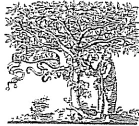

ELSEVIER

Available online at www.sciencedirect.com

SCIENCE DIRECT®

Drug and Alcohol Dependence 78 (2005) 169–175

DRUG and ALCOHOL DEPENDENCE

www.elsevier.com/locate/drugalcdep

Predictors of health functioning in two high-risk groups of smokers

Judith J. Prochaska [a,*], James L. Sorensen [a], Sharon M. Hall [a], Joseph S. Rossi [b], Colleen A. Redding [b], Amy B. Rosen [a], Stuart J. Eisendrath [a], Marc R. Meisner [c]

[a] *Department of Psychiatry, University of California, San Francisco, CA 94143-0984, USA*

[b] *Cancer Prevention Research Center, University of Rhode Island, Kingston, RI 02881, USA*

[c] *Kaiser-Permanente Northern California, San Rafael, CA 94903, USA*

Received 19 May 2004; received in revised form 28 October 2004; accepted 29 October 2004

Abstract

The relative and combined health effects of cigarette smoking, heroin use, and depression were examined in 322 clinically depressed smokers and 117 opioid-dependent smokers participating in two studies of the San Francisco Treatment Research Center. Opioid-dependent smokers averaged 16 years (S.D. = 9) of heroin use; 3% of depressed smokers used opiates in the past 6 months. Cigarettes per day ($M = 15$, S.D. = 10) and Beck Depression (BDI-II) scores ($M = 21$, S.D. = 11) were comparable between the two groups. Health functioning was assessed using the *Medical Outcomes Study Short Form* (*SF*-36). Adjusting for demographic differences, depressed smokers reported better physical but poorer emotional health relative to opioid-dependent smokers. Both groups scored significantly lower than published norms ($p < .05$). Within groups, severity of depressive symptoms, tobacco use, and opiate use were independent predictors of lower health functioning ($p < .05$). Examining risk-related subgroups based on depression scores (BDI-II $\geq$ 20), cigarettes per day ($\geq$1 pack), and opiate use, number of risk factors was monotonically related to health functioning in both samples. Individuals with two or more risk factors scored the lowest ($p < .05$). Severity of depressive symptoms, tobacco use, and opiate use contributed individually and collectively to lower health functioning. Blended treatments that target multiple risk factors are needed to improve health outcomes.

© 2004 Elsevier Ireland Ltd. All rights reserved.

Keywords: Smoking; Depression; Heroin; Multiple risk behaviors; Health functioning

1. Introduction

Depression, tobacco use, and illicit drug abuse are costly and prevalent disorders. Depression is a major cause of disability and the fourth leading contributor to the global burden of disease (World Health Organization, 2001). Tobacco use is the second leading cause of death in the world, responsible for about 5 million deaths annually (World Health Organization, 2002), with an estimated economic toll of US$ 200 million per year (Barnum, 1994). Heroin abuse, particularly among those engaged in non-sterile injection practices, is associated with serious medical consequences including skin and soft tissue abscesses, endocarditis, HIV infection, hepatitis B and C, liver disease, and nutritional deficiencies (National Institute on Drug Abuse, 1997). The mortality rate of heroin users is estimated at 1–3% annually (Darke and Zador, 1996).

These health consequences are estimates for each risk condition individually. Accumulating data, however, indicate substantial rates of co-occurrence among mental and addictive disorders. At least half of clients in psychiatric and addictions treatment meet criteria for comorbid substance abuse and psychiatric disorders (Substance Abuse and Mental Health Services Administration, 2002; Havassy et al., 2004). In the US, rates of tobacco use among individuals with affective disorders range from 53 to 90% (Hughes, 1993) compared to 23% in the general population (Centers for Disease Control and Prevention, 2003). Among clients

* Corresponding author. Tel.: +1 415 476 7695; fax: +1 415 476 7719.
E-mail address: jodijpr@itsa.ucsf.edu (J.J. Prochaska).

0376-8716/$ – see front matter © 2004 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.drugalcdep.2004.10.012

in treatment for opiate dependence, tobacco use rates are as high as 85–98% (Richter and Ahluwalia, 2000).

Despite the high rates of co-occurrence, controversies remain regarding how to, and even whether to, treat the multiple comorbid conditions with which patients present. In the literature, most studies have focused on the treatment of single disorders with other risk conditions left unassessed and unaddressed. A greater appreciation of the co-occurrence of multiple disorders and the implications for health functioning could help inform the types of comprehensive treatments needed.

The purpose of the current study was to examine the individual and combined effects of depression, tobacco use, and opiate use on health functioning in two complex patient groups: smokers diagnosed with clinical depression recruited from outpatient psychiatry clinics, and opioid-dependent smokers recruited from medical services of a public hospital. The following three hypotheses were tested: (a) both patient groups will report reduced health functioning, with depressed smokers scoring particularly low on domains of emotional health and opioid-dependent smokers reporting poorer physical health; (b) the severity of depressive symptoms, tobacco use, and opiate use will each independently predict health functioning; and (c) individuals at high risk on multiple risk factors will demonstrate the worst health functioning profiles.

2. Methods

2.1. Procedures

Data were collected in two clinical trials of the NIDA-funded San Francisco Treatment Research Center focused on innovative treatments for substance abuse with complex patient groups in new settings (website: http://www.ucsf.edu/sftrc/). Trial 1 evaluated a comprehensive behavioral and pharmacological intervention for treating nicotine dependence among psychiatric outpatients diagnosed with depressive disorders. Trial 2 evaluated innovative strategies for linking medical patients with identified opiate dependence to methadone treatment. Both samples were recruited from the San Francisco Bay Area. The appropriate institutional review boards approved the study protocols, and all participants provided informed consent. All measures were self-reported by participants. Common measures used across studies allowed for comparative analyses. The current study examined baseline data.

2.2. Participants

2.2.1. Sample 1: Depressed smokers

Participants ($N=322$) were recruited from one of four psychiatric outpatient clinics including one university-based clinic and three clinics from a large Health Maintenance Organization. The sample has been described in detail previously (Prochaska et al., 2004b). Inclusion criteria were diagnosis of DSM-IV unipolar depression on the PRIME-MD (Spitzer et al., 1994), either current or in partial remission; having smoked at least one cigarette per day during the week prior to recruitment; enrollment as a patient at one of the participating clinical sites; and age 18 years or older. Exclusion criteria were non-English speaking, history of Bipolar Disorder, plans to leave the geographic area within 18 months, or presence of a medical condition that contraindicated use of transdermal nicotine replacement or bupropion for smoking cessation.

2.2.2. Sample 2: Opioid-dependent smokers

Participants ($N=126$) were recruited from emergency department, inpatient wards, and integrated soft tissue service outpatient clinics of a public general hospital. Review of ICD-9 codes for clinic admissions around the time of baseline assessment revealed 94% of participants presented with heroin-related health complications (e.g., opportunistic infections, hepatitis, HIV/AIDS, drug withdrawal, bacterial infections). Drug-related problems were coded based on published methodology (Masson et al., 2002; Stein, 1994). Study inclusion criteria were age 18 years or older, two or more years of meeting DSM-IV criteria for opioid dependence, at least two prior treatment attempts for opiate dependence, and currently injecting heroin. The inclusion criteria were based on hospital requirements for methadone maintenance treatment. Individuals unable to provide informed consent due to current psychotic disorder, severe medical complications, or sedation; who faced imminent incarceration; were non-English speaking; or expected to leave the geographic area within 6 months were excluded. The current study used data from the 117 (93%) participants who reported smoking at least one cigarette in the 24 h prior to baseline assessment.

2.3. Measures

Participants self-reported their age, gender, ethnicity, marital status, educational level, income level, employment status, and living situation. The *Medical Outcomes Study Short Form* (*SF*-36) (Ware et al., 1997) measured functioning in eight health domains relating to physical (Physical Functioning, Role-Physical, Bodily Pain, General Health) and emotional (Vitality, Social Functioning, Role-Emotional, Mental Health) well-being. The scales are briefly defined in Table 1. The scores were transformed to a scale from 0 (worst health functioning) to 100 (best health functioning). The SF-36 is one of the most widely used measures of health functioning. Evaluated with a variety of samples, the scales have demonstrated adequate internal consistency, measurement stability, and construct validity (Ware et al., 1997). The Beck Depression Inventory-II (BDI) (Beck et al., 1996) measured severity of depressive symptoms in the past 2 weeks. A single item assessed the number of cigarettes smoked in the 24 h prior to baseline assessment (CPD). The *Fagerstrom Test for Nicotine Dependence* (*FTND*) (Fagerstrom, 1978) measured smoking behaviors indicative of physical dependence. Measures of

Table 1
Health domains of the *Medical Outcomes Study Short Form* (*SF*-36; Ware et al., 1997)

Domain	Definition
Physical Functioning	Extent to which health limits ability to perform physical activities such as walking or climbing steps
Role-Physical	Extent to which physical health problems interfere with work and daily activities
Bodily Pain	Intensity of pain and limitations due to pain
General Health	Rating of overall personal health
Vitality	Levels of energy and vitality
Social Functioning	Extent to which physical or emotional problems interfere with social activities
Role-Emotional	Extent to which emotional problems interfere with work and daily activities
Mental Health	Overall rating of emotional health

opiate use differed in the two studies. In Trial 1, a single item assessed any opiate use in the 6 months previous. In Trial 2, all participants were opioid dependent. A single item assessed years of heroin use.

2.4. Analyses

Analyses were conducted in SPSS version 11.0.1. Pearson Chi-square and *t*-tests were run to examine differences in baseline characteristics between the two samples. To test hypothesis 1, a multivariate General Linear Model (GLM) was run to examine group differences on the eight SF-36 health functioning domains with age, gender, ethnicity, education, and income level entered as covariates. Ethnicity was dichotomized as non-Hispanic Caucasian versus other. Effect sizes (η^2) were calculated. To test hypothesis 2, predictors of health functioning were examined within each sample separately. Univariate GLMs tested the contribution of demographic, mood, and substance use variables to health functioning. To test hypothesis 3, risk-related subgroups were created based on severity of depressive symptoms (BDI $\geq$ 20; moderate to severe), smoking ($\geq$1 pack per day), and opiate use categorized as yes/no for depressed smokers and by median split of years of heroin use ($\geq$17) for opioid-dependent smokers. The association between number of risk factors and health functioning was examined in multivariate GLMs controlling for the same set of demographic variables.

3. Results

3.1. Sample characteristics

The samples differed significantly ($p < .001$) with respect to gender, ethnicity, educational level, marital status, income level, employment status, and living situation (see Table 2). Though participants in Trial 2 were not recruited by smoking or depression status, CPD, *FTND*, and BDI scores did not differ significantly between the two samples. Measures of opiate use differed by study and thus, could not be compared directly. In Trial 1, 11 (3%) participants reported using opiates in the past 6 months. In Trial 2, all participants were current heroin users, with years of use ranging from 1 to 53 (mean = 17, S.D. = 11).

3.2. Group differences in health functioning

Quality of health functioning was examined between the two groups, controlling for demographic differences. The effect of group on health functioning was significant, $F(8, 412) = 11.36$, Wilks' Lambda = .82, multivariate $\eta^2 = .18$, $p < .001$, in a multivariate GLM with gender ($p = .053$), age ($p < .001$), ethnicity ($p = .018$), educational level ($p = .002$), and income ($p = .071$) entered as covariates. As anticipated, depressed smokers scored higher on measures of physical health, but lower on measures of emotional health as compared to opioid-dependent smokers. Adjusted means are graphed in Fig. 1. Follow up univariate GLMs revealed the group differences were significant for the SF-36 factors of Role-Physical ($p = .002$, $\eta^2 = .02$), Bodily Pain ($p < .001$, $\eta^2 = .09$), Role-Emotional ($p = .002$, $\eta^2 = .02$), and Mental Health ($p = .002$, $\eta^2 = .02$). For comparison, Fig. 1 also includes general US population normative scores for the SF-36 factors (Ware et al., 1997). Both study samples scored significantly lower than the normative sample across all health domains. The greatest disparities in health functioning relative to US norms were for the Role-Physical (−48 points) and Role-Emotional (−50 points) scales among opioid-dependent and depressed smokers, respectively.

3.3. Predictors of health functioning: depressed smokers

GLMs were run with the SF-36 factors as dependent variables. Higher BDI scores were associated with lower health functioning across all eight dimensions ($p < .001$), with effect sizes ranging from $\eta^2 = .05$ (Bodily Pain) to .49 (Mental Health). CPD was independently associated with lower Physical Functioning and General Health ($p < .05$, $\eta^2 = .02$ and .01, respectively). Opiate use was associated with lower General Health and greater limitations due to Bodily Pain ($p < .05$, $\eta^2 = .02$ and .02). Demographic differences also were observed (all $p < .05$): Physical Functioning was poorer among women, older adults, the less educated and those with lower incomes; Role-Physical scores were lower among older adults; limitations due to Bodily Pain were greater among older adults, women, and the less educated; men reported greater Vitality. Ethnicity was not significant in any of the models. The amount of variance accounted for in the full models ranged from .13 for Role-Physical to .49 for Mental Health (all $p < .001$).

Risk-related subgroups were created based on BDI ($\geq$20), CPD ($\geq$1 pack), and opiate use. Participants low on all three risk factors ($n = 78$) were compared with participants high on one ($n = 159$) to those high on two or more ($n = 72$) risk factors. The effect of risk group on health functioning was

Table 2
Sample characteristics

	Depressed smokers $N = 322$		Opioid-dependent smokers $N = 117$	
	N (%)	M (S.D.)	N (%)	M (S.D.)
Female*	224 (70)		26 (22)	
Ethnicity*				
Caucasian	220 (68)		55 (47)	
African-American	33 (10)		34 (29)	
Hispanic	24 (8)		11 (9)	
Asian/Pacific Islander	7 (2)		2 (2)	
Other	38 (12)		15 (13)	
Age (years)		42 (13)		43 (8)
College educated*	256 (79)		29 (25)	
Marital status*				
Married/cohabitating	89 (28)		8 (7)	
Divorced/separated/widow	96 (30)		55 (47)	
Single	137 (43)		54 (46)	
Income ≤ US$ 20,000*	119 (37)		103 (88)	
Unemployed*	88 (27)		113 (97)	
Homeless*	0 (0)		97 (83)	
BDI-II:		21 (11)		22 (11)
Minimal (<14)	85 (26)		28 (24)	
Mild (14–19)	64 (20)		19 (16)	
Moderate (20–28)	94 (29)		35 (30)	
Severe (>28)	79 (25)		35 (30)	
Cigarettes per day		16 (10)		14 (9)
FTND		4.0 (2.5)		4.6 (2.1)

* Group difference significant at $p < .001$.

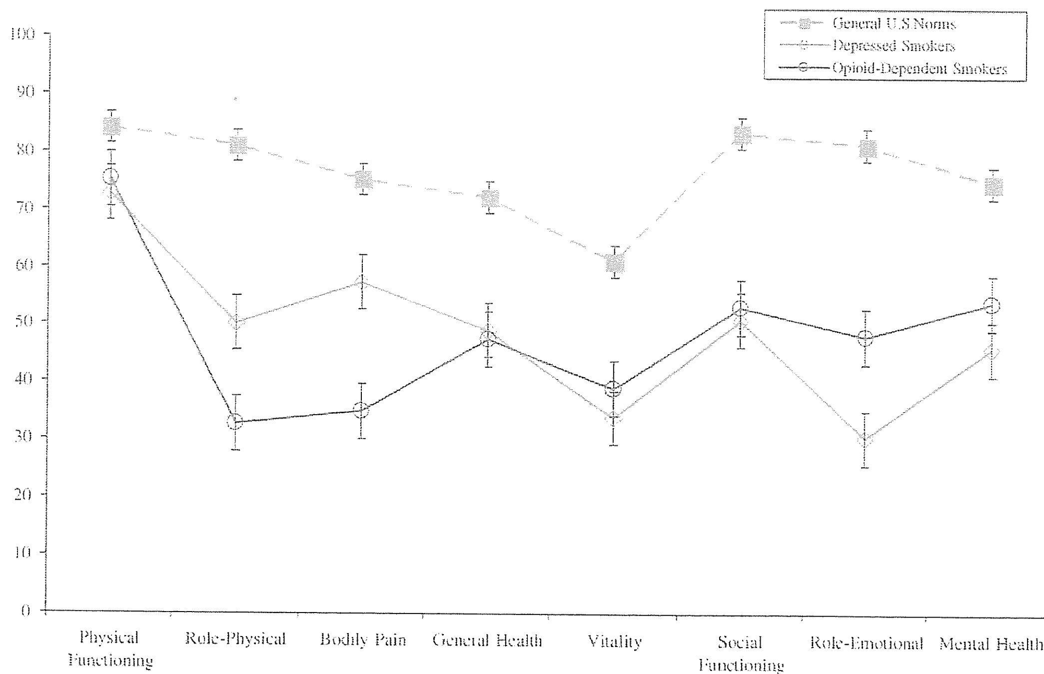

Fig. 1. Health functioning (adjusted mean ± S.E.) for depressed and opioid-dependent smokers compared to general US population norms (Ware et al., 1997). Model covariates are age, gender, ethnicity, education, and income. Scores are transformed to a scale from 0 (worst health functioning) to 100 (best health functioning).

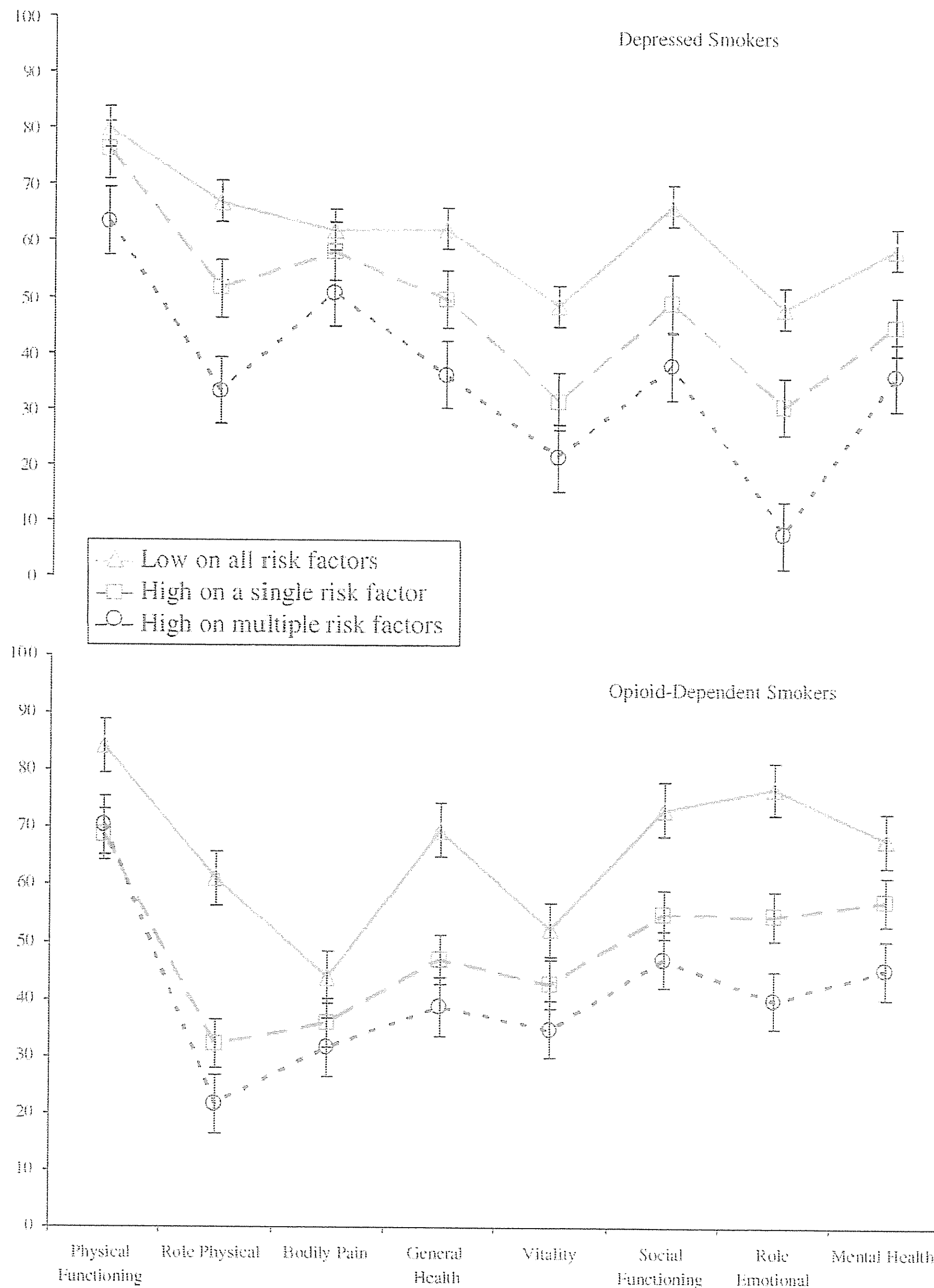

Fig. 2. Health functioning (adjusted mean ± S.E.) by risk-factor status. The top panel displays values for the depressed smokers sample and the bottom panel displays values for the opioid-dependent smokers sample. Model covariates are age, gender, ethnicity, education, and income. Scores are transformed to a scale from 0 (worst health functioning) to 100 (best health functioning).

significant, $F(16, 590) = 8.98$, Wilks' Lambda = .65, multivariate $\eta^2 = .20$, $p < .001$, in a multivariate GLM with gender ($p = .016$), age ($p < .001$), ethnicity ($p = .683$), educational level ($p = .001$), and income ($p = .007$) entered as covariates. Number of risk factors was monotonically related to health functioning across all eight dimensions ($p < .05$), with effect sizes ranging from $\eta^2 = .02$ (Bodily Pain) to .23 (Vitality). Individuals with two or more risk factors scored the lowest (see Fig. 2).

3.4. *Predictors of health functioning: opioid-dependent smokers*

Higher BDI scores was associated with lower health functioning for seven of eight dimensions ($p < .05$), with effect sizes ranging from $\eta^2 = .02$ (Role-Physical, $p > .05$) to .37 (Mental Health). CPD and years of heroin use were independently associated with lower Role-Physical scores ($p < .05$, $\eta^2 = .10$ and .04, respectively). Heroin use also was associated

with poorer General Health ($p < .05$, $\eta^2 = .05$). The strongest demographic predictor was ethnicity, with Caucasians scoring lower on Physical Functioning, Bodily Pain, Vitality, Social Functioning, and Mental Health relative to other ethnic groups. Women also reported greater limitations due to Bodily Pain. Age, education, and income were unrelated to any of the factors. The amount of variance accounted for in the full models ranged from .09 for Physical Functioning to .43 for Mental Health (all $p < .05$).

Risk-related subgroups were created based on BDI (≥ 20), CPD (≥ 1 pack), and median-split of years of heroin use (≥ 17). Severity risk groups were none ($n = 14$), single ($n = 43$), and multiple ($n = 60$) risk factors. The effect of risk group on health functioning was significant, $F(24, 294) = 2.28$, Wilks' Lambda = .61, multivariate $\eta^2 = .15$, $p = .001$, in a multivariate GLM with gender ($p = .718$), age ($p = .034$), ethnicity ($p = .002$), educational level ($p = .783$), and income ($p = .708$) entered as covariates. Number of risk factors was related to health functioning for six of eight SF-36 domains ($p < .05$), with effect sizes ranging from $\eta^2 = .03$ (Bodily Pain) to .21 (Mental Health). Individuals with two or more risk factors scored the lowest (see Fig. 2).

4. Discussion

Large deficits in health functioning were observed among these two high-risk groups of smokers. As anticipated, particularly low functioning was observed in domains of emotional health among depressed smokers recruited from outpatient psychiatry clinics and in physical health among opioid-dependent smokers recruited from medical settings. In both samples, the greatest impairment in functioning was with regards to fulfillment of life roles (i.e., work and daily activities), with about a 40% discrepancy relative to US norms. Physical health problems were particularly limiting for opioid-dependent smokers, with emotional health problems particularly limiting for depressed smokers. Ninety-four percent of the opiate dependent smokers were diagnosed with heroin-related health complications. A previous study reported very poor health functioning among heroin users presenting for methadone treatment (Ryan and White, 1996). While the investigators reported longer duration of heroin use was associated with better Role-Physical scores, tobacco use and depressive symptoms were not assessed and relevant covariates were not included in analyses. In the current study, the effect size for cigarettes per day was more than double that for years of heroin use in the model for Role-Physical limitations.

Consistent with SF-36 published norms, significant demographic differences were found. Men, younger adults, and the more educated reported better health functioning. In terms of modifiable risk factors, variability in health functioning was related to the severity of depressive symptoms, smoking rate, and opiate use. Depressive symptoms were associated with decrements in both physical and emotional functioning, while tobacco and opiate use were specifically related to decrements in physical functioning. Severity of depressive symptoms and smoking in both samples were surprisingly comparable given that participants in Trial 2 were not recruited with respect to depression or smoking status. In fact, had assessments of depressive symptoms and tobacco use not been included, these treatment needs would have gone unrecognized. To optimize health outcomes in these complex groups, blended treatments that target multiple comorbid conditions are needed.

Current guidelines recommend that treatment of both mental illness and addictive disorders be coordinated and available in all systems of care (Substance Abuse and Mental Health Services Administration, 2002). Depression is associated with worse treatment outcomes among the methadone-maintained, and the need for greater attention to mental health concerns in these patients has been identified (Fernandez Miranda et al., 2001). Similarly, substance abuse or dependence is a poor prognostic indicator among the mentally ill, and integrated treatment of both disorders is recommended (Substance Abuse and Mental Health Services Administration, 2002). The traditional medical model, however, tends to treat individual risk factors, rather than all behaviors for which an individual is at risk, with lack of coordination between systems of care. Even smoking cessation services remain largely peripheral to addictions and psychiatric treatment (Currie et al., 2003). Tobacco use is often viewed as a lower priority for intervention when dealing with acute disorders such as depression and heroin dependence, yet it is associated with higher mortality (Hser et al., 1994), and in the current study was independently associated with deficits in health functioning. Recent investigations examining the potential for intervening on multiple risk factors concurrently include treatment of nicotine dependence among clinically depressed smokers (Prochaska et al., 2004b), treatment of depression among substance abusers (Nunes and Levin, 2004), and smoking cessation in addictions treatment settings (Prochaska et al., 2004a). More research investigating treatment options with comorbid populations is sorely needed.

When evaluating general health outcomes in multiple risk factor interventions, the SF-36 appears to be a potentially useful measure. The measure provides summary indicators related to a wide variety of risk factors. Attention to deficits in health functioning also may serve as a powerful motivator for abstinence from substances of abuse, including tobacco (Myers and MacPherson, 2004; Tate and Sorensen, 2001). Additionally, assessments of multiple risk factors, though they may be outside the scope of the intervention at hand, may be valuable in providing a broader understanding of the health needs of these at risk groups.

Limitations of the current study include select samples, the cross-sectional nature of the data, and the reliance on self-report measures. The measure of opiate use in the depressed smokers study was limited in that it assessed any use in the past 6 months and thus, did not allow for assess-

ment of abuse or dependence. The SF-36 assessed perceptions of health functioning, without indication of the relative perceived value of health quality, which may differ among these high risk groups relative to the general population. The perceived value of different health states may be better assessed with utility measures of health quality rather than the SF-36.

Strengths of the study include relatively large clinical samples, use of psychometrically sound measures, and use of common measures across studies allowing for cross-sample comparisons. The samples were diverse and represent under-researched patient populations. The consistency in findings between these diverse study samples strengthens the conclusion that multiple risk factor research and intervention development are needed to optimize health outcomes.

Acknowledgements

This work was supported by the National Institute on Drug Abuse (NIDA) San Francisco Treatment Research Center (Grant #P50 DA09253), NIDA Grants #R01 DA02538, #R01 DA15732, #K05 DA016752, and #T32 DA07250, and a Postdoctoral Fellowship from the Tobacco-Related Disease Research Program (#11FT-0013). The authors thank Raymond Zablotny, Jerry Pattillo, David Pating, Fumi Mitsuishi, and Christine Lin for assistance with patient recruitment; Tania Lihatsh, Jesse Cardozo, Robyn Sera, and Te Chieh Chen for help with data collection; and Kevin Delucchi and Kevin Ahern for assistance with data management.

References

Barnum, H., 1994. The economic burden of the global trade in tobacco. Tob. Control 3, 358–361.
Beck, A.T., Steer, R.A., Brown, G.K., 1996. BDI-II Manual. The Psychological Corporation, San Antonio, TX.
Centers for Disease Control and Prevention, 2003. Prevalence of current cigarette smoking among adults and changes in prevalence of current and some day smoking, United States, 1996–2001. MMWR. 52, pp. 303–307.
Currie, S.R., Nesbitt, K., Wood, C., Lawson, A., 2003. Survey of smoking cessation services in Canadian addiction programs. J. Subst. Abuse Treat. 24, 59–65.
Darke, S., Zador, D., 1996. Fatal heroin 'overdose': a review. Addiction 91, 1765–1772.
Fagerstrom, K.O., 1978. Measuring degree of physical dependence to tobacco smoking with reference to individualization of treatment. Addict. Behav. 3, 235–241.
Fernandez Miranda, J., Gonzalez Garcia-Portilla, M., Saiz Martinez, P., Gutierrez Cienfuegos, E., Bobes Garcia, J., 2001. Influence of psychiatric disorders in the effectiveness of a long-term methadone maintenance treatment. Actas Esp. Psiquiatr. 29, 228–232.
Havassy, B.E., Alvidrez, J., Owen, K.K., 2004. Comparisons of patients with comorbid psychiatric and substance use disorders: implications for treatment and service delivery. Am. J. Psychiat. 161, 139–145.
Hser, Y.I., McCarthy, W.J., Anglin, M.D., 1994. Tobacco use as a distal predictor of mortality among long-term narcotics addicts. Prev. Med. 23, 61–69.
Hughes, J.R., 1993. Possible effects of smoke-free inpatient units on psychiatric diagnosis and treatment. J. Clin. Psychiat. 54, 109–114.
Masson, C.L., Sorensen, J.L., Batki, S.L., Okin, R., Delucchi, K.L., Perlman, D.C., 2002. Medical service use and financial charges among opioid users at a public hospital. Drug Alcohol Depend. 66, 45–50.
Myers, M.G., MacPherson, L., 2004. Smoking cessation efforts among substance abusing adolescents. Drug Alcohol Depend. 73, 209–213.
National Institute on Drug Abuse, 1997. Heroin: Abuse and Addiction.. National Institutes of Health, Bethesda, MD.
Nunes, E.V., Levin, F.R., 2004. Treatment of depression in patients with alcohol or other drug dependence: a meta-analysis. JAMA 291, 1887–1896.
Prochaska, J.J., Delucchi, K., Hall, S.M., 2004a. A meta-analysis of smoking cessation interventions with individuals in substance abuse treatment or recovery. J. Consult. Clin. Psychol. 72, 1144–1156.
Prochaska, J.J., Rossi, J.S., Redding, C.A., Rosen, A.B., Tsoh, J.Y., Humfleet, G.L., Eisendrath, S.J., Meisner, M.R., Hall, S.M., 2004b. Depressed smokers and stage of change: implications for treatment interventions. Drug Alcohol Depend. 76, 143–151.
Richter, K.P., Ahluwalia, J.S., 2000. A case for addressing cigarette use in methadone and other opioid treatment programs. J. Addict. Dis. 19, 35–52.
Ryan, C.F., White, J.M., 1996. Health status at entry to methadone maintenance treatment using the SF-36 health survey questionnaire. Addiction 91, 39–45.
Spitzer, R.L., Williams, J.B., Kroenke, K., Linzer, M., deGruy III, F.V., Hahn, S.R., Brody, D., Johnson, J.G., 1994. Utility of a new procedure for diagnosing mental disorders in primary care The PRIME-MD 1000 study. JAMA 272, 1749–1756.
Stein, M.D., 1994. Injected-drug use: complications and costs in the care of hospitalized HIV-infected patients. J. Acquir. Immun. Defic. Syndr. 7, 469–473.
Substance Abuse Mental Health Services Administration, 2002. Report to Congress on the Prevention and Treatment of Co-occurring Substance Abuse Disorders and Mental Disorders. US Department of Health and Human Services, Washington, DC.
Tate, S.R., Sorensen, J.L., 2001. Life stressors and substance use outcomes among HIV positive substance abusers. Ann. Behav. Med. 23 (Suppl.), S146 (Abstract).
Ware, J.E., Snow, K.K., Kosinski, M., Gandek, B., 1997. SF-36 Health Survey Manual and Interpretation Guide. The Health Institute, New England Medical Center, Boston, MA.
World Health Organization, 2001. The World Health Report 2001—Mental Health: New Understanding New Hope. NMH Communications, Geneva.
World Health Organization, 2002. The World Health Report 2002—Reducing Risks Promoting Healthy Life. NMH Communications, Geneva.