



The role of sleep dysfunction in the relationship between trauma, neglect and depression in methamphetamine using men



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ABSTRACT

Background: Childhood abuse and neglect, or childhood trauma (CT), has been associated with methamphetamine use, HIV, and depression. This study explored the potential for sleep dysfunction to influence the relationship between CT and depression in methamphetamine using men.

Methods: A total of $N = 347$ men were enrolled: 1) HIV-uninfected, non-methamphetamine (MA) using heterosexual and homosexual men (HIV- MA-; $n = 148$), 2) MA-using MSM living with HIV (HIV + MA +; $n = 147$) and 3) HIV-uninfected, MA using MSM (HIV- MA +; $n = 52$). Participants completed measures of demographic characteristics, sleep dysfunction, childhood trauma, and depression.

Results: Participants were on average 37 years old ($SD = 9.65$). Half of participants were Hispanic, and 48.1% had a monthly personal income of less than USD\$500. Controlling for sleep dysfunction and control variables, the impact of CT on depression decreased significantly, $b = 0.203$, $p < 0.001$, and the indirect effect of CT on depression was significant according to a 95% bCI, $b = 0.091$, bCI (95% CI 0.057, 0.130). That is, sleep dysfunction partially explained the relationship between CT on depression.

Limitations: Important limitations included the cross-sectional design of the study, and the self-reported measure of sleep.

Conclusions: Results highlight the use of sleep interventions to prevent and treat depression, and the utility of assessing sleep disturbances in clinical care.

1. Introduction

Childhood abuse and neglect, or childhood trauma (CT), has been associated with both substance use and depression (Briere & Elliott, 2003; Ding, Lin, Zhou, Yan, & He, 2014; Edalati & Krank, 2016). Among methamphetamine users, studies report 50.5% of users endorse at least one of eight adverse childhood events, suggesting that childhood adversity may increase susceptibility for substance use (Ding et al., 2014). Childhood abuse and neglect has also been more frequently reported by have sex with men (MSM) living with HIV; MSM rates of methamphetamine use range from 10% to 23%. In addition, a history of childhood physical neglect has been associated with depression, and slower recovery from depression (Briere & Elliott, 2003; Mandelli, Petrelli, & Serretti, 2015; Paterniti, Sterner, Caldwell, & Bissrbe, 2017).

The relation between CT and depression (Briere & Elliott, 2003; Mandelli et al., 2015) may be explained by sleep dysfunction, which includes sleep onset, sleep latency, wake after sleep onset, total sleep

time, and sleep efficiency, as CT has been linked to sleep dysfunction (Kajeeepeta, Gelaye, Jackson, & Williams, 2015). Sleep dysfunction has also been linked to depressive symptomatology and fatigue (Broström, Wahlin, Alehagen, Ulander, & Johansson, 2018), and may result from impaired circadian sleep rhythms arising from posttraumatic stress symptomatology, e.g., hypervigilance (Ugland & Landrø, 2015). Combined, these findings suggest that CT, depression, and sleep dysfunction may be interrelated. These relations may also be influenced by HIV status or by antiretroviral therapy (ART); among those living with HIV, sleep dysfunction is common; previous research in this population classified 88% as poor sleepers, with 66% reporting less than 7 h of sleep for most nights over the last month and 60% reporting delayed sleep onset latency (Fraun, 2017). Methamphetamine use also prevents sleep and some users may sleep for up to 30 h following use (Meth woes outlined in Alamosa County, 2007; National Institute on Drug Abuse, 2016), which may exacerbate symptoms associated with sleep dysfunction, particularly among those with an increased vulnerability for

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sleep disorders.

Early life exposure to traumatic experiences has been identified a risk factor for poor sleep quality in adulthood (Greenfield, Lee, Friedman, & Springer, 2011; Kajeepeta et al., 2015). Developmental frameworks suggest that the impact of childhood experiences on sleep dysfunction in adulthood are mediated by biological processes, such as increased allostatic load due to exposure to repetitive stress. Furthermore, children who have experienced abuse and frequent re-victimization may be unable to develop or maintain healthy sleep schedules and such patterns may continue into adulthood (Anda et al., 2006). In addition, previous studies have shown that childhood experiences increase sleep disturbances by 2.1 (Greenfield et al., 2011). In turn, sleep disturbances predict the onset of depression and are predictor of continued chronic depression (Baglioni et al., 2011).

Given the high rates of CT, depression, and sleep disorders among MSM living with HIV, including those who use methamphetamine, this study sought to examine the role of sleep dysfunction in the association between CT and depression. Consistent with prior research and theory, it was hypothesized that CT and sleep dysfunction would both be associated with depression (Briere & Elliott, 2003; Broström et al., 2017; Krystal, 2012; Mandelli et al., 2015). However, because, to the best of our knowledge, the interrelatedness of these three clusters of symptoms had not been explored in prior research, the mediational effect of sleep dysfunction between CT and depression was tested. It was hypothesized that sleep dysfunction would account for this association. Given the increased risk for sleep dysfunction among people living with HIV and methamphetamine users, whether this mediational effect would differ as a function of HIV status and methamphetamine use was explored. It was anticipated that results from this study could guide the development of interventions to treat depression among those living with HIV and methamphetamine users.

2. Method

2.1. Participants and procedures

Prior to any study activities, approval was obtained from the University of Miami Miller School of Medicine Institutional Review Board. Candidates were recruited by convenience sampling from local clinics, hospitals, support groups, drug treatment programs, and by word of mouth in Southeastern Florida. Due to the high rates of methamphetamine use among men in Southeastern Florida, particularly among MSM, recruitment targeted men. Participants were included if they were heterosexual men or MSM, HIV seropositive or negative, having or not having a history of methamphetamine use, and if they were between the ages of 18 and 55. Participants were excluded if they endorsed a history of migraine, seizure, visual impairment, learning disorders, cardiovascular disease, diabetes mellitus, hypertension, current treatment for hepatitis C, or depression, bereavement resulting in a loss of social support in the preceding 3 months. A total of $N = 347$ men were enrolled: 1) HIV-uninfected, non-methamphetamine (MA) using heterosexual and homosexual men (HIV- MA-; $n = 148$), 2) MA-using MSM living with HIV (HIV+ MA+; $n = 147$) and 3) HIV-uninfected, MA using MSM (HIV- MA+; $n = 52$). All participants were compensated \$50 for their time and transportation. Enrolled participants completed pencil-and-paper measures in private study offices. Further detail about the study protocol, including recruitment and procedures, has been previously described (Carrico, Rodriguez, Jones, & Kumar, 2018).

2.2. Measures

Demographic and biopsychosocial characteristics. Demographic and biopsychosocial questionnaires, including questions regarding MA and polydrug use, were administered by trained Bachelor- or Masters-level research study personnel.

Depressive symptoms. Depressive symptoms were assessed using the Center for Epidemiological Studies-Depression Scale (CES-D) (Radloff, 1977). The CES-D requires respondents to report the frequency of depressive symptoms in the past week. CES-D scores range from 0 to 60; higher scores indicate greater severity of depressive symptomatology. In this sample, internal consistency was excellent ($\alpha = 0.87$).

Childhood Abuse and Neglect. Trauma and neglect were assessed using the Childhood Trauma Questionnaire (CTQ) (Bernstein, Ahluvalia, Pogge, & Handelsman, 1997) a 28-item Likert scale (1 = never true to 5 = very often) assessing emotional abuse (parents wished they had never been born), physical abuse (was kicked, bit, or burned), sexual abuse (was touched in a sexual way), emotional neglect (not listened to or caregivers were unsupportive), physical neglect (was not taken to a doctor), and denial about abuse and neglect in childhood (had a “perfect” childhood). Possible scores for this scale range from 28 to 140, where greater scores indicate a greater frequency or severity of CT. In this sample, reliability was excellent ($\alpha = 0.84$).

Sleep Dysfunction. The Pittsburgh Sleep Quality index (PSQI) was used to assess overall sleep disturbance (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI includes seven components of sleep quality: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. In the current study, the PSQI global score was used for analyses. Greater scores on this scale indicated a greater degree of sleep dysfunction ($\alpha = 0.59$).

Substance Use. The Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV), non-patient version (SCID-IV-NP; (Spitzer, Williams, Gibbon, & First, 1992) was used to assess methamphetamine use. The assessment included the duration and frequency of methamphetamine use, as well as remission from methamphetamine dependence. Among those who reported drug use, an indicator variable was created to differentiate those who were substance dependent versus those who reported recreational methamphetamine use, methamphetamine abuse, and remission from methamphetamine use for a period of 12 months. All participants in the study met criteria for either methamphetamine abuse or dependence, which required participants to have used methamphetamine in the past 12 months. Per DSM-IV criteria, participants were not considered to be in remission if they met reported any methamphetamine use with 12 months of meeting criteria for methamphetamine abuse or dependence.

2.3. Statistical analyses

Analyses of variance (ANOVA) and chi-square tests were used to examine the sociodemographic and psychosocial associations with depression. Comparisons were conducted by group (HIV-MA-, HIV+MA+, HIV-MA+) to describe participant characteristics. Covariates were deemed potential confounders if they were associated with depression at $p < 0.10$ in bivariate analyses. Subsequently, a series of multiple linear regression models were built with depression as the outcome and the variables identified to be associated with depression in bivariate analyses included as covariates, independent variables. Only variables significant at $p < 0.10$ in the multivariable model were included in subsequent analyses. Then, a simple mediation model (Preacher & Hayes, 2004) was developed, using depression as the dependent variable, childhood trauma and neglect as the independent variable, and sleep dysfunction as a mediator, while controlling for the variables retained in the reduced multivariable model. A test of mediation was performed using the PROCESS macro developed by Hayes for SPSS (model 4), with 5000 bootstrap samples as suggested by (Hayes, 2009). Results from the test of mediation are reported using Baron and Kenny (1986) classical approach. The presence of an indirect effect was assessed using the absence of zero in the bootstrapped bias-corrected 95% confidence interval (bCI) Hayes (2009). These analyses are appropriate to use in homogenous or heterogenous samples, as sample heterogeneity or homogeneity is not an assumption of ANOVAs, chi-

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