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Chronic childhood adversity and stages of substance use involvement in adolescents

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ABSTRACT

Background: Studies have shown that those who experience chronic childhood adversity have a greater likelihood of substance abuse and dependence. However, substance use disorders are first preceded by substance use, and substance use is preceded by substance use opportunities. This study aims to estimate the association of chronic adversity with different stages of substance involvement: opportunities, use given the opportunity and abuse or dependence given use.
Methods: 3005 adolescents aged 12–17 were interviewed in a stratified multistage general population probability survey of Mexico City, Mexico. Substance involvement and chronic childhood adversities were assessed with the World Mental Health Composite International Diagnostic Interview Adolescent Version (WMH-CIDI-A). Discrete-time survival models were performed; their survival coefficients and standard errors were exponentiated, and reported as odds-ratios (ORs).
Results: Childhood adversities were associated with alcohol opportunity, alcohol use and alcohol abuse/dependence with significant ORs for individual adversities ranging from 1.4 to 4.1. Childhood adversities were also associated with illicit drug opportunity, drug use and drug abuse/dependence with significant ORs for individual adversities ranging from 1.6 to 17.3. Having more adversities was associated with greater incremental odds of substance involvement, particularly drug use given the opportunity.
Conclusions: While adversities are mostly related to transitioning into use and disorder, a few are related to substance opportunities, particularly those which were likely to make substances available through parents. Attending to the needs of youth living in adversity, particularly adversities related to parental dysfunction and child abuse should be integral to addiction prevention efforts.

1. Introduction

Epidemiological studies have shown that people who experience chronic childhood adversity have a greater likelihood of substance abuse and dependence as well as other psychiatric disorders (Benjet et al., 2010; Enoch et al., 2010; Kessler et al., 2010; Turner and Lloyd, 2003; Lloyd and Turner, 2008). Likewise, animal models have shown stress and early adversity to increase self-administration of substances (Becker et al., 2011; Goeders and Guerin, 1996; Lopez et al., 2011; Lynch et al., 1999; Goeders, 2002; Vengeliene et al., 2003; Koob and Kreek, 2007) while human models have shown that stress is related to substance abuse and dependence and to relapse and craving amongst substance abusers (Higley et al., 2011; Sinha et al., 2011, 2006). Many theories have been proposed to explain this association. Among the most frequently mentioned in the addiction literature is the self-medication hypothesis, in which those who abuse substances do so to ease or relieve the pain of trauma, negative affect and psychiatric disorders (Garland et al., 2012; Khantzian, 1985; Robinson et al., 2011). Compatible with the self -medication hypothesis are theories which propose neurobiological pathways that alter learning, reward, craving, and impulsivity through stress allostasis. The theory of allostasis or allostatic load posits that the process of achieving stability through alteration of neural, neuroendocrine and immune mechanisms (allostasis), while adaptive in the short run, becomes "overloaded" (allostatic load) with chronic stress (McEwen, 2000). Frequent, multiple stressors, failure to habituate to chronic stressors, compensatory hyperactivity and delayed shutdown of the stress response alter key neurocircuitry that impacts upon craving, loss of control and compulsion and, thus, vulnerability to addiction (McEwen, 2000; Uhart and Wand, 2009).

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The types of chronic childhood adversities typically included in epidemiological studies fall into one of four categories: family or parental dysfunction, abuse/neglect, interpersonal loss and socio-economic disadvantage.

Certain epidemiological questions regarding adversity and stage of drug involvement have yet to be addressed and may contribute to further understanding of this relationship. Substance use disorders are first preceded by substance use and substance use is preceded by substance use opportunities. Substance opportunities are generally considered a measure of availability of substances in a given context, although they may also reflect, to some degree, actively seeking out opportunities. Prior work has found that certain factors related to substance use and abuse are actually related to exposure to substance opportunities (Benjet et al., 2007a; Chen et al., 2004; Storr et al., 2011). For example, several studies have shown that males are more likely to have opportunities to use drugs than females, but females are equally as likely as males to try drugs when given the chance (Benjet et al., 2007a; Delva et al., 1999; Van Etten et al., 1999; Van Etten and Anthony, 1999). Another study found drug use opportunities to mediate the association between mental illness and drug use (Liang et al., 2011). An important question to address is whether the association between chronic childhood adversity and substance use disorders is due to those with childhood adversity having greater substance use opportunities, being more likely to use given the opportunity, being more likely to develop substance use problems given use, or all of the above. Given the reported associations of psychiatric disorder with both childhood adversity and substance involvement, it is also important to determine whether the association between adversity and substance involvement holds when controlling for psychiatric disorders. This study aims to address these questions.

2. Methods

2.1. Participants

This report presents secondary analyses of data from the Mexican Adolescent Mental Health survey (Benjet et al., 2009a). The sample consists of 3005 adolescents (52.1% female) aged 12–17, selected from a stratified multistage area probability sample representative of the nearly two million adolescents residing in the Mexico City Metropolitan Area. In all strata, the primary sampling units were census count areas cartographically defined and updated for the XII Population and Housing Census in 2000. Secondary sampling units were city blocks (or groups of them), selected with probability proportional to size. All households within these city block units with adolescents in the age range were selected. One eligible member from each of these households was randomly selected using the Kish method of random number charts. The response rate of eligible respondents was 71%.

2.2. Procedures

A verbal and written explanation of the study was given to both parents and adolescents, after which signed informed consent from a parent or legal guardian was obtained, as well as the assent of the adolescent. Interviews were conducted in the homes of the selected participants. All study participants and their families were offered information on local mental health services. The Internal Review Board of the National Institute of Psychiatry approved the recruitment, consent and field procedures.

2.3. Measures

Substance involvement, adversity and psychiatric disorders were evaluated with the fully structured, computer assisted, World Mental Health adolescent version of the Composite International Diagnostic Interview (WMH-CIDI-A) the development and validity of which is described elsewhere (Kessler et al., 2009; Merikangas et al., 2009). The computer assisted version was administered, in which extensively trained lay interviewers read the questions to the participant directly from the computer screen, the questions are chosen by the computer based on previous responses of the participant and complex logical skip patterns. The interviewer inputs the respondent's answers directly into the computer and consistency checks are programmed so that inconsistent information is probed and corrected. Diagnostic classification is based on meeting the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994). The substance use section includes questions regarding the lifetime use (defined as consumption of the substance at least once at any time in one's life) of alcohol and illicit drugs, opportunity to use alcohol and drugs, and substance abuse and dependence. The illicit drugs included were marijuana, cocaine in any of its presentations, tranquilizers or stimulants used without a medical prescription, such as methamphetamine, and other substances (e.g., heroin, inhalants, LSD, etc.) which were grouped as "other drugs". Participants were asked about each category of drugs openly and then presented with a list of numerous different street names for these drugs. The questions regarding opportunity to use alcohol and drugs were posed after the questions about alcohol and drug use so that opportunities to use alcohol and drugs referred to all the alcohol and drugs previously presented to the respondents. All participants were asked about opportunities regardless of whether they had previously endorsed using any substance. Opportunity to use alcohol and opportunity to use illicit drugs were asked about separately and defined as having the opportunity to use any substance, independently of whether or not the respondent did so. For example, someone offered the respondent drugs or the respondent was present when others were consuming and could have done so if he or she chose to.

In order to cover a range of chronic childhood adversities and those for which previous research has found associations with substance abuse, we included different forms of parental loss, parental psychopathology, abuse, physical illness and economic adversity; these were evaluated from the childhood and post-traumatic stress disorder sections of the WMH-CIDI-A. Each of 12 chronic adversities was classified as present or not present using the same criteria as the World Mental Health Survey Initiative (Kessler et al., 2010). *Physical abuse and parental violence* were assessed with a modified version of the Conflict Tactics Scale (Strauss, 1979). *Neglect* was evaluated with questions often used in child welfare studies (Courtney et al., 1998). *Sexual abuse* was assessed by reading a definition of rape and then asking about other forms of abuse or molestation. In order to be consistent with the other World Mental Health Surveys; chronic sexual abuse was defined as reporting at least three episodes of sexual abuse thus representing chronic sexual abuse as opposed to acute one time trauma (Bruffaerts et al., 2010). To assess parental loss, the adolescents were asked whether they lived with both parents all of their lives. Those who did not were asked whether this was because their parents had separated or divorced, a parent had died or some other reason. Those mentioning separations of six months or more from either parent for some other reason were classified as *other parental loss*, with reasons ranging from having gone to boarding school, having left home, or that their parent was in prison. Parental pathology was evaluated using questions from the Family History Research Diagnostic Criteria Interview and included *parental mental illness*, *substance problems*, and *criminal behavior* (Endicott et al., 1978). Participants were considered to have experienced *family economic adversity* if the family ever received money from a government assistance program for poor families or by lack of parental employment most or all of the time during the participant's childhood. *Serious physical illness* is based on the adolescent's report of having experienced a life-threatening physical illness.

Mood, anxiety and behavioral disorders are associated with childhood adversity and with substance involvement. In order to estimate the association of adversity with substance use and substance use disorder without the possible confounding of psychiatric disorders, the following psychiatric disorders were also evaluated with the WMH-CIDI according to DSM-IV criteria and were used as a covariate in the statistical models described below: major depression, dysthmia, bipolar I and II, generalized anxiety disorder, panic disorder, agoraphobia, specific phobia, social phobia, post-traumatic stress disorder, separation anxiety, eating disorders, attention deficit hyperactivity disorder, oppositional-defiant disorder, conduct disorder, and intermittent explosive disorder.

The WMH-CIDI assessed age-of-onset of substance opportunity, use and disorder as well as for other psychiatric disorders retrospectively using a series of questions shown to improve accuracy of retrospect reports and avoid implausible response patterns (such as use of anchoring events and quality control programs to search for response inconsistencies; Knauper et al., 1999).

2.4. Statistical analysis

Data were weighted to adjust for differential probabilities of selection and non-response as well as post-stratification to the total Mexico City Metropolitan Area adolescent population according to the year 2000 Census in the target age and sex range. The socio-demographic distribution of the sample closely approximates the target population, in that roughly half are female, there is an even distribution of ages, two-thirds live with both parents, and the socio-economic level of the parents represents the educational and income levels in Mexico; for example, one-fourth of parents have 6 years or less of formal education whereas only 13% have gone to college. More details of the weighted and un-weighted socio-demographic distribution of the sample is presented elsewhere (Benjet et al., 2007a, 2009a) as is the distribution of chronic adversity (Benjet et al., 2009b). First we present the prevalence estimates for each substance involvement stage.

Then multivariate associations of the childhood adversities with substance opportunity, use and abuse/dependence were estimated using discrete-time survival analysis with person-years as the unit of analysis (Efron, 1988; Willett and Singer, 1993). Each model controlled for the adolescent's age at interview, gender, psychiatric disorders prior to substance involvement and person-year. Psychiatric disorder and substance involvement are time varying variables whereas