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Trauma and Psychosocial Predictors of Substance Abuse in Women Impacted by HIV/AIDS

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Abstract

The purpose of this study was to estimate the relative contributions of trauma, chronic stress burden, depression, anxiety, social support, and social undermining in predicting alcohol and drug abuse, and whether ethnicity moderated these relationships. A multi-ethnic sample of 288 HIV-positive and HIV-negative women was recruited. Multiple group path analysis indicated that greater drug dependence was associated with being HIV+, more depression, and higher chronic burden. Trauma was related only to anxiety. Also, greater alcohol dependence was associated with more depression and more social undermining, and these effects were moderated by ethnicity. African American and Latina women evidenced different relationships between depression, social support and social undermining. Depression, social support and social undermining served as intervening variables in influencing the relationships between the other psychosocial variables and drug and alcohol dependence. The implications of these findings for alcohol and drug abuse research and services are discussed.

Introduction

HIV continues to be a significant public health issue and psychological and social factors have been implicated as contributing to both the onset and trajectory of HIV.¹ There is substantial evidence that substance use disorders (SUD) are prevalent among HIV-infected individuals, with conservative estimates from studies indicating that at least one third of all HIV-infected individuals have histories of substance abuse.^{2–7} Along with high rates of substance use, high levels of psychosocial distress have been documented among individuals diagnosed with HIV.³

Epidemiological evidence indicates that women bear a disproportionate burden of the HIV epidemic and the number of new HIV cases among ethnic minority women is expected to continue to rise.⁷ An important challenge facing the field today is the need to fully delineate the range of psychosocial factors that contribute to the relationship between trauma and substance abuse among vulnerable women in order to inform more effective and tailored prevention and treatment interventions. Known psychosocial risks for substance abuse among women with HIV include: (a) trauma exposure, particularly childhood sexual abuse (CSA), (b) psychological distress, including symptoms of depression and anxiety, (c) chronic stress and (d) social support.^{1–4} Despite high levels of these factors among ethnic women in the United States, relatively little is known about substance abuse and dependence among multi-ethnic samples of women with dual burdens of HIV and histories of trauma.^{2,4}

Trauma exposure in the context of HIV and SUD

Indisputably, trauma exposure can negatively impact an individual's health.^{8–10} Wyatt et al.² argue that trauma may be one of the most important psychosocial contributors to HIV infection risk in women. Indeed, research has confirmed that approximately one third of all women in the United States have been exposed to childhood sexual abuse (CSA), adult sexual abuse (ASA) and other forms of physical abuse, making them particularly vulnerable to adverse health outcomes, including HIV.^{9,11} In addition, there is mounting evidence that trauma exposure rates are higher for subgroups of ethnic minorities, especially African Americans and Latinas.^{12,13}

There is substantial evidence of a strong link between exposure to traumatic events and increased risk for alcohol and illicit drug use and high-risk sexual behaviors.^{5,14,15} The type of trauma experienced appears to play a role in shaping high-risk behaviors. Lang et al.⁸ found that a history of sexual assault was associated with an increase in substance abuse. In addition, a history of childhood sexual abuse has been associated with increased risk for adult sexual abuse and intimate partner violence.^{16,17} Violent re-victimization confers additional risk for developing a SUD, when abusable substances are used to ameliorate the psychological consequences of traumatic experiences.

Psychological distress

Negative affective states are common among individuals with trauma exposure and contribute to risk for substance abuse.⁵ Symptoms of depression, generalized anxiety and post-traumatic stress disorder (PTSD) are the most prevalent outcomes of trauma exposure

among women and often accompanies the behavioral disinhibition produced by substance use, which may also precipitate acts of sexual trauma and interpersonal violence (IPV).^{5,16} Similarly, alcohol use is correlated with adult sexual abuse (ASA), including rape and mood disorders.¹⁶ Depressive symptoms have been extensively studied among HIV-positive women and implicated in the trauma sequelae, SUD, and the course of illness, yet there remains a paucity of research examining symptoms of anxiety and depression among ethnic women with HIV.

Not surprisingly, women with trauma histories are at increased risk for living a life of chronic stress. Recent investigations suggest that women are more vulnerable to experiencing chronic stress when compared to men, which may contribute to higher levels of anxiety and depression.^{18,19} Social status associated with race, ethnicity, and gender also may compound life disadvantages for African American and Latina women rendering them vulnerable to limited financial, educational, job, and housing opportunities as well as racial and ethnic discrimination.^{20,21}

There is a preponderance of evidence implicating the role of chronic stress in negative behaviors.^{19,22} These stressors usually do not occur in isolation but across multiple domains of an individual's life (e.g., work, home, interpersonal) and aggregate into an overall stress burden that is directly predictive of adverse health and behavioral outcomes.²¹

Consequently, there is mounting evidence that past trauma and chronic life stress, particularly among socially disadvantaged women contributes to the disproportionate burden of disease, dysfunction, and poor health behaviors in this population.^{10,21,23} Among individuals with immune disorders, such as HIV, chronic stress has also been associated with greater disease-related morbidity and mortality. For example, Leserman et al.²² found that stressful events predict the progression to AIDS in HIV-infected individuals. However, some evidence suggests that the detrimental effects of chronic stressors may vary across individuals depending on the presence of other risk factors (e.g., substance abuse) and may be ameliorated by protective factors (e.g., social support).²¹

Another factor within the social environment related to psychological distress, and possibly substance abuse, is the quality of the interactions within the support system. Undermining social interactions with family and friends that includes excessive anger and criticism increases stress burden and may also increase risk for substance abuse. Sun²⁴ noted that interpersonal conflicts and negative emotions contributed to substance abuse relapse among women. Social conflict or negative social interactions occurring within an interpersonal context, is commonly referred to as social undermining. Social undermining has been linked with psychological distress and may be prevalent among populations from the lower socio-economic status strata.²³ Although the role of social undermining in health has yet to receive a great deal of attention, it has been linked to poor health outcomes and may be particularly salient among individuals from low socio-economic backgrounds.^{23,28} Thus, additional research is needed to explore the relevance and role of social undermining in psychological distress and substance use, particularly among individuals from lower socio-economic backgrounds and whose health has been compromised.

Psychosocial resources

Potential protective factors have been postulated to moderate or mediate the effect of risk factors such as HIV status, traumatic experiences, and drug and alcohol abuse.²¹ One of the factors that may mitigate overall outcomes of trauma exposure and HIV outcomes is social support. HIV-positive women and women who have experienced sexual and/or physical abuse trauma may be less likely to disclose such information to friends or family due to fears of rejection and shame.^{26,27} Thus, such nondisclosure and secrecy may increase feelings of alienation and disrupt social support networks.

Substance abuse has also been linked negatively to social support.²⁵ Severity of substance use has also been shown to be impacted by the availability of social support from women's networks.^{20,24} Women who have less social support and more restricted social networks are more likely to drink and have more severe alcohol and drug use. On the other hand, family and friend support has been linked to lower substance abuse and drinking rates.^{24,25}

Although the connections between substance abuse, HIV status, trauma, social support and social undermining have been established, how these factors are interrelated in predicting risk for drug and alcohol abuse are poorly understood.

The current study

Prevention and treatment programs for women at risk for or suffering from substance abuse or HIV usually do not address trauma and its sequelae, and this may limit their effectiveness.² In a quest to formulate and tailor such programs, it is essential that the role and contribution of these psychosocial factors are not ignored. Therefore, the aim of this study was to investigate the relationships between trauma exposure, HIV serostatus, ethnicity, and substance dependence among substance using women who were either at risk for or HIV-infected.

Specifically, the primary objective of this study was to estimate the relative contributions of known psychosocial risk factors (e.g., HIV serostatus, trauma exposure, chronic life stress burden, social undermining, psychological distress, and social support) in predicting alcohol and drug dependence in a multi-ethnic sample of HIV-positive and HIV-negative women. A secondary study objective was to test whether ethnicity moderated these relationships. The study was guided by a conceptual model (Fig. 1) that hypothesized: (1) that HIV serostatus will be directly associated with history of trauma, perceived chronic life stress burden, social undermining, social support, and psychological distress, as well as with alcohol and drug dependence; (2) that social support will mediate the relationships between chronic stress and psychological distress to predict higher rates of alcohol and drug dependence; and (3) that ethnicity will moderate these direct relationships such that African American and Caucasian women will report higher rates of substance abuse than Latinas. The latter was tested in multiple models (see Fig. 2).

Methods

Sample

Women were recruited for the Women & Family (WFP) study from a variety of community-based organizations and agencies in the greater Los Angeles County. HIV-positive participants were recruited from community clinics and hospitals, AIDS-service organizations, community service agencies, and drug rehabilitation centers. HIV-negative women were recruited through the UCLA Institute for Social Science Research, which used stratified probability sampling and random digit dialing to identify an ethnically and residentially matched sample of women. The study was approved by the UCLA and Charles R. Drew University IRBs and human subject consent was obtained from all participants in either English or Spanish.

Inclusion criteria for potential participants, both HIV seropositive and seronegative included: being female, 18 years of age or older, and self-identified as African American, Latina, or European American (See Wyatt et. al.,⁹ for a detailed description of the sample). For the purposes of this study, and because the focus of the study was on identifying predictors of substance dependence, only baseline data from a sub-sample of 288 African American ($n=122$), European American ($n=119$) and Latina ($n=47$) women who reported that they drank alcohol and/or had taken street drugs were included. Of these, 203 were HIV-positive and 85 were HIV-negative.

Women were assessed with a comprehensive, semi-structured interview conducted by trained female interviewers who were matched on ethnicity and language.

Measures

Demographic characteristics included ethnicity, HIV serostatus, age, total monthly household income, education, and marital status. Ethnicity was determined by self-identification as African American, Latina, or European American. Education was assessed as number of years of education completed. The majority of the women (58.7%) had less than a high school education, with the African American (73%) and European American (82.4%) women more likely to have at least a high school education than the Latinas (53.2%). Relationship status was assessed as whether women were married or living with a partner or living alone. Approximately one third were not married or living with a partner (34.6%), with the Latinas (31.9%) more likely to be married or living with a partner than the African American (13.1%) and European American women (19.3%).

HIV status was determined by enzyme linked immunoabsorbent assay (ELISA) and confirmed by Western Blot.

Predictors—Chronic stress burden was assessed using the 21-item Chronic Stress Burden scale.²¹ The measure asks respondents to rate on a four-point scale ranging from 0 (*Not a problem for me in the past 6 months*) to 4 (*A major problem for me in the past 6 months*) whether they have experienced common stressors in the past six months (Cronbach's $\alpha=0.75$).

Trauma history was created as a composite score using participant's history of CSA, ASA, and physical conflict or violence. Child sexual abuse was determined by asking nine "yes or no" screening items related to sexual experiences with an adult or someone older than them before the age of 18 years, including fondling, frottage, attempted intercourse, intercourse, oral copulation, digital or object penetration. If a women responded "yes" to any of the items, they were asked more detailed information regarding the experience that included the type of physical contact, age of the participant at the time of abuse, duration, relationship of the perpetrator to the participant, and whether this had happened with someone else before the age of 18.²⁹ Adult sexual abuse was assessed with two items that asked about experiences of attempted or actual rape since the age of 18. Responses were coded as yes=1, no=2.

Current or previous incidents of relationship violence were assessed using four items from the Conflicts Tactics Scale.³⁰ Each respondent was asked whether in the last 6 months, her partner threw, smashed, hit, or kicked something; slapped or physically attacked or hurt her; or threatened her with or used a knife or gun. If any of these behaviors occurred, respondents were asked if the events occurred during pregnancy and summed into a total score.

The Social Undermining Scale was used to assess stresses caused by members of the social network using a three-item measure that asked respondents to rate, on a five-point Likert-type scale, each of the four nominees in the network on the degree to which they "act angry," "criticize," or "make life difficult for them."²⁸ A reliable total social undermining score was calculated and used in the analyses (Cronbach's alpha=0.80).

Psychological Distress was assessed with two measures of depression and anxiety. Depression was assessed with the 20-item Center for Epidemiological Studies-Depression Scale (CES-D),³¹ which asks participants to rate the occurrence of various symptoms on a four-point scale ranging from rarely (0) to most of the time (3), and responses are summed to yield a reliable total depression symptoms score (Cronbach's alpha=0.93). Anxiety was assessed using the 15-item Symptom Checklist 90-Anxiety subscale (SCL-90-Ax),³² which asks participants to rate their symptoms of anxiety using a five-point Likert-type scale that ranged from 0 (*not at all*) to 4 (*extremely*), and responses are summed to yield a reliable total anxiety symptoms score (Cronbach's alpha=0.95).

Social support was conceptualized as serving as either a moderator or mediator in the model and was assessed with a short version of the Social Support Questionnaire.³³ The SSQ asks respondents to rate the four most important members of the participant's social network on a five-point Likert-type scale (1=*not at all* to 5=*a great deal*). The measure assessed the degree to which each person in their network provided advice and emotional, affectional, and instrumental support, as well as the degree to which they were satisfied with the overall support received. A reliable sum social support score was calculated (Cronbach's alpha=0.86).

Primary Outcome Measures—Both Alcohol abuse/dependence and Drug abuse/dependence were assessed with the respective modules of the University of Michigan

Revised Composite Diagnostic Interview Schedule (UM-CIDI), which assessed problematic substance abuse during the past 6 months and yields DSM-III-R diagnoses.³⁴ Alcohol dependence was the measured variable created as the mean of questions that assess problem drinking (e.g. being at work or school under the influence of alcohol, being under the influence in situations where injury was possible, experiencing emotional problems from using alcohol, etc.; Cronbach's $\alpha=0.82$). Drug abuse/dependence was created as the mean of questions that assess problematic use of recreational drugs (e.g., experiencing emotional problems from using drugs, spent a great deal of time using drugs, use more drugs than usual to get the same effect; Cronbach's $\alpha=.73$).

Results

A multiple group path analysis modeling strategy was employed using EQS 6.1 to examine the role of ethnicity as moderator of the relationship between drug and alcohol dependence and a set of psychosocial predictors. After assumption evaluation and estimation of missing data, a single group model was estimated in each of the three ethnic/racial groups (African American, European American, and Latina). After establishing good-fitting single group models, a multiple group model was estimated in which the parameter estimates in all three groups were allowed to freely vary across groups. This model served as a baseline model to which other, more restricted, nested models were compared. Subsequent models were estimated that constrained the regression coefficients to equality across the three groups. So, instead of estimating separate regression coefficients within each group, common regression coefficients were estimated for all three groups. Regression coefficients that significantly differed across groups provided evidence that ethnicity was a moderating variable. This approach provides a rich test of moderation (Tables 1 and 2).³⁵

Assumptions and Missing data—There were a total of 288 women in this study, and of those, 117 (41%) had complete data for all variables (50% of the African American, 29% of the European American, and 27% of the Latina women had complete data). The data were screened for patterns of missingness and, due to the large amount of missing data (41%), maximum likelihood (ML) estimation and the EM algorithm were employed to impute data based on the assumption that data were missing at random (MAR).^{35,36} The models were also estimated using complete cases only and test statistics, fit indices, and parameter estimates results from the datasets based on the two approaches to the missing data were compared. The pattern of results was very similar for both the complete case method and the imputed data method. Therefore, following Schafer & Graham, we have chosen to report the results from the models estimated from datasets that imputed missing data.³⁷

Although there were no univariate or multivariate outliers, the data for the African American and European American groups were significantly non-normal, Mardia normalized estimate for African American sample, $z=6.03$, $p<0.001$, for European American sample, $z=6.03$, $p<0.001$, and for Latina sample, $z=2.39$, $p>0.001$. Therefore, the models were estimated with the ML estimation and evaluated with the Satorra–Bentler scaled chi-square.³⁸ Given the small single group sample sizes, the models were also evaluated with the Yuan–Bentler Residual-Based F statistic. In Monte Carlo studies this test statistic has performed well in

small samples.³⁹ Goodness of fit was evaluated using the Comparative Fit Index (CFI).⁴⁰ The CFI is a measure of fit along a range of models where 0 represents a model in which there are no relationships between variables and 1 represents perfect-fitting models. A good-fitting model is indicated with a CFI of equal to or greater than 0.95.⁴¹ The standard errors of the path coefficients were also adjusted for the non-normality.⁴²

Single Group Models—The hypothesized model was estimated in each group. And, in each group there was evidence of good fit; African American sample, Satorra–Bentler scaled $\chi^2(N=122, 2)=4.39, p<.05, CFI=0.99$; European American sample, Satorra–Bentler scaled $\chi^2(N=119, 2)=5.53, p<.05, CFI=0.98$; Latina sample, Satorra–Bentler scaled $\chi^2(N=47, 2)=1.51, p>.05, CFI=0.99$. All Yuan–Bentler Residual-Based F statistics yielded non-significant ($p>.05$) values indicating good-fitting models. Interpretation of the models will be presented in the multiple group model section.

Multiple Group Models—The baseline model that allowed all parameters to be freely estimated fit the data well, Satorra–Bentler scaled $\chi^2(N=288, 6)=10.62, p>.05, CFI=.99$. Next, a nested model that constrained all of the regression coefficients to be the same across groups was estimated. This model also fit the data well, Satorra–Bentler scaled $\chi^2(N=288, 68)=86.72, p>.05, CFI=0.96$ and was not significantly different from the baseline model, Satorra–Bentler scaled χ^2 difference ($N=288, 62$)= 76.15, $p>.05$.⁴³ In addition to this overall test of ethnicity as a moderator of the relationships in the model, the univariate Lagrange multiplier tests were examined using a conservative probability ($p<.005$) to control for Type I error.

The path coefficient predicting alcohol dependence from social support was significantly different across the three groups, $\chi^2(N=288, 2)=9.55, p<.05$. Releasing these parameter constraints significantly improved the fit of the model, Satorra–Bentler scaled χ^2 difference ($N=288, 2$)=11.83, $p<.05$. This indicates that ethnicity moderates one predictive relationship in these models. Finally, non-significant paths were dropped from the model in an effort to present a parsimonious model. Deletion of these paths did not significantly degrade the model, Satorra–Bentler scaled χ^2 difference ($N=288, 10$)=10.31, $p>.05$. The final model with the significant unstandardized coefficients is shown in Fig. 2. With the exception of the path predicting alcohol dependence from social support, indicated in bold, all of the coefficients were constrained to equality so the coefficients are the same in all three groups. The path coefficients for each group are indicated for the regression path between alcohol dependence and social support.

Predictors of drug dependence

Direct predictors of drug dependence—Greater drug dependence was associated with being HIV+, less depression, and higher perceived chronic burden.

Indirect predictors of drug dependence—For ease of interpretation a sub-model is depicted in Fig. 3 with only coefficients for the indirect effects presented. Depression and chronic burden also served as intervening variables between HIV status and drug dependence. Being HIV-positive predicted greater perceived burden, and this predicted

greater depression and more drug dependence (unstandardized coefficient=0.16, $z=3.13$, $p<0.05$). In addition to the primary indirect relationships between HIV status and drug dependence, depression served as an intervening variable between chronic burden and social undermining and drug dependence. Greater burden and more social undermining predicted more depression and more drug dependence (unstandardized coefficient for chronic burden=0.15, $z=2.35$, $p<0.05$, unstandardized coefficient for social undermining=0.05, $z=1.98$, $p<0.05$).

Variance accounted for in drug dependence—Close to 20% (19.7%) of the variance in drug dependence was explained by these predictors in the African American sample, 21.3% in the European American sample and 15.2% in the Latina sample.

Predictors of alcohol dependence

Direct predictors of alcohol dependence—Greater alcohol dependence was associated with more depression and more social undermining. In the African American and European American groups greater social support predicted greater alcohol dependence (unstandardized coefficient for the African American group=0.77, $z=4.26$, $p<0.05$, for the European American group=0.15, $z=1.95$, $p=0.052$). However, in the Latina sample less social support predicted greater alcohol dependence (unstandardized coefficient for the Latina group=-0.69, $z=-2.17$, $p<0.05$).

Indirect predictors of alcohol dependence—For ease of interpretation a sub-model is depicted in Fig. 4 with only coefficients for the indirect effects presented. In all three groups, depression served as an intervening variable between chronic burden and alcohol dependence. Greater chronic burden predicted greater depression, and greater depression predicted greater alcohol dependence (unstandardized coefficient=0.27, $z=3.54$, $p<0.05$). In both the African American and Latina groups, social support served as an intervening variable, but in different directions. For the African American sample, less social undermining led to more social support and more alcohol dependence (unstandardized coefficient for social undermining=-0.21, $z=-2.13$, $p<0.05$). In the Latina sample, however, more social undermining led to less social support and more alcohol dependence (unstandardized coefficient for social undermining=0.35, $z=2.45$, $p<0.05$).

Social undermining and social support served as intervening variables between HIV status and alcohol dependence in the African American group only. HIV+ status predicted less social undermining, less social undermining predicted more social support and greater social support predicted greater alcohol dependence (unstandardized coefficient=0.15, $z=1.95$, $p=0.052$).

Variance accounted for in alcohol dependence—Close to 11% (i.e. 10.6%) of the variance in drug dependence was explained by these predictors in the African American and European sample, while 22.3% of the variance in alcohol dependence was explained by these predictors in the Latina sample.

Predictors of Depression and Anxiety—Higher perceived chronic burden, HIV+ status, and more social undermining directly predicted greater depression. Greater anxiety was predicted by greater perceived burden and social undermining, history of trauma, and HIV+ status. Additionally, depression and anxiety were predicted by HIV status indirectly through chronic burden, trauma history, and social undermining. Being HIV+ predicted greater perceived burden, greater trauma, more social undermining, which in turn was associated with greater depression and greater anxiety (unstandardized coefficient for indirect effect of depression=0.12, $z=2.70$, $p<0.05$; unstandardized coefficient for indirect effect of anxiety=0.14, $z=2.72$, $p<0.05$). It should be noted that depression and anxiety symptoms were highly correlated in these analyses ($r(288)=0.61$, sharing 37% common variance). So this overlapping variance may have served to obscure unique relationships between depression and anxiety and other variables in the models.

Predictors of social support, chronic burden, trauma, and social undermining—Greater social undermining directly predicted less social support. HIV+ status predicted increased chronic burden, increased trauma, and more social undermining.

Discussion

The purpose of this study was to estimate the relative contributions of exposure to trauma, chronic life stress burden, depression, anxiety, social support, and social undermining in predicting alcohol and drug dependence, and to determine whether these relationships were moderated by ethnicity. Both individual and multiple group path analyses were tested, and the models fit the data well. As hypothesized, being HIV-positive, carrying a higher burden of chronic stress, and more depression predicted drug dependence. This is consistent with previous evidence, and there are hypothesized biological processes that account for these relationships (See Brady and Sinha⁴⁴ for a review of this evidence).

Predictors of drug dependence

The strong and consistent role that depression appears to play as an intervening variable between chronic stress burden, social undermining and HIV serostatus and greater drug dependence is also worth noting. These findings suggest that the detrimental effects of chronic, social status stresses and interpersonal stresses and HIV-seropositivity on drug dependence are mediated through elevated depression in this sample of primarily low SES women from diverse ethnic backgrounds. It is important to note that the measure of depression used was a measure of symptoms, not a measure of clinical depression. Therefore, even moderate levels of depression may be sufficient to increase risk for problematic drug use in women dually burdened by high chronic stress and HIV. Further, these effects were not different across ethnic groups, which suggest that this relationship is likely attributable mainly to low SES. These findings also appear to support the Sandanger et al.¹⁸ hypothesis that women's mental health may be more susceptible to stress in their proximal environment, especially in socioeconomically challenged women. Further, those women who respond to their psychological distress by developing a drug-using habit are increasing their risk for drug abuse and dependency substantially.

Relationships between HIV serostatus, drug dependence, trauma, and stress

Our findings also suggest a possible reciprocal relationship between HIV-seropositivity and problematic drug use. While many studies have indicated that substance abuse enhances risk for HIV infection, our results also indicate that being HIV-positive is associated directly with increased risk of drug dependence.⁹ These findings are consistent with findings on substance abuse among Latinas reported by Newcomb and Carmona,⁴⁵ especially in the context of trauma.

Our data also provide additional support for the independent and direct impact HIV-seropositivity has on trauma exposure, chronic stress burden, and undermining from the women's social network, all of which, in turn, increases risk for psychological distress and drug abuse.

Also noteworthy is that, contrary to expectations, trauma history did not have a direct or even indirect association with drug dependency, but only predicted greater anxiety symptoms. This finding runs counter to the large body of evidence linking trauma history, especially child sexual abuse, as a risk factor for drug abuse.^{2,15,45} It is likely that while experiences of trauma may enhance risk for drug use and abuse, other factors not assessed in this study (e.g., time since meeting criteria of drug abuse, type and amount of drug use, number of drug abusers in the women's social networks, etc.) likely mediate the contribution trauma exposure makes to risk for meeting criteria for drug dependence. Future studies will be needed to test this hypothesis, as well as to identify potential protective factors that reduce risk of drug dependence, even among abused women who become regular drug users.

Also worth mentioning is that contrary to expectations, there were no ethnic differences in the models for drug dependence, although there were ethnic differences in the amount of the variance explained in each ethnic group by the predictors in the nested model. These variables were more effective predictors of drug dependence in the sub-sample of European American and African American women and less so for the Latinas. It is quite possible that these differences may be attributable, at least in part, to the significantly lower frequency of drug abuse among Latinas, especially among those who are low acculturated. These pattern of ethnic differences need to be confirmed and explored in greater detail in subsequent studies with larger and more socio-economically diverse samples.

Predictors of alcohol dependence

Results of the model predicting alcohol dependence abuse was less complex, and indicated that alcoholism was best predicted by depression and high levels of social undermining, which is consistent with findings of alcohol-specific support in families and friend social networks.²⁵ It is especially interesting to note that there were clear ethnic differences in the relationship between social support and risk for alcohol dependence. For the African American women, greater social support was associated with greater risk for alcohol dependence, while the opposite was true for Latinas. There are several explanations possible for these results. For the African American women, it is possible that they received more support from persons in their drinking networks rather than from non-drinking relatives and friends. Alternatively, they received more support to help them achieve sobriety. In the case

of the Latinas, these data appear to confirm the hypothesized protective effect that family and social networks have in moderating risk for alcohol abuse among Latina women, especially among those that are less acculturated.^{46,47} In any event, these results will need to be replicated and these explanatory hypotheses explored in future studies.

As in the case with drug dependence, depression also served as an intervening variable between chronic burden and alcohol dependence, with greater burden of stress associated with more depression, and this in turn, associated with greater risk of alcohol dependence.

Summary

Taken together, these results underscore the important role of being HIV-positive in conferring additional risk for drug dependence, and the important contributions of chronic stress, social network stress and depression as mediators of risk for both drug and alcohol dependence. However, and contrary to expectations, the contribution of trauma exposure was unrelated to these outcomes when considered in the same models with more proximal psychosocial variables. Also, ethnicity appeared to be an important moderator, but only for alcohol dependence, and exerted its effects as a moderator of the relationship between social support and risk for alcohol dependence. These findings require further testing with larger and more socio-economically diverse samples to determine whether these results apply only to lower SES women or whether they are generalizable more globally to women at risk for substance abuse and dependence.

Implications for Addiction Health Services

These results have a number of implications for research and services for substance abuse and dependence in socio-economically marginal, trauma exposed, HIV-infected women. Of particular importance is the salient role that depression and chronic life stress burden appear to play in conferring risk of problematic drug and alcohol use. Greater attention needs to be given to targeting these two mediators in treatment programs for substance abusing women, especially women of color. Specifically, substance abuse prevention and treatment interventions for women are needed that include state of the art treatments for depression, skill-based stress-reduction and coping-enhancement strategies, as well as strengthening non-substance abusing social networks, especially for African American women. Finally, and although trauma exposure was not a significant independent contributor to risk of either drug or alcohol dependence in this study, the large body of previous evidence linking trauma to adverse mental health and health outcomes, including risky behaviors, argue for giving more attention to addressing this risk factor in substance abuse treatment.

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Figure 1.
Hypothesized conceptual model

Figure 2.

Final model with unstandardized coefficients paths included. Note residuals were estimated, but for ease of interpretation are not included in the model. Note: $*=p<.05$; *Bold path* is different in three groups. AA African American, EA European American, and LA Latina American. Residuals were estimated, but for clarity are not shown in the diagram

Figure 3.

Sub-model diagram depicting only indirect predictors of drug dependence with unstandardized indirect paths included. Note:
 $*=p<.05$; residuals were estimated, but for ease of interpretation are not included in the model

Figure 4.

Sub-model diagram depicting only indirect predictors of alcohol dependence with unstandardized indirect paths included. Note:

$*=p<.05$; residuals were estimated, but for ease of interpretation are not included in the model

Table 1
Mean (SD) psychosocial predictors and substance use/abuse by ethnicity and HIV serostatus

	African Americans		European Americans		Latina Americans	
	HIV+	HIV-	HIV+	HIV-	HIV+	HIV-
Alcohol abuse/dependence	1.815 (0.299)	1.927 (0.307)	2.003 (0.3998)	1.921 (0.224)	1.986 (0.386)	1.942 (0.416)
Drug abuse/dependence	1.602 (0.401)	1.907 (0.223)	1.714 (0.393)	1.81 (0.378)	1.710 (0.367)	1.833 (0.252)
Depression	1.044 (0.633)	0.523 (0.396)	0.934 (0.534)	0.651 (0.578)	0.883 (0.744)	0.746 (0.473)
Anxiety	0.730 (0.796)	0.317 (0.518)	0.746 (0.590)	0.352 (0.395)	0.671 (0.767)	0.619 (0.657)
Social support	4.262 (0.561)	4.183 (0.518)	4.035 (0.587)	4.100 (0.426)	4.009 (0.678)	4.214 (0.464)
Social undermining	1.506 (0.584)	1.685 (0.430)	1.729 (0.590)	1.744 (0.547)	1.606 (0.498)	1.816 (0.508)
Chronic burden	1.79 (0.39)	1.58 (0.39)	1.77 (0.43)	1.48 (0.38)	1.64 (0.44)	1.51 (0.23)

Note: the distribution is of the women in each group who reported using any alcohol and/or drugs.

Table 2

Frequency distribution of HIV serostatus by ethnicity

	African Americans	European Americans	Latina Americans
HIV+	90 (74%)	80 (67%)	33 (70%)
HIV–	32 (26%)	39 (33%)	14 (30%)
Total	122	119	47

Note: the distribution is of the women in each group who reported using any alcohol and/or drugs.