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Predictors of Screening Results for Depressive Symptoms Among Homeless Adults in Los Angeles With Latent Tuberculosis

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Abstract

The purpose of this study was to examine predictors of screening results for depressive symptoms in a Los Angeles homeless population with latent tuberculosis (TB). Four hundred and fifteen homeless adults participating in a nurse case managed intervention were included in this analysis. Logistic regression results indicated that those who reported a physical health limitation, multiple sex partners, daily drug use, alcohol dependence, or not having completed high school, were more likely to screen positive. Social support from non-drug users was protective. Given the importance of adherence to TB treatment regimens, the high prevalence of a positive screening for depressive symptoms in the homeless and the potential for depression to reduce adherence rates, routine screening and treatment for depression in high risk homeless adults being treated for TB may be warranted.

Keywords

homelessness; depressive symptoms; perceived adherence with TB

There have been numerous studies indicating that homeless individuals are more likely to be psychologically distressed than the general population (Goering, Tolomiczenko, Sheldon, Boydell, & Wasylenki, 2002; Susser, Struening, & Conover, 1989; Unger, Kipke, Simon, Montgomery, & Johnson, 1997). Researchers have reported that homeless adults are 2 to 4 times more likely to be depressed, one manifestation of psychological distress, than adults who are not homeless (Ritchey, La Gory, Fitzpatrick, & Mullis, 1990; Schutt, Meschede, & Rierdan, 1994; Wong & Piliavin, 2001) with rates of depressive disorders ranging from 22 to 74% depending on definition and sampling (Goering et al., 2002; Koegel, Sullivan, Burnam, Morton, & Wenzel, 1999; Ritchey et al.; Susser et al.). However, the homeless have also been described as a diverse group with a significant number of resilient individuals who exhibit excellent adaptive and coping skills (Gelberg & Linn, 1989; Sumerlin, 1996). In the process of refining approaches to medical outreach and intervention

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for the homeless, it is important to consider whether, and to what extent, depression and psychological distress influence treatment adherence in this population. Answers to these questions could inform approaches to managing chronic conditions and infectious disease such as tuberculosis (TB) in the homeless.

Homeless persons are at high risk for contracting infectious diseases such as TB (Asch, Leake, Knowles, & Gelberg, 1998; Tulsky et al., 2000). Inner city homeless persons are considered to be at particularly high risk given crowded living conditions and elevated rates of mental illness and substance abuse (Asch et al.). Homeless persons with TB may also be more likely to spread the disease due to decreased immunocompetency and delay in health care seeking and treatment. Although strict adherence to anti-TB medication regimens is critical for successful treatmen strategies, homeless persons reportedly have many barriers to completing such regimens (Wright & Joyner, 1997). Common barriers cited include forgetfulness, difficulty setting up routines around taking medication, and the need to carry medication on one's person (Nyamathi & Shuler, 1990).

The presence of depressive symptoms may pose an additional barrier to adherence among homeless adults (DiMatteo, Lepper, & Croghan, 2000; Wing, Phelan, & Tate, 2002). Researchers have found that depression is linked with poor treatment adherence (Turner, Laine, Cosler, & Hauck, 2003), and furthermore, that treatment of underlying depression significantly improves adherence rates (Starace et al., 2002; Turner et al.; Wing et al.). Wing and associates contend that depressed patients may fail to adhere to medical regimes due to feelings of hopelessness in following a regimen to completion, lack of perceived self-efficacy, social support, energy, or memory. Thus, it is important to investigate predictors of depressive symptoms in homeless individuals with latent TB, as screening and treatment for depression may improve adherence rates with isoniazid (INH) therapy.

Perception of poor health has been linked to depression in both the general population and the homeless. It is thought that homeless adults with chronic health problems may be at greater risk for depression because they have fewer resources available to address and treat their conditions (La Gory, Ritchey, & Mullis, 1990; Tausig, 1986). Although latent TB is asymptomatic, affected individuals may perceive themselves as having a chronic disease and thus lower overall health status. As part of a larger, ongoing study on the treatment of latent TB in homeless adults, we sought to identify predictors of a positive screening for depressive symptoms.

THEORETICAL FRAMEWORK

The Comprehensive Health Seeking and Coping Paradigm (CHSCP; Nyamathi, 1989) was used as the theoretical framework for this study. The CHSCP has been used to understand the coping behaviors and health outcomes of impoverished and drug-addicted persons (Nyamathi, Flaskerud, Keenan, & Leake, 1998; Nyamathi, Longshore, Keenan, Lesser, & Leake, 2001). In the model, originally adapted from Lazarus & Folkman's (1984) stress and coping model and Schlotfeldt's (1981) health seeking paradigm, a number of factors are postulated to play an influential role in health outcomes. For this study, the following factors were examined either directly or through proxy variables: situational (recruitment site, number of times homeless), personal (physical limitations), social (social support), cognitive (perceived ease of adherence with INH treatment, perception of ability to complete INH treatment), behavioral (drug and alcohol use, sexual risk factors), and sociodemographic (age, gender, ethnicity, and education) in relation to the outcome variable, screening results for depressive symptomatology.

Situational Factors

Researchers investigating situational factors have suggested that chronic homelessness is associated with less depression and more hardiness (Sumerlin, 1996). In contrast, individuals who are episodically homeless or who are homeless for the first time appear to experience higher rates of depression than the chronically homeless (Goering et al., 2002). In a small study of 150 Alabama homeless adults, La Gory et al. (1990) assessed the role of environment and length of time homeless in predicting depressive symptomatology but found no direct relationship. However, in larger, more recent studies, researchers have demonstrated a correlation. In a study of 1051 homeless women in Los Angeles, Nyamathi, Leake, and Gelberg (2000) found that those living on the street were more likely to have physical and mental health problems than those living in sheltered housing. Moreover, in that study, recruitment site was assessed, as it had been found that persons residing in residential treatment programs are not equivalent to those residing in shelters (Nyamathi, Leake, & Gelberg, 2000). Homeless persons residing in residential treatment programs may be more likely than those in shelters to have a history of drug and/or alcohol abuse, but they may also have greater access to peer and social support, and mental health services.

Personal Factors

Personal factors, such as physical limitations, also affect homeless persons more than they affect the general population (Kushel, Vittinghoff, & Haas, 2001). Many physical limitations are due to lifestyle factors associated with being homeless. The environmental exposure, high-risk behaviors such as alcohol and drug use, poor nutrition, sleeping upright, and forced walking experienced by many homeless individuals (Wright & Joyner, 1997) predispose to injury and illness. Conversely, poor health may in itself precipitate homelessness. Physical limitations have been linked to depression in the general population (Riso, Miyatake, & Thase, 2002), but to our knowledge, the relationship has not been validated in the homeless population.

Social Factors

Emotional distress is associated with higher rates of risk-taking behavior in the homeless (Nyamathi, 1992; Nyamathi, Flaskerud, et al., 1998) and may interfere with health seeking activity. Prior research utilizing the CHSCP has demonstrated that social support acts as a resource by providing encouragement to the recipient and by promoting health protection, a sense of belonging, and feelings of personal efficacy (Nyamathi, Keenan, & Bayley, 1998; Nyamathi, Leake, Keenan, & Gelberg, 2000). Failure to seek support or seeking support from negative sources (Nyamathi & Bennett, 1997) may predispose drug-using individuals to non-completion of INH treatment.

Cognitive Factors

Previous researchers have demonstrated a positive correlation between intention to adhere and adherence behavior (Dunbar-Jacob et al., 2000; Hovell et al., 2003). Perceived health status has also been shown to affect adherence (De Geest, Abraham, Gemoets, & Evers, 1994; McDonnell, Turner, & Weaver, 2001) although data in homeless populations are limited. In this study we examined cognitive perceptions about adherence and health status predictors of screening results for depressive symptoms among homeless adults with latent TB infection.

Behavioral Factors

Engagement in high-risk behaviors has been correlated with depression in both the homeless and general population. Engagement in high-risk behaviors is common among homeless persons with low self-esteem and high levels of psychological distress (Nyamathi, Wenzel,

Lesser, Flaskerud, & Leake, 2001). Alcohol and drug use, sexual risk factors, and violence have been linked to psychological distress in adolescents and young adults (Unger et al., 1997), women (Stein, Leslie, & Nyamathi, 2002), African-American males (Littrell & Beck, 2001), and veterans (Tessler, Rosenheck, & Gamache, 2002). Researchers have advocated more longitudinal studies to unravel cause and effect relationships (Unger et al.; Wong & Piliavin, 2001).

Sociodemographic Factors

Socio-demographic characteristics related to depression in homeless adults include age, gender, ethnicity, education, and employment (La Gory et al., 1990); North, Pollio, Smith, & Spitznagel, 1998). In the general population, depression has been found to be more prevalent in ethnic minorities, young adults, and females (Radloff & Locke, 1986); however, these findings have not been replicated in homeless populations (Gelberg & Linn, 1989; La Gory et al., Nyamathi, Stein, & Bayler, 2000; Unger et al., 1997). Higher education has been associated with a lower risk of depression in homeless populations. It has been hypothesized that education affords some mastery in dealing with difficult life situations, and individuals who are better educated may be more resilient (La Gory et al.). Conversely, depression or the causative factors leading to depression (e.g., prior history of abuse, family history of depression) may result in educational difficulties and school failure.

METHOD

Design

This study of baseline depressive symptomatology was part of a larger study designed to examine the effectiveness of a nurse case managed versus a standard program on adherence with a 6-month regimen of INH by direct observed therapy in homeless adults treated for latent TB. After receiving a full description of the study goals and procedures and the informed consent procedure as approved by the University of California Human Subjects Protection Committee, participants engaged in baseline face-to-face interviews conducted by trained nurses and outreach workers.

Sample and Setting

Data were collected in the Skid Row (a geographical boundary consisting of three census tracks) region of downtown Los Angeles between 1997 and 2003. Subjects were eligible to participate in the screening phase of this TB chemoprophylaxis study if they: (a) had spent the previous night in a homeless shelter or residential substance abuse treatment program; (b) had no self-reported history of a positive test for Protein Purified Derivative (PPD) or of completing a TB treatment program; and, (c) were between the ages of 18 and 55, or were over the age of 55 and reported risk activation factors for TB. Risk activation factors included being an injection drug user (IDU), taking immunodepressive medications such as chronic steroids, or having a medical diagnosis associated with immune compromise such as HIV/AIDS, diabetes mellitus, or severe kidney disease.

Participants were subsequently PPD-tested via the Mantoux method, and those found to be positive, defined as a PPD reaction of at least 10 mm of induration, with a negative chest-ray and normal liver enzymes, were enrolled in the TB chemoprophylaxis study. The resulting convenience sample consisted of 415 homeless men and women residing in 12 shelters and residential recovery programs within downtown Los Angeles.

Procedure

Recruitment procedures consisted of posting flyers in 12 targeted shelters and residential recovery programs in the Skid Row area of Los Angeles. These flyers directed interested

persons to call or visit the research nurses located at a neighborhood clinic within a few blocks of the shelters or treatment programs. Individuals were excluded from the study if, during the interview, they demonstrated cognitive impairment such as active hallucinations or stupor. Those determined to be eligible for the study were administered a baseline questionnaire by trained nurses and outreach workers.

Instruments

Situational factors—The site of residence, whether it was a homeless shelter or a residential recovery program, was confirmed by staff at each site. Further, the respondents were asked the number of times and the length of time they had been homeless in their lifetime.

Personal factors—Physical limitations were assessed (*Yes*/*No*) by the RAND Functional Status Scale (Health Cost & Services Utilization Study, 1995). This 6-item scale examines ability to perform various activities such as bending or stooping, moving a table, running, walking several blocks. Chronbach's alpha for the scale in the study was .91.

Social factors—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 five items were computed for substance-using and non-substance using support sources and used to form two scales measuring level of support from friends, family, and partners who did or did not use alcohol and/or 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 non-substance users.

Cognitive factors—Perceived ease of adherence with INH was measured by one item that assessed the subject's perceived self-efficacy in adherence with a 5-point response set ranging from *definitely would* to *definitely wouldn't* comply. Responses were dichotomized to definitely would versus other due to the highly positively skewed distribution.

Perceived health status was measured by an individual item. Respondents were asked to rate their general health on a 5-point 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 & Anderson, 1981); it was also part of the health assessment in the RAND Medical Outcomes Study (Sherbourne & Stewart, 1991).

Behavioral factors—Drug and alcohol use were assessed with a revised version of the Texas Christian University Drug History Form (Simpson & Chatham, 1995). This instrument has been validated with men and women with a history of drug addiction, prostitution, and homelessness. The frequency of use of 16 drugs by injection or other means is assessed for the past 6 months and over the lifetime. Drugs assessed are: heroin, street methadone, other opiates, cocaine, crack, methamphetamine and other amphetamines, inhalants, marijuana/hashish, hallucinogens, tranquilizers, barbiturates, other sedatives,

designer drugs, alcohol, and nicotine. The CAGE questionnaire was administered to assess persons with a high likelihood of alcohol dependence or abuse. 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 last 6 months and over the lifetime. Objective measures of drug use were not obtained as they provide relatively short-term evidence of drug use. In a prior study, our research team found reasonable concurrence between self-report and objective evidence (through hair sampling) of cocaine use in homeless women (Nyamathi, Leake, Longshore, & Gelberg, 2001).

Sexual behavior was assessed by individual items concerning whether participants had been sexually active in the past 6 months, number of overall partners, number of new partners, frequency of condom use with regular and other partners, and gender of partners.

Psychological outcome—Screening for depressive symptoms was conducted by using the Center for Epidemiological Studies Depression (CES-D) scale (Radloff, 1977). The 20-item self-report instrument is designed to screen for depressive symptomatology in the general population and has been validated for use in the homeless (Ritchey et al.). 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. Higher scores indicate screening of more depressive symptoms with scores of 16 or higher consistent with a positive screen, indicating possible clinical depression (Radloff; Wong, 2000). CES-D scores on the current study ranged from 3 to 53. Cronbach's alpha for the overall CES-D scale was .85.

Sociodemographic factors—A structured instrument assessed self report of age, ethnicity, education, lifetime length of time homeless, number of homeless episodes, marital status, and history of incarceration.

Data Analysis

Descriptive analysis consisted of frequencies and percentiles or means and standard deviations, depending on the level of the data. Differences in categorical sociodemographic and behavioral characteristics between individuals with positive screening for depressive symptoms and those without were examined by chi-square and Fisher exact tests. Differences in continuous variables between the two groups were assessed by independent sample *t*-tests. The level of significance was accepted at $p < .01$ to correct for repeated testing. Logistic regression analyses were performed to estimate independent predictors of screening results of depressive symptomatology. Stepwise backward and forward regression techniques were used to create a core model of important predictors of screening results. Variables used to construct the core model were associated with positive screening results at the $p < .10$ level or less in preliminary analyses. Regardless of results in the preliminary analyses, variables not included in it were then added one at a time to estimate their effects, controlling for other predictors in the model. Finally, variables found to have important effects were given an opportunity to enter the core model using stepwise forward selection techniques. Length of time homeless was log transformed for analysis, although unlogged statistics are presented in Table 1.

RESULTS

Characteristics of the Sample

Descriptive findings of the study sample and variables are presented in Table 1 as a function of screening results for depressive symptomatology. Overall, approximately half of all homeless adults met the threshold for screening for depressive symptoms (n = 209, 50%) with a CES-D score of 16 or more. Participants were predominantly male (84%) and African-American. Their mean age was 41 years, and they had completed a mean of 12.1 years of education. No significant differences between participants with and without positive screening results were noted with respect to age, education, or time homeless.

In bivariate analyses, homeless adults with positive screen for depressive symptoms were more likely than their counterparts with negative screening to reside within a residential recovery program. They were also more likely to report fair/poor health rather than excellent or good health. Homeless adults with a positive screen for depressive symptoms were more likely than their counterparts with negative depression screening to have been homeless at least three times.

As depicted in Table 2, homeless adults who screened positive for depressive symptoms were more likely to have a history of daily use of serious drugs and lifetime alcohol use than those not showing a positive screening. Homeless adults with positive screening for depressive symptoms also were more likely to report multiple sexual partners compared to homeless adults who were less likely to be depressed. Homeless adults with positive screening for depressive symptoms were more likely to receive social support from non-drug-using friends (Table 1), and more likely to report a physical limitation.

Predictors of Screening Results for Depressive Symptoms

Logistic regression analysis indicated that persons with a physical limitation had almost three times greater odds of being at risk for depression than their healthier counterparts (Table 3). In addition, those who had completed less than high school education, reported daily use of serious drugs or alcohol dependence, and those who had multiple sexual partners had at least one and a half times the odds of showing elevated screening results for depressive symptomatology compared to their respective counterparts.

DISCUSSION

The purpose of this study was to examine predictors of screening results for depressive symptomatology in homeless adults initiating treatment for latent TB. The CHSCP provided a guide for selection of variables to examine, either directly of by proxy. In our study, 50% of the homeless adults showed elevated screening results for depressive symptoms. This finding is consistent with previous large scale studies (Wasylenki & Tolomiczenko, 1997). Individuals with positive depression screening were more likely to have a physical limitation, to use alcohol and drugs, and to have multiple sex partners. Those in drug recovery were also more likely to show elevated screening results than those in homeless shelters, a finding that is supported by earlier research on homeless women (Nyamathi, Flaskerud, & Leake, 1997). Factors independently predicting screening results for depressive symptoms were history of alcohol dependence, recent drug use, lifetime use of injection drugs, physical limitation, daily use of serious drugs, and multiple sex partners. These results were not unexpected. Similar findings have been noted by others (La Gory et al., 1990; Unger et al., 1997; Wong & Piliavin, 2001), however, not in the context of treatment for latent TB.

Our results support the need to unravel the nexus of depression, drug and alcohol use, and homelessness and to identify approaches to reduce risks and improve care for this vulnerable population. One area of promise is the potential value of appropriate social support, an important component of the CHSCP model. A number of investigators have examined social support in an effort to identify protective mechanisms that might insulate homeless individuals. Nyamathi, Leake, Keenan, & Gelberg (2000) found that social support from peers and significant others whowere non-drug or alcohol users led to more positive outcomes among homeless women. In the current study, we found that homeless adults receiving support from non-drug users were less likely to have a positive screen for depressive symptoms.

It is also important to identify homeless adults at high risk for depression because both homelessness and depression may interfere with adherence with TB treatment regimes. Homeless adults at high risk for depression may be more likely to be non-adherent even when latent TB treatment is facilitated. It is possible that TB medication adherence may be improved in this group through concurrent evaluation and treatment for depression.

Limitations

One of the limitations of this study is the use of a cross-sectional design; we could only observe a single point in time in the lives of our sample. Another limitation is the use of self-report data obtained for sociodemographic factors, including history of incarceration. Moreover, the CES-D is a screening tool for depression, rather than a diagnostic tool. Thus the actual prevalence of depression in this population is unknown. In addition, although intention to comply with medical regimens has been correlated with observed adherence rates (Dunbar-Jacob et al., 2000), it is an indirect measure, and assessment of actual adherence rates remains to be determined. Nonetheless, our findings serve as a basis for better understanding the predictors of depression and how depression might affect adherence with TB Chemoprophylaxis.

Conclusion

The literature is replete with studies documenting that health care utilization is poor among the homeless due to numerous barriers (Hwang et al., 2001; Kushel et al., 2001; Nyamathi, Leake, & Gelberg, 2000). Because depression may be an additional barrier to long-term treatment adherence for homeless individuals, depression screening may provide an important adjunct to the therapeutic approach to TB prophylaxis. Similarly, depression screening and treatment may prove effective in optimizing adherence in treating other chronic medical conditions common in homeless populations such as diabetes, hypertension, asthma, HIV, and hepatitis. Clinicians should consider the possibility of depression in homeless individuals, particularly those who did not complete high school, have a history of alcohol or drug dependence, have physical limitation, practice high risk sexual behaviors, or receive social support primarily from substance users. The CHSCP model provided the framework for the study and may provide direction for intervention in the depressed homeless population. Identification and treatment of affected individuals may ultimately provide superior results in the treatment of chronic disease in the homeless.

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Table 1

Sociodemographic Characteristics by Screening Results for Depressive Symptoms

	Total		Non-Depressive Symptoms (*n* = 206)		Positive Screen for Depressive Symptoms (*n* = 209)	
	Mean	***SD***	**Mean**	***SD***	**Mean**	***SD***
Age	41.07	8.54	41.69	8.00	40.46	9.09
Education	12.08	1.80	12.29	1.85	11.88	1.76
Time homeless (years)	0.34	1.24	0.23	1.25	0.46	1.24
Race	*n*	%	*n*	%	*n*	%
African American	341	82.17	173	84.08	168	80.38
White	29	6.99	15	7.28	14	6.70
Hispanic	37	8.92	15	7.28	22	10.53
Other	8	1.93	3	1.46	5	2.39
Marital status						
Never married	245	59.04	120	58.25	125	59.81
Married	27	6.51	15	7.28	12	5.74
D/W/S	143	34.45	71	34.47	72	34.45
History of Incarceration	255	61.45	130	63.11	125	59.81
Site*						
Homeless Shelter	323	77.83	173	83.98	150	71.77
Residential Drug						
Recovery	92	22.17	33	16.02	59	28.23
Perception of health poor/fair*	83	20.00	30	14.56	53	25.36
Social support*						
Primarily drug user	22	5.76	5	2.58	17	9.04
Primarily non-user	241	63.09	134	69.07	107	56.91
Both	119	31.15	55	28.35	64	34.04
Homeless more than three times*	176	42.36	102	48.80	74	35.92

* $p < .01$.

Table 2

Bivariate Relationships With Positive Screen for Depressive Symptoms

	Totals		Non -depressive symptoms (*n* = 206)		Positive screen for depressive symptoms (*n* = 209)	
	n	**%**	***n***	**%**	***n***	**%**
Daily use of serious drugs**	95	22.89	33	16.02	62	29.67
Lifetime alcohol**	202	49.87	81	39.90	121	58.45
IDU last 6 months	60	21.58	22	17.60	38	24.84
Ever injected drugs	88	21.36	33	16.18	55	26.44
Multiple sexual partners**	125	49.76	49	39.20	76	60.32
Any physical limitation**	124	29.85	41	20.00	83	39.71

** $p < .001$.

chi-square tests for categorical variables; *t*-tests for continuous variables comparing homeless persons at risk for clinical depression and not at risk for clinical depression; IDU = injection drug user.

Table 3

Logistic Regression Analysis for Depressive Symptoms[a]

	Odds ratio	95% CI	*p*
Variable/item			
Any physical limitation	2.90	1.83–4.57	.001
Less than high school completion	1.84	1.14–2.96	.013
Daily use of serious drugs	1.83	1.10.09–3.04	.020
Lifetime alcohol dependence	1.69	1.100.97–2.60	.016
Multiple sex partners	1.52	0.94–2.43	.084
Support primarily from non-substance user	0.62	0.42–0.98	.043
Age	0.97	0.95–1.00	.074

[a]Depressive symptoms were assessed in terms of having a CES-D score of 16 or higher.