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The Role of Chronic Pain and Current Substance Use In Predicting Negative Social Support Among Disadvantaged Persons Living with HIV/AIDS

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Abstract

Chronic pain and substance use can strain the supportive relationships of persons with serious chronic illness, which may increase the likelihood of receiving negative, rather than positive, social support from informal caregivers and social network members. To our knowledge, this is the first study to longitudinally examine the effects of chronic pain and substance use on negative social support. The sample ($N=383$) comprised disadvantaged, primarily African-American, persons living with HIV/AIDS (PLHIV) with a history of injection drug use, 32.4% of whom reported frequent or constant pain in the prior 6 months. Using factor analysis and structural equation modeling, current substance use and greater levels of chronic pain positively predicted negative social support 12 months later, after controlling for baseline negative support, viral load, age and sex. We also found a significant interaction effect such that among those not using substances, there was a significant positive association between pain and negative support, but no such association among those currently using substances. The findings emphasize the importance of treatment of chronic pain and substance use in the supportive functioning of social networks of a disadvantaged population with serious chronic conditions and persistent health disparities.

Keywords

chronic pain; substance/drug use; Black/African-American; HIV/AIDS; negative social support

INTRODUCTION

People living with HIV (PLHIV) have a high burden of chronic pain, which impedes social and physical functioning and adversely affects psychological well-being and health-related

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quality of life. An estimated 30% to 60% of PLHIV in medical care in the United States have chronic pain, which, among PLHIV, is associated with chronic conditions such as substance use disorders, to which they are at high risk, as well as neuropathies caused by HIV and by certain classes of medications used to treat HIV (Dorfman et al., 2013; Ellis et al., 2010; Miaskowski et al., 2011; Phillips, Cherry, Cox, Marshall, & Rice, 2010). Indeed, peripheral neuropathy alone affects a significant proportion of PLHIV and all persons by late stage HIV; and tends to be chronic, resistant to common treatments, and is the major cause of disability among PLHIV (Hanass-Hancock, Regondi, van Egeraat, & Nixon, 2013; Phillips et al., 2010; Simpson et al., 2010; Uebelacker et al., 2015; Wulff, Wang, & Simpson, 2000). No commonly available analgesics have shown efficacy over placebo in reducing neuropathic pain in PLHIV (Phillips et al., 2010; Simpson et al., 2010). High rates of adverse effects of analgesics, especially in persons with liver disease (a leading cause of death in PLHIV), and of invasive treatments for chronic pain, limit their long-term or routine use in clinical practice (Turk, Audette, Levy, Mackey, & Stanos, 2010). For persons with a history of illicit drug use, who comprise a majority of PLHIV in the US, clinician concerns about the potential for analgesic abuse further restrict PLHIVs' access to analgesics and adequate pain management (Nadol et al., 2015; Pence, Miller, Whetten, Eron, & Gaynes., 2006; Selph, 2014).

Substance use can complicate PLHIVs' HIV treatment and is associated with worse adherence to treatment and disparities in HIV health outcomes (Uthman, Magidson, Safren, & Nachega, 2014). Substance use can also engender strains and conflict in interpersonal relationships and jeopardize the quality and supportive functioning of social networks. Indeed, current drug use, along with concurrent negative affect and pain have been found to adversely affect disadvantaged PLHIVs' HIV treatment outcomes by interfering with the supportive functioning of their social ties (Chander, Himelhoch, & Moore, 2006; DeLorenze, Satre, Quesenberry Jr, Tsai, & Weisner, 2010; Pence, 2009). This is particularly problematic for disadvantaged PLHIV, who are highly reliant on their social ties for assistance with basic resources as well as health-related support (Knowlton, Hua, & Latkin, 2004; Knowlton et al., 2015; Knowlton et al., 2006).

While persons in need typically report positive interactions and gratitude to their family and friends for their support and care, some report negative interactions with support network members including caregivers (Rook, Luong, Sorkin, Newsom, & Krause, 2012). Supportive relationships may be strained by perceived negative social support, defined as support that is negatively interpreted or unsupportive behaviors from social network members (Newsom, Nishishiba, Morgan, & Rook, 2003; K. S. Rook & Pietromonaco, 1987). Examples of negative support include network members expressing criticism or anger, neglecting or failing to provide support when needed, or providing unwanted advice (Newsom et al., 2003). Negative support is largely overlooked in the social support literature, yet has been found to have a greater impact than positive support on psychological and physical health outcomes (Kiecolt-Glaser, Glaser, Cacioppo, & Malarkey, 1998; Liebschutz et al., 2010; Lincoln, 2000; Newsom et al., 2003)

Previous research indicates an association between pain and negative social support (Mavandadi, Sorkin, Rook, & Newsom, 2007). While in many cases having a chronic illness

is linked with increased emotional and instrumental support, a condition such as chronic pain, which impedes physical health, may strain these otherwise supportive relationships (Mavandadi et al., 2007). Relationship strains among populations in need of support and informal care (unpaid emotional support and instrumental assistance) may be due to mental and physical dysfunction affected by pain and by the consequent increased demands for support and care placed on their social network members and caregivers (Mavandadi et al., 2007; Litwin, 2011; Kool, Van Middendorp, Lumley, Bijlsma & Geenen, 2013).

Studies also suggest that negative social interactions and other persisting stressors can render people vulnerable to or exacerbate chronic pain (Vachon-Preseu et al., 2013). Due to this possible bidirectional association between chronic pain and negative support, it is important to examine the association longitudinally. In understanding the role of chronic pain and substance use on negative support, it is also important to account for the potential confounding effect of health status, as it may partially explain the effects of pain on negative support by placing on others greater demands or expectations of support and care (Merlin et al., 2013; Pratchukal & Grant, 2003; Turner & Catania, 1997).

In the present study we hypothesized that among disadvantaged, African American PLHIV at greatest risk of HIV-related chronic pain, both pain and substance use at baseline would predict negative social support at 12-months follow-up. To our knowledge, this is the first study to date to examine relationships among chronic pain, substance use, and negative support in a longitudinal model. The study findings will add to a more nuanced understanding of associations between chronic pain and social environmental factors in the context of substance use. The results have implications for new, interpersonal approaches to promoting HIV health outcomes and health-related quality of life in the study population.

METHOD

Procedure

Data were from the baseline and 12-months follow-up data of the BEACON (Being Active and Connected) study (2008-2012), with the purpose of examining social environmental factors associated with health outcomes and well-being among disadvantaged PLHIV and their informal caregivers. PLHIV were recruited from clinic and community venues. Selection criteria included: HIV seropositive adult on antiretroviral treatment (ART); Baltimore City resident; having a history of injection drug use; and willing to invite a main supportive person or caregiver to participate in the study. All care recipients completed informed consent and were given \$35 for survey participation. Survey items were administered both by Computer-Assisted Personal Interview (CAPI) and Audio Computer-Assisted Self-Interview (ACASI). The BEACON study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Measures

Negative Social Support—Negative social support, the outcome in the study, is defined as interpersonal stressors, such as others' failures to provide needed help and providing unwanted advice (Lincoln, 2000; Newsom et al., 2003). Negative social support at baseline

and 12-months follow-up was measured by eight items from the negative social exchange measure developed by Newsom and colleagues (2003). Items were coded from 1 = “Rarely or none” to 3 = “Most or all.” Items tapped facets of negative support such as intruding on one’s affairs, acting insensitively, and failing to provide needed help (Newsom, Rook, Nishishiba, Sorkin, & Mahan, 2005) The present study adds a fourth domain of negative exchanges, rejection or neglect by others (Newsom et al., 2005) Survey items began with the stem, “In the past 30 days, how often did someone you know...” and ended with phrases such as, “let you down when you needed help?” and “interfere or meddle in your personal matters?” (Table 2).

Pain and Substance Use—Pain, which was one independent variable in the study, was defined as frequent to persistent chronic pain and measured by the item, “How often have you been bothered by pain in the past six months?” with response options never, sometimes, often and always. Based on the distribution of responses and their substantive meaning, we dichotomized the survey item into 0 = “never or sometimes” versus 1 = “often or always” (Knowlton, Nguyen, Robinson, Harrell, & Mitchell, 2015a). Substance use, which was the other independent variable, was coded as 0 = no substance use in past 6 months versus 1 = self-reported use of opioids, heroin, cocaine, stimulants, barbiturates, or hallucinogens in the past six months, or daily alcohol use (at least one alcoholic drink per day for 30 days) or binge use of alcohol (5 or more drinks in a single day at least once per week in the past 30 days). Serum viral load was measured by the Roche Cobas Amplicor and dichotomized as 1 = undetectable (<50 copies per mL) versus 0 = detectable (≥ 50 copies per mL) (Arribas et al., 2005)

Data Analyses—Analyses were conducted using Mplus version 7.1 (Muthén & Muthén, 1998-2012). Two separate exploratory factor analyses (EFAs) were conducted with eight items representing negative social support from the baseline and 12-month measures. Subsequently, the 12-month negative support factor was entered into a structural equation model (SEM) as the outcome with pain and substance use as predictors, and sex, age, viral load, and baseline negative social support as control variables. A second SEM was run with the interaction between pain and substance use. Subsequently, the sample was split and separate SEMs were run to compare the relationship between pain and negative social exchange for current substance users versus non-substance users. In addition, a plot was generated to illustrate the interaction.

RESULTS

Table 1 reports demographic characteristics of the sample ($N=383$). Participants were predominantly male (61.4%), with a monthly income of less than \$1000 (79.9%). Less than 20 percent of the sample had more than a high-school diploma or GED, and mean age was 48 years (standard deviation = 6 years). Nearly two-thirds of participants (63.3%) reported active substance use (58.1% illicit drug use) in the past 6 months, and nearly one-third (32.4%) reported chronic pain (being bothered by pain often or always in the last 6 months).

The EFA for the baseline negative social support factor indicated one factor that achieved good fit (Comparative Fit Index [CFI] = .98, Root Mean Square Error of Approximation

[RMSEA] = .05, RMSEA 90% Confidence Interval [CI] = .03, .08, Tucker-Lewis Index [TLI] = .98; Hu & Bentler, 1999). The EFA for the 12-month negative social support factor also achieved good fit. Loadings ranged from .49 to .77 in the baseline model and from .58 to .78 in the 12-month model (Table 2).

After controlling for baseline negative social support, age, sex, and viral load, we found in a structural equation model that having pain often or always ($\beta = .15, p < .05$) and currently using substances ($\beta = .14, p < .05$) were independently predictive of having greater negative social support at the 12-month follow-up (Figure 1). This model achieved good fit (CFI = .97, RMSEA=.03, RMSEA 95% CI = .02, .04, TLI = .97; Hu & Bentler, 1999).

A second SEM, which indicated that the interaction between pain and substance use predicted negative social support at 12-months was significant ($\beta = -.29, p < .05$) and achieved good fit (CFI = .99; RMSEA = .03, RMSEA 95% CI = .01, .04, TLI = .98; Hu & Bentler, 1999). Upon splitting the sample by substance use and retaining the covariates in the model, we found that having chronic pain predicted increased negative social support for persons not currently using substances ($\beta = .34, p < .05$), but the association was not significant among current substance users. Subsequently, we plotted the interaction, which showed these relationships graphically (Figure 2).

DISCUSSION

We found that chronic pain at baseline had a significant direct, positive effect on negative social support at follow-up, even after adjusting for substance use and the other covariates including sex, age, viral load, and baseline negative social support. By examining the influences of pain and substance use on negative social support, our study fills a gap in the literature on the social impact of pain among highly vulnerable, former or current drug using PLHIV. Our findings build upon previous research with this population that has emphasized the associations between chronic pain and self-medicating behaviors (Knowlton et al., 2015a) and between substance use and interpersonal conflict (Feinberg, Solmeyer, & McHale, 2012). The results suggest the important impact of chronic pain on vulnerable PLHIVs' social support systems.

Chronic pain is well established as adversely affecting social interactions and social network members' own symptoms of depression and anxiety (De Souza & Frank, 2011). Our findings suggest that chronic pain among PLHIV may contribute to their negative interactions and those of their caregivers. This may lead to interpersonal conflict, which may threaten PLHIVs' health benefits of positive supportive interactions, and adversely affect the mental health of caregivers and recipients alike.

Negative support may also jeopardize drug-using PLHIVs' access to needed support and the viability of their supportive relationships. Given evidence of the importance of support networks and caregiving relationships on this population's use of antiretroviral therapy (ART) and virologic outcomes of ART (Mitchell, Robinson, Nguyen, & Knowlton, 2015), the findings suggest the potential implications of chronic pain for their HIV care and treatment outcomes and quality of life.

However, while provision of social support could improve PLHIVs' quality of life, we found that pain predicted more negative social support, which would likely make their quality of life worse. Our finding emphasizes the importance of improved management of chronic pain in this population, which has high levels of chronic pain and major barriers to pain management resources. For example, clinician concerns about common analgesics' toxicities, potential interactions with other medications, and potential for abuse with long-term use restrict former or current drug using PLHIVs' access to pharmacologic pain treatments (Liebschutz et al., 2010; Merrill, Rhodes, Deyo, Marlatt, & Bradley, 2002)

It is important to note that subjective appraisals of social interactions are considered to be more important for mental and physical health outcomes than actual levels of support or conflict (Barrera Jr, 1986; Doeglas et al., 1996; Vaux & Wood, 1987). Negative interactions with supportive ties, as compared to ties not relied on for support, affect more negative perceptions, which is likely due to violations of expectations of support (Okun & Keith, 1998; Rook, 1990). Thus, both unsupportive actions of the caregiver and subjective perceptions of these interactions may have greater negative impact than similar actions of non-caregiving network members.

We also found that current substance use predicted greater negative support at follow-up. This finding suggests that rather than drug use restricting the availability of support, drug use reduces the quality of social support received (Knowlton et al., 2011; Newcomb & Locke, 2005). Substance use may affect interpersonal conflict in supportive relationships, exacerbating strains from resource limitations and ambient stress that this population of disadvantaged PLHIV and their social network members already encounter.

Rook (2014) has posited that negative exchanges have the greatest impact on well-being among people who are experiencing a high level of stress. It is possible that pain and substance use independently predicted negative social support in the current study due their status as major stressors (Hannibal & Bishop, 2014; Newsom et al., 2003).

Lastly, our results indicated that pain predicted an increase in negative social support among non-substance users, but not among current substance users. It is likely that current substance use has such deleterious effects on social support that the additional stressor of chronic pain affects no further potential for negative social support (Chou, Liang, & Sareen, 2011; Stevens, Jason, Ram, & Light, 2014). In contrast, among non-substance users, the potential for chronic pain to increase negative social support is greater.

Limitations

Although temporal order is established with longitudinal data, it is possible that substance use and chronic pain did not cause negative social support because not all potential confounders were included in the model. In addition, pain was measured with a four response category single item that was subsequently dichotomized, likely reducing variability in the measure. Also, the negative support factor, based from the negative social exchange scale (Newsom et al., 2003), did not include all of the items in the established scale because three items did not achieve adequate loadings of .4 or above. However, each of the four subscales (emotional, instrumental, informational, and rejection or neglect by

others) was represented in the final overall factor. Although effects were detected at the 12-month follow-up, it is possible that these effects could change and possibly wane over time, which could not be captured by the current study design.

Implications and Conclusions

Further research is needed to understand the implications of pain-related negative support for HIV caregiving relationships, as well as the health outcomes of this vulnerable HIV population and their caregivers. Such interpersonal processes of pain may help to explain the high prevalence of chronic pain in substance using populations, which are found to have high levels of interpersonal conflict. Analyzing longitudinal data over a longer timespan could aid in more fully examining antecedents and distal outcomes related to negative social support.

In sum, the present study emphasizes the importance of examining the relationships among pain, substance use, and negative social exchanges among PLHIV in low-resource, disadvantaged communities. Of particular importance is intervention with PLHIV who experience pain or are currently using substances. The significant interaction between these variables suggests pain is an important risk factor for PLHIV who are not using substances. Examining these constructs in predicting negative support is especially important given the established association between social support and psychological and physical health, which are primary components of health-related quality of life (Kiecolt-Glaser et al., 1998)

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Figure 1.

Chronic pain (bothersome often or always in the prior 6 months) and substance use at baseline predicting negative social support at 12 months follow up among current or former drug using persons living with HIV/AIDS, adjusting for baseline viral load, sex and age. (Beacon Study; $N = 383$)

Model Notes: Path coefficients are standardized. CFI = .97, TLI = .97, RMSEA = .03, 95% CI = .02, .04. All predictors are baseline measures. Statistical analysis controlled for sex, age, and viral load. $R^2 = .30$. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 2. Interaction between substance use and pain in predicting follow-up negative support factor scores at mean level of baseline negative support (Beacon Study, $N = 383$).

Table 1

Demographic characteristics of former or current drug using persons living with HIV/AIDS (Beacon Study; $N = 383$).

Variable	N (%)
Sex: male	235 (61.4)
Race/Ethnicity: Black/African American	329 (85.9)
Education: high school/GED or less	321 (83.8)
Income: < \$1,000 per month	306 (79.9)
Viral Load (Undetectable)	251 (70.9)
Chronic pain: bothersome often or always	122 (32.4)
Illicit drug or problem alcohol use	243 (63.3)
Type of drug	
Heroin	130 (33.9)
Cocaine	174 (45.4)
Opiates	103 (26.9)
Stimulants	10 (2.6)
Tranquilizers	26 (6.8)
Hallucinogens	4 (1.0)
	Mean (SD) ^a
Age	48 (6)

Note:

^aSD = Standard Deviation

Table 2

Factor indicators' frequencies and loadings on the negative social support factor (Beacon Study).

Item stem, "In the past 30 days, how often did someone you know..."	Rarely/None N (%)	Some/Little N (%)	Most/All N (%)	Baseline Factor Loadings ^a	12-Month Factor Loadings ^b
...let you down when you needed help?	182 (47.5)	148 (38.6)	53 (13.8)	.63	.69
...fail to spend enough time with you?	199 (52.0)	138 (36.0)	46 (12.0)	.68	.69
...ask you for too much help?	206 (53.8)	117 (30.5)	60 (15.7)	.49	.58
...interfere or meddle in your personal matters?	191 (49.9)	138 (36.0)	54 (14.1)	.52	.61
...leave you out of activities you would have enjoyed?	243 (63.4)	115 (30.0)	25 (6.5)	.71	.71
...forget or ignore you?	221 (57.7)	137 (35.8)	25 (6.5)	.77	.75
...act angry or upset with you?	189 (49.3)	162 (42.3)	32 (8.4)	.65	.73
...not pay enough attention to you?	204 (53.3)	142 (37.1)	37 (9.7)	.77	.78

Note:

^aCFI = .98, RMSEA = .05, *N* = 383;^bCFI = .98, RMSEA = .06, *N* = 331.