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Predictors of
Perceived Health Status of
Tuberculosis-Infected Homeless

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This study examines the predictors of perceived health status among homeless adults with latent tuberculosis (TB) in Los Angeles, especially in relation to gender differences. Total, 415 men and women enrolled in a TB-adherence trial completed baseline assessments concerning health status. Results indicated that women were more likely than men to report being in fair or poor health and to have experienced health problems. More women than men self-reported daily drug use and poor mental health. Homeless women were also more likely than their male counterparts to receive support from non–drug-users. Homeless adults who reported fair or poor health were also more likely than those who reported better health to have used injection drugs, to report experiencing depressive symptoms and poor mental health, and to have been homeless more than 3 years. Predictors of fair or poor health included being female and experiencing more depressive symptoms.

Keywords: homeless; tuberculosis; gender; health status; drug use

In 2002, 15,078 tuberculosis (TB) cases were reported in the United States, second only to AIDS as a life-threatening disease (Centers for Disease Control & Prevention, 2002). The vast majority of these cases originated in large urban centers such as Los Angeles, New York City, and Washington, D.C. (California Department of Health Services, 2000), environments where homeless individuals are most likely to find refuge. Homeless persons are

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particularly vulnerable to both latent TB infection and active disease by virtue of their congregate living arrangements and lifestyles that include high risk behaviors such as use of injection drugs and other substances (D'Amore, Hung, Chiang, & Goldfrank, 2001; Gelberg et al., 1997; Raoult, Foucault, & Brouqui, 2001). Homeless individuals are more likely to have chronic physical and mental health problems (Gelberg et al., 1997; Kushel, Vittinghoff, & Haas, 2001), which may further enhance their vulnerability to this disease. Outreach efforts to this population are especially difficult given the lack of a permanent address or phone. The decision to seek out care is based, among other things, on individuals' own perceptions about the gravity of their condition. Although perceived health has face validity and serves as a predictor of health outcomes, it is not clear how psychological status, risk behaviors, and the myriad challenges associated with homelessness influence health perception, particularly when a positive diagnosis of TB infection has already been made.

PREDICTORS OF PERCEIVED HEALTH STATUS

Perceived health status has been used successfully to assess global health among individuals with HIV, cancer, and cardiac conditions (Avis et al., 1996; Bjordal & Kaasa, 1992; Ringdal & Ringdal, 1993; Smith, Shelley, & Dennerstein, 1994; Wu et al., 1991). Perceived health incorporates patients' perspective about their health status; it also reliably predicts morbidity and mortality (Franks, Gold, & Fischella, 2003). Although a number of studies have examined predictors of perceived health status in the general population (Bailis, Segall, & Chipperfield, 2003; Franks et al., 2003; Subramanian, Kim, & Kawachi, 2002), there is only limited research examining perceived health among homeless adults, and what is available is dated. For example, the early work of Ropers and Boyer (1987) found that the most important predictors of perceived health status, as rated poorly by homeless individuals, were the presence of a chronic condition, sustained depression, and symptomatology related to significant alcohol use. Later studies support these findings: White, Tulsky, Dawson, Zolopa, and Moss (1997) reported that homeless individuals with physical or mental health problems were three times more likely than the general population in the United States to rate their health as fair or poor. Wojtusik and White (1998), and Reichenbach, McNamee, and Seibel (1998) also found that in the 37% to 50% of homeless persons self-rating health as fair and poor, most had physical and mental health problems. African Americans in particular report lower health status

than Whites (Kington & Smith, 1997) as well as lower levels of well-being (Schulz et al., 2001).

The influence of gender on self-rated health has also been acknowledged as a topic of study. In general, women have poorer self-rated health than men in the general population (Franks et al., 2003). Women use a broader assessment base to form their opinion of self-rated health than men (Benyamini, Leventhal, & Leventhal, 2000). For example, women have lower self-rated health as compared to their male counterparts when there are emotional aspects of the disease or when there are limitations in functional status (Gonzalez, Chapman, & Leventhal, 2002). Although women in the general population have poorer self-rated health, homeless women are reported to have more health problems, more symptoms, and to use health services more often than homeless men (Stein, Andersen, Koegel, & Gelberg, 2000; Stein & Gelberg, 1997). Some of the research on self-rated health has focused on an elderly population and has linked self-rated health with mortality (Benyamini et al., 2000); reporting that mortality is linked more with men's report of poor health in contrast with women's reports of poor health. In the homeless population, self-reported poor health has been studied less frequently, and thus no conclusions about mortality can be made. It may be important to assess self-rated health status of homeless women in treatment for any health problem because this may represent an opportune time for intervention.

Although TB is a health problem reported by participants in the study by Wojtusik and White (1998), latent TB is unaccompanied by physical symptoms and may not be acknowledged as a true health problem by the carrier of latent TB. Even without any symptoms, knowing that an illness lies dormant in his or her body may have an impact on perceived health. It is important to investigate the perceptions of individuals with latent disease, especially if the disease poses a public health risk, as is the case with TB. Self-rated health as fair or poor has also been associated with premature discontinuation of medication (Buist et al., 2000); understanding the links between the homeless persons' characteristics and their perceived health status may provide justification for programs targeted to enhance health status and medication adherence.

PURPOSE

The purpose of this study is to examine the predictors of perceived health status among homeless adults with latent TB in Los Angeles, especially in relation to gender differences. The research questions of interest were to

determine the strength of the predictive ability of age and other selected demographic characteristics, history of past and current drug and alcohol use, depressive symptoms, mental health status, type of social support, and regular source of care on perceived health status. In addition, the predictors of perceived health status in relation to gender were also assessed.

DESIGN

This study represents baseline assessments of homeless participants engaged in a randomized clinical trial of an intervention designed to assess completion of TB chemoprophylaxis among homeless adults. Participants were randomized into a nurse case-managed program versus a standard program.

SAMPLE AND SETTING

The intervention study was conducted from 1997 to 2002 in 12 homeless shelters in the skid row area of Los Angeles with a convenience sample of 331 homeless men and 84 homeless women. Homeless adults were considered eligible if they met the following criteria: (a) aged 18 to 55 years and (b) had no self-reported history of being protein purified derivative-positive or a previous history of completing a TB treatment program. Persons older than the age of 55 were eligible for screening if they reported risk-activation factors for active TB such as injection drug use or had immune-compromising diseases. Homeless adults were notified of the study via flyers that were posted in their place of residence. These flyers provided the phone number and address of the clinic where the research nurses were situated. A total of 17 participants older than the age of 55 were enrolled into the study, the oldest age being 66 years of age. Experienced research nurses and outreach workers conducted interviews with all participants in a private room at the medical clinic where the intervention study operated. Of the 546 eligible for the study, 415 agreed to participate.

Sociodemographic Factors

The mean age of the overall sample was 41.1 years ($SD = 8.6$); with 80% being male. No significant age differences were observed between men and

TABLE 1:   Sociodemographic Characteristics by Gender (*n* = 415)

	Female (n = 84)		Male (n = 331)	
	M	SD	M	SD
Age	40.4	8.7	41.2	8.5
Education	12.0	2.0	12.1	1.8
	n	%	*n*	%
Race				
African American	67	79.8	274	82.8
White	7	8.3	22	6.7
Latino	7	8.3	30	9.1
Other	3	3.6	5	1.5
Martial status				
Single	45	53.6	200	60.4
Married	9	10.7	18	5.4
Divorced, widowed, or separated	30	35.7	113	34.1
Homeless site**				
Homeless shelter	48	57.1	275	83.1
Residential drug recovery	36	42.9	56	16.9
History of incarceration	46	54.8	209	63.1
Fair or poor health**	28	33.3	55	16.6
Health problems*	18	24.0	37	13.3
Intimate relationship**	36	42.9	80	24.2

*$p < .05$; chi-square test for gender difference.
**$p < .001$; chi-square test for gender difference.

women in the sample (41 years vs. 40 years; Table 1). Women were more likely to have been recruited from drug recovery ($p < .001$). No ethnic differences were observed. The majority of the sample was African American (81%) with fewer Latinos (9%) or Whites (7%). Most of the participants were unemployed (87%) and single (59%).

As displayed in Table 1, women were more likely than their male counterparts to report being in fair or poor health (33% vs. 17%, respectively; $p < .001$) and to be in an intimate relationship (43% vs. 24%, respectively; $p < .001$). No significant gender differences were found in terms of history of incarceration (55% vs. 63%). No differences were found in sociodemographic characteristics when analyzed by fair or poor health (data not shown) except for education. Homeless adults reporting fair or poor health were less educated than their counterparts reporting better health (11.7 years vs. 12.2 years; $p < .01$). Findings in Table 2 revealed these homeless adults

TABLE 2:   Behavioral Relationships by Fair or Poor Health[a] (*n* = 415)

	Fair or Poor Health			
	Yes (n = 332)		*No* (n = 83)	
	n	%	n	%
History of alcohol dependency	47	58.0	155	47.1
Daily alcohol use	15	18.1	52	15.6
Ever used injection drug use*	25	30.1	65	20.0
Daily use of serious drugs	30	36.1	87	26.2
Sex for money or drugs	9	10.8	20	6.0
Regular source of care*	42	51.2	128	38.6
Sixteen or more depressive symptoms**	53	63.9	156	47.0
Social support from non-drug users	44	53.0	197	59.3
Poor mental health**	52	62.7	153	46.1

a. compared to good, very good, and excellent health.
*$p < .05$; chi-square test for gender difference.
**$p < .01$; chi-square test for gender difference.
***$p < .001$; chi-square test for gender difference.

in fair or poor health were also more likely to report a regular source of care compared to those reporting better health (51% vs. 39%; $p < .05$).

METHODS

Instruments

Many of the instruments used in this study had been pilot tested using focus group format to determine sensitivity to the population being tested and clarity (Nyamathi & Lewis, 1991; Nyamathi, Leake, & Gelberg, 2000), and all have been previously tested among homeless populations, the majority of whom were African American and Latino adults (Nyamathi et al., 2000; Nyamathi, Stein, Dixon, Longshore, & Galaif, 2003). Sociodemographic characteristics including age, ethnicity, education, time homeless, marital status, and history of incarceration were assessed in a structured questionnaire that included the instruments described below.

Risk behaviors. Drug and alcohol use was assessed with a revised version of the Texas Christian University drug history form (Simpson & Chatham, 1995). This questionnaire has been tested with men and women with a

history of drug addiction, prostitution, and homelessness. It records the frequency of use of 16 drugs by injection or other means during the past 6 months and also elicits information about lifetime use (1 = no and 2 = yes). Drugs assessed are heroin, street methadone, other opiates, cocaine, crack, methamphetamine and other amphetamines, inhalants, marijuana or hashish, hallucinogens, tranquilizers, barbiturates, other sedatives, designer drugs, and alcohol and nicotine. Injection drug use was defined as any use of drugs by injection, regardless of frequency, during the past 6 months (recent) and lifetime. Test-retest reliability for daily narcotic use and abstinence is in the acceptable range of .63 to .71 (Anglin et al., 1996). Objective measures of drug use were not obtained as they only provide relatively short-term evidence of drug use. Our research team collected hair samples in a previous study of homeless women, and we found reasonable concurrence between self-report and objective evidence of cocaine use (Nyamathi, Leake, Longshore, & Gelberg, 2001).

The CAGE (cut down, annoyed, guilty, eye opener) questionnaire was administered to assess persons with a high likelihood of alcohol dependence or abuse. Four yes-no CAGE questions assess whether the individual has ever tried cutting down on drinking, has ever been annoyed by criticism regarding drinking, felt guilty about drinking, or needed an eye opener in the morning. Cronbach's alpha for the CAGE instrument in this sample was .81. Injection drug use was defined as any use of drugs by injection, regardless of frequency, during the past 6 months and over the lifetime.

Perceived health status. An individual item inquiring about participants' perceived physical health measured perceived health status. Respondents were asked to rate their general health on a 5-point Likert-type scale from *excellent* to *poor.* This item has been used in a number of health surveys as a valid overall indicator of physical health (Aday, 1994); it was also used as part of the health assessment in the RAND medical outcomes study (Ware & Sherbourne, 1992). To compare with norms in other populations, health status was dichotomized to fair or poor health versus better health.

Social support from non–drug user. Social support was measured by five items used in the RAND course of homelessness study (Burnam & Koegel, 1989). These items elicited information about how often respondents had friends, family, or partners available to (a) have a good time with, (b) provide them with food or a place to stay, (c) listen to them talk about themselves or their problems, (d) accompany them to an appointment to provide moral support, and (e) show their love and care. Participants were asked to respond to

these five items first for their substance-using sources of support and then again for their non–substance-using support sources. Responses were scored on a 5-point Likert-type scale ranging from (1) *none of the time* to (5) *all of the time*. Those without any identified source of support were assigned a score of 1. The original 19-item instrument demonstrated high convergent and discriminant validity and internal consistency reliability coefficients ranging from .91 to .97 for the two subscales (Sherbourne & Stewart, 1991). Means of the 5 items were computed for substance-using and non–substance-using support sources (subject peer) and used to form two scales measuring level of support from friends, family, and partners who did or did not use alcohol and drugs. Internal consistency for the two scales, as measured by Cronbach's alpha, was .93 for support from substance users and .97 for support from nonsubstance users.

Health care access and use. Items inquiring about whether homeless participants had a regular source of care within the past 6 months assessed health care access and use. They were also asked if they had received veteran benefits or insurance, using a yes-no response format.

Psychological profile. The presence of depressive symptoms was measured by the Center for Epidemiological Studies Depression scale (CES-D; Radloff, 1977). The instrument is a 20-item scale that measures frequency of symptoms on a 4-point continuum and has been validated for use in the homeless. Each item measures the frequency of a symptom on a 4-point response scale from 0 to 3. Examples of CES-D items are *I felt depressed* and *I felt fearful*. Responses from each item are summed to yield a total score ranging from 0 to 60. Scores of 16 or higher indicate possible clinical depression (Radloff, 1977; Wong, 2000). Cronbach's alpha for the overall CES-D scale was .85.

Emotional well-being. Emotional well-being was measured by the mental health index (MHI-5; Stewart, Hays, & Ware, 1988). For each of the five items of the MHI-5, responses on a 6-point scale range from *all of the time* to *none of the time*. The MHI-5 has well-established reliability and validity and has been shown to detect significant psychological disorders including major depression, general affective disorders, and anxiety disorders (Berwick et al., 1991). Cronbach's alpha in this sample was .84. Mean-item scale scores were computed and linearly transformed to a 0 to 100 range to evaluate them in terms of an established clinical cutpoint. Higher scores indicate greater emotional well-being.

Procedure

After the study was described and written informed consent obtained as approved by the Human Subjects Protection Committee, potential participants were provided appointments for an interview. Persons were excluded from the study if during the interview, they demonstrated cognitive impairment such as active hallucinations or stupor. Once determined as eligible for the study, trained nurses and outreach workers administered and completed the baseline questionnaire based on the participants' responses.

DATA ANALYSIS

Descriptive analysis consisted of frequencies and percentiles and means and standard deviations, depending on the distribution of the data. Variables were also examined for outliers and for normality when appropriate. *Perceived Health Status* was collapsed into dichotomous variables for purposes of comparison to other studies and population norms. Differences in categorical sociodemographic and behavioral characteristics between males and females and between those with poor or fair health versus better health status were examined by chi-square and Fisher's exact tests. Similar differences in continuous variables were assessed with independent sample *t* tests.

Logistic regression analyses were used to assess the independent effect of gender on fair or poor health among homeless persons with latent TB. Potential covariates in the regression model included variables that were associated with fair or poor health and gender at the .10 level in bivariate analyses and thus might confound the relationship between gender and health. Other potential covariates were variables that were associated with fair or poor health alone, to better understand avenues for health screening and intervention among homeless women. Based on preliminary analysis, depression symptomatology scores were not dichotomized for regression modeling; further age was dichotomized at the upper quartile to control for the known effects of older age on health. Stepwise backward regression and forward logistic regression techniques were used to produce a parsimonious model for fair or poor health status and help to avoid problems with multicollinearity and overfitting. Multicollinearity was examined and not found to be a problem with the variables used in the regression model.

TABLE 3: Behavioral or Mental Health Relationships by Gender (*n* = 415)

	Female (n = 84)		*Male* (n = 331)	
	n	%	n	%
History of alcohol dependency**	50	62.5	152	46.1
Daily alcohol use	19	22.6	48	14.5
Ever used injection drug use	21	25.0	69	20.9
Daily use of serious drugs*	31	36.9	86	26.0
Sex for money or drugs***	16	19.1	13	3.9
Regular source of care	36	42.9	134	40.6
Has 16 or more depressive symptoms	50	59.6	159	48.0
Social support from non-drug users***	32	39.5	153	17.6
Poor mental health*	50	59.6	155	46.8

*$p < .05$; chi-square test for gender difference.
**$p < .01$; chi-square test for gender difference.
***$p < .001$; chi-square test for gender difference.

RESULTS

Risky Drug and Sexual Behavior

Homeless women were more likely than their male counterparts to self-report a history of alcohol dependency (63% vs. 46%; $p < .01$) as well as daily use of serious drugs (37% vs. 26%; $p < .05$; Table 3). In terms of sexual behavior, women were more likely than men to report sex for money and drugs. No gender differences were noted in reports of having a regular source of care.

Homeless adults reporting fair or poor health were more likely to report lifetime use of injection drug use as compared to homeless adults reporting better health (30% vs. 20%; $p < .05$; Table 2).

Psychosocial Relationships

Homeless women were more likely to report poor mental health compared to their male counterparts (60% vs. 47%; $p < .05$; Table 3). Approximately 40% of homeless women reported receiving support from non-substance users compared to 18% of men ($p < .001$). Homeless persons reporting fair or poor health were more likely to report depressive symptoms and poor mental health than those reporting better physical health.

Predictors of Fair or Poor Health Status

Logistic regression analysis revealed that women had 2.5 times (odd radio [OR]: 2.50; 95% confidence interval [CI] 1.36, 4.30; $p = .002$) greater odds of reporting fair or poor health than men (data not shown). Persons who reported scores of 16 or greater on the CES-D were also more likely to report fair or poor health (OR: 1.06; 95% CI 1.03, 1.08; $p = .02$) than those who did not report depressive symptoms. Homeless persons who were older (OR: 1.84; 95% CI 1.04, 3.25; $p = .04$) and reported a history of being incarcerated (OR: 1.80; 95% CI 1.03, 3.14; $p = .04$) were also more likely to report fair or poor health than their counterparts not reporting these characteristics.

DISCUSSION

This study looked at the predictors of self-rated health status among homeless adults in Los Angeles, especially with regard to gender. The sample was relatively homogeneous, age 41 years old, African American, and unemployed. Similar to the findings of others, we found no differences in self-rated health when examining ethnicity and employment but found that those who were homeless 3 or more times were more likely to report poorer health (Gonzalez et al., 2002; White et al., 1997; Wojtusik & White, 1998). We also found that women in our study were more than 2 times as likely to report fair to poor health status.

According to other reports in the literature, in the general population, women are more likely than men to report poor health status (Franks et al., 2003). African American women in particular appear to be at increased risk for poor health status and poor health outcomes (Cunningham, Hays, Burton, & Kington, 2000). Homeless persons are more likely to report poor health status when compared with those who are housed (Nyamathi et al., 2000). Other characteristics that are associated with persons reporting poor health status include alcohol and drug use, depression, and chronic health problems (Nyamathi et al., 2003). The women in our sample who reported having a fair or poor health status were also more likely to report having a history of alcohol dependency, prostitution, daily drug use, depressive symptoms, and poor mental health. These findings are consistent with the literature that reveals that women tend to use drugs and alcohol to overcompensate negative feelings about being engaged in risky or immoral behavior (Cooper, Frone, Russell, & Mudar, 1995). Other studies revealed that

women were more likely to abuse any prescription drug, including narcotic analgesics and minor tranquilizers (Simoni-Wastila, Ritter, & Strickler, 2004); they were also more likely to report injection drug use at an earlier age and a history of borrowing needles than their male counterparts (Evans et al., 2003). We found that receiving social support from non–drug-using peers did not have an impact on self-rated health. This lack of relationship between social support from non–drug users and perceived health status is interesting as previous research has shown that social support has a positive influence of risk reduction behavior (Neaigus et al., 1994). Our previous research has also shown that social support may not always be used, even when available (Nyamathi, Flaskerud, Leake, & Chen, 1996). These findings continue to point to the need to understand the sources of support available to drug-using women and barriers to using such support by these women.

Homeless women who are at great risk for poorer health outcomes may need specialized programs. Nyamathi and associates (2000) reported that women living on the streets need comprehensive services that target a variety of needs. Swigart and Kolb (2004) acknowledged that fear of child custody issues for some homeless women may deter them from being screened for TB at a women's homeless shelter. These two examples address the need for services that are directed to women and the concerns that homeless women may face. Access to convenient multiservice health related programs may provide the opportunity to address neglected health screening and preventive programs (Stein et al., 2000). These efforts may include outreach and case management services as these components have been identified as being critical components of improved access to health care for homeless people (Cousineau, 1997). Another novel approach may include mobile medical outreach services (Nuttbrock, Rosenblum, Magura, & McQuiston, 2003). Any and all services needed should be tailored to meet the needs of the individual.

Our findings revealed that individuals having a regular source of care were more likely to rate their health as fair or poor. Those with identified chronic illnesses seek health care more often than others without identified health problems. Those with identified health problems acknowledge their health status as fair or poor. Wojtusik and White (1998) reported that 70% of their sample of homeless adults in San Francisco had at least one chronic illness and 50% of the sample rated their health as fair or poor. Other significant predictors of reporting poor health status included age, access to regular health care, a history of incarceration, and depression.

Several of the limitations of this study include its cross-sectional design and the fact that the CES-D is a screening tool for depression rather than a

diagnostic tool for depression. This sample reflects a western United States sample that may be very different from homeless adults in other parts of the United States. This study provides a better understanding the predictors of health status among homeless adults, with a particular focus on gender.

NOTE

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