induced physiologic changes that may contribute to frailty in this population (Walston, 2004). It is plausible that addiction, as a chronic disease is a cause of secondary frailty and warrants further examination. Gaining a greater understanding of harm-reduction, substance use interventions and their impact on frailty outcomes is a clear and pressing need. While much of this paper is focused on frailty, future research needs to focus on an upstream approach whereby pre-frailty is identified to mitigate frailty. In particular, it is important to screen for pre-frailty and provide more comprehensive care and healthcare provider referral. Furthermore, funding agencies should recognize the impact of frailty among vulnerable populations, level of need and intensity related to working with this homeless and otherwise vulnerable population during reentry, along with unique predisposing factors and the need to tailor interventions.

As has been noted, the findings of this study shed light on physical, psychological and social frailty of vulnerable populations that need to be considered with intake assessment, program planning and social service referrals regardless of chronological age. All things considered, these findings are a call for further domestic and international research utilizing the FFVP model focused on homeless and otherwise vulnerable prefrail and frail populations.

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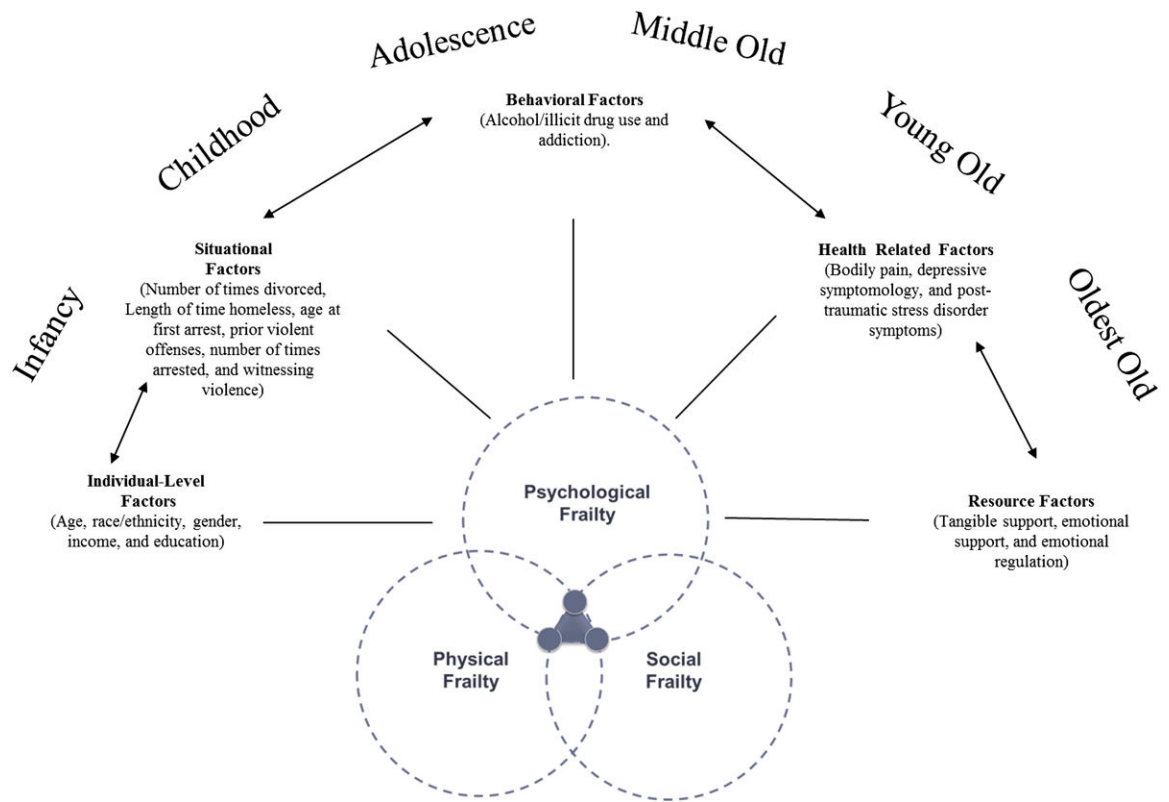


Figure 1. Application of Modified Frailty Framework among Vulnerable Populations (FFVP) for Formerly Incarcerated, Homeless Women

Table 1.

Baseline Sample Characteristics among Formerly Incarcerated, Homeless Women (N=130)

Measure	N or Mean	% or SD (Range)
Individual-Level Related Factors		
Age	38.9	11.4 (19–64)
Hispanic or Latino, <i>yes</i>	52	40.0
African-American, <i>yes</i>	53	40.8
Education		
< High School	39	30.0
High School Graduate, GED, Vocational School	61	46.9
At Least Some College	30	23.0
Situational Factors		
Number of Times Divorced		
Never divorced/single/no children	82	63.1
Number of Years Homeless ^a	5.4	6.0 (0.08, 25.00)
Number of Prior Violent Offenses		
None	70	53.9
1–2	45	34.6
3 or more	15	11.5
Times in jail, <i>lifetime</i>	12.9	17.2 (1, 100)
Times in prison, <i>lifetime</i>	2.0	3.6 (0, 22)
Witnessed violence, <i>yes</i>	110	85.3
Times arrested		
0–1	8	6.2
2–4	26	20.0
5 or more	96	73.9
Age at first arrest		
Less than or equal to 14 years	62	47.7
Behavioral Factors		
Drug Dependency Score	7.1	2.3 (0, 9)
Alcohol Use, <i>daily</i>	23	17.7
Marijuana Use, <i>daily</i>	24	18.5
Cocaine, <i>daily</i>	17	13.1
Heroin use, <i>daily</i>	6	4.6
Methamphetamine use, <i>daily</i>	31	23.9
Number of drugs used, last six months of 5 most prevalent	1.4	1.4 (0, 5)
Health-Related Factors		
Depressive Symptomology	9.6	6.4 (0, 28)
Total PTSD score	1.6	1.6 (0, 4)
Emotional Regulation	82.5	25.3 (40, 140)
Bodily Pain^a, past 4 weeks		
Very severe or Severe	17	13.1

Measure	N or Mean	% or SD (Range)
Moderate, Mild or Very Mild	73	56.2
None	40	30.8
Resource Factors		
Tangible Support	3.4	1.2 (1, 5)
Emotional Support	3.4	1.1 (1, 5)
Frailty		
Physical	2.0	1.95 (0, 8)
Psychological	1.7	1.2 (0, 4)
Social	1.1	0.8 (0, 3)

^a1–2 participants with missing data

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Frailty Mean, Standard Deviation, and Median by Age Quartile among Formerly Incarcerated, Homeless Women

Table 2

Age quartile	Physical Frailty			Psychological Frailty			Social Frailty		
	Mean	SD	Median	Mean	SD	Median	Mean	SD	Median
< 30 years	1.23	1.48	1	1.71	0.97	2	1.06	0.89	1
30–37 years	1.31	1.55	1	1.75	1.27	1.5	1.28	0.73	1
38–47 years	1.78	1.64	1	1.69	1.12	2	0.91	0.64	1
48 and older	3.43	2.16	3	1.77	1.24	2	1.29	0.87	1

Table 3

Bivariate Correlations of Variables and Physical, Psychological and Social Frailty among Formerly Incarcerated, Homeless Women (N=130)

	Physical Frailty ^a N=130	Psychological Frailty ^a N=130	Social Frailty ^a N=130
Individual-Related Factors			
Age	0.411 ***	0.022	-0.006
Hispanic or Latino	-0.129	-0.039	0.036
African-American	0.275 **	0.007	-0.003
Education	-0.073	0.108	-0.031
Situational Factors			
Times Divorced	0.134	0.163	0.127
Years Homeless ^b	0.334 ***	0.076	0.097
No. prior violent offenses	0.143	-0.012	0.136
Age at first arrest	-0.037	-0.048	-0.011
Times in jail, lifetime	0.046	-0.043	0.082
Times in prison, lifetime	0.170	-0.119	-0.037
Witnessed Violence, <i>yes</i>	-0.204 *	-0.173	-0.073
Times arrested	0.028	-0.014	0.049
Behavioral Factors			
Drug Dependency	0.040	0.134	-0.055
Alcohol Use, <i>daily</i>	-0.111	0.127	-0.189 *
Marijuana Use, <i>daily</i>	-0.104	0.018	0.012
Cocaine, <i>daily</i>	0.155	0.099	-0.026
Heroin use, <i>daily</i>	-0.108	0.080	0.090
Methamphetamine use, <i>daily</i>	-0.158	-0.032	-0.017
Number of drugs used	0.009	0.163	0.018
Health-Related Factors			
Bodily Pain ^b , <i>past 4 weeks</i>	-0.391 ***	-0.191 *	-0.108
Depressive Symptomology	0.260 **	0.522 ***	0.216 *
Total PTSD score	0.251 **	0.417 ***	0.037
Resource Factors			
Tangible Support	-0.168	-0.134	-0.231 **
Emotional Support	-0.231 **	-0.138	-0.145
Emotional Regulation	0.193 *	0.538 ***	0.273 **

^aSpearman correlation

^b1-2 participants omitted because of missing data

* $p < .05$

**
 p .01

 p .001

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Table 4

Multivariable Regression Results for Physical, Psychological and Social Frailty among Formerly Incarcerated, Homeless Women (N=127^a)

Measure ^d	Physical Frailty ^b			Psychological Frailty ^c			Social Frailty ^e		
	Coefficient (S.E.)	p-value	O.R. (C.I.) ^f	Coefficient (S.E.)	p-value	O.R. (C.I.) ^f	Coefficient (S.E.) ^d	p-value	O.R. (C.I.) ^f
Age	0.030 (0.007)	<0.001 ^f	0.958 (0.923–0.995)	-0.043 (0.019)	0.025	-	-	-	-
Hispanic or Latino	0.418 (0.218)	0.055	-	-	-	-	-	-	-
African-American	0.402 (0.217)	0.064	-	-	-	-	-	-	-
Times divorced	-	-	0.821 (0.305)	0.068 (0.033)	0.007	2.272 (1.250–4.129)	-	-	-
Number of years homeless	0.039 (0.011)	<0.001	0.067 (0.012)	0.027 (0.012)	0.039	1.071 (1.003–1.142)	-	-	-
Times in jail, <i>lifetime</i>	-	-	-0.171 (0.062)	0.027 (0.012)	0.025	1.067 (1.003–1.051)	-	-	-
Times in prison, <i>lifetime</i>	-0.035 (0.019)	0.060	0.843 (0.747–0.951)	-0.171 (0.062)	0.006	0.843 (0.747–0.951)	-	-	-
Number of Prior violent offenses, <i>yes</i>	0.328 (0.099)	0.001	-	-	-	-	-	-	-
Witnessed violence	-0.393 (0.170)	0.021	-1.158 (0.488)	-1.158 (0.488)	0.018	0.314 (0.121–0.817)	-	-	-
Drug dependency scale	0.061 (0.030)	0.047	0.161 (0.075)	0.161 (0.075)	0.033	1.174 (1.013–1.361)	-	-	-
Number of drugs	-	-	0.274 (0.137)	0.274 (0.137)	0.045	1.316 (1.007–1.719)	0.386 (0.147)	0.009	1.471 (1.104–1.961)
Alcohol use, <i>daily</i>	-	-	-	-	-	-	-1.910 (0.551)	<0.001	0.148 (0.050–0.436)
Methamphetamine use, <i>daily</i>	-	-	-0.983 (0.467)	-0.983 (0.467)	0.035	0.374 (0.150–0.934)	-	-	-
Bodily pain	-	-	-0.014 (0.006)	-0.014 (0.006)	0.036	0.986 (0.974–0.999)	-	-	-
PTSD screen	0.099 (0.039)	0.012	NA	NA	-	-	NA	-	-
Tangible support	-0.198 (0.051)	0.001	-	-	-	-	-	-	-
Emotional support	-	-	-0.261 (0.154)	-0.261 (0.154)	0.090	0.771 (0.570–1.041)	-	-	-
Emotional regulation	-	-	-	-	-	0.024 (0.007)	0.024 (0.007)	<0.001	1.024 (1.010–1.039)

^a 3 participants omitted from analysis because of missing data^b Poisson regression results^c ordinal logistic regression results^d correlates and results shown only if $p < .10$ for at least one frailty measure; - [dash] indicates correlate $p > .10$; NA indicates variable not used as correlate because of conceptual overlap with dependent variable^e O.R. = odds ratio, C.I.=95% confidence interval for O.R.

05
< p is bolded if <

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