Full length article

Life events and alcohol use disorder clinical course: Modeling the dynamic association

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ARTICLE INFO

ABSTRACT

Background: Despite over 35 years of study, the relationship between life events (LEs) and alcohol use disorder (AUD) treatment outcome lacks consistent empirical support, which may be due to a lack of theoretically driven designs and corresponding statistical analyses. The purpose of this study was to elucidate the LEs-AUD treatment outcome relationship by statistically modeling the dynamic relationship between negative LEs and alcohol use post-treatment, as it is conceptualized within the dynamic model of relapse.
Methods: Existing longitudinal data from 417 AUD treatment-seeking adults were randomly assigned to two demographically comparable samples. One sample ($N = 208$) was used to estimate a series of dynamic bivariate latent change score models that differentially relate latent indicators of distal and proximal negative LEs (i.e., events subjectively rated as negative) and percent heavy drinking days across 12 months. Cross-validation was conducted on the second sample ($N = 209$).
Results: Findings indicated that distal negative LEs were positively associated with a greater increase in negative LEs, but not heavy drinking, over the subsequent 12 months. Proximal negative LEs were significantly associated with subsequent increases in heavy drinking, though heavy drinking was not a determinant of change in negative LEs. These findings were cross-validated with the second sample.
Conclusions: This study provides initial justification for the further study of the LEs-alcohol use relationship as it is described in the dynamic model of relapse.

1. Introduction

Life events (LEs), defined as occurrences likely to bring about re-adjustment-requiring changes in people's lives (Holmes and Rahe, 1967), have been studied as factors that may influence the treatment outcome (i.e., alcohol use frequency and quantity) of an alcohol use disorder (AUD), as defined by the Diagnostic and Statistical Manual (DSM-5; American Psychiatric Association, 2013). However, the nature of the LEs-AUD treatment outcome relationship remains unclear due to inconsistent findings (Krenek and Maisto, 2013). Moreover, the dynamic relationship between LEs and alcohol use, as hypothesized within the dynamic model of relapse (Witkiewitz and Marlatt, 2004), has not been empirically evaluated.

Krenek and Maisto's (2013) review identified 18 studies published from 1988 to 2010 that examined the association between LEs and AUD/substance use disorder (SUD) treatment outcomes. No additional relevant published studies were identified since this review. Among the studies reviewed, 12 found that more negative LEs were associated with poorer SUD treatment outcome, 7 reported no relationship between negative LEs and treatment outcome, and 2 found that more positive LEs were associated with better treatment outcome. These findings support previous research showing that negative, not positive, LEs are more likely to be associated with poor treatment outcome (Dohrenwend, 2006). Thus, the current study focuses on negative LEs only. These findings also suggested that the data are inconsistent regarding the association between negative LEs and post-treatment substance use, possibly due to minimal use of theory-driven hypotheses, study design, and analyses.

The dynamic model of relapse provides a conceptual framework of substance use behavior that is both clinically relevant and empirically testable, and could be applied to evaluating the LEs-AUD treatment outcome relationship. The model, which describes substance use as a nonlinear process differentially influenced by present and past factors, predicts that the occurrence of LEs (e.g., divorce) can operate as both a proximal and distal risk of substance use. An acute LE may act as a transient risk that precipitates substance use. Further, feedback loops in the model predict that, following use, the likelihood of a LE occurring increases, potentially resulting in an increase in substance use. Lastly,

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the occurrence of past LEs may serve as a distal risk that predisposes an individual to substance use by continuing to have a negative impact on the individual.

Research within the SUD treatment outcome literature has primarily focused on understanding the proximal, unidirectional influence of LEs on treatment outcome, producing an inconsistent pattern of findings (cf., Krenek and Maisto, 2013; O'Doherty and Davies, 1987). Consistent across the 18 studies in the 2013 review is the use of analytic techniques that do not assess the potential reciprocal relationship between LEs and substance use as described in the dynamic model and thus cannot detect any existing relation between substance use and subsequent LEs. Moreover, it has been suggested that the inclusion of a LE that is "a consequence or potential consequence" of a SUD (Paykel, 1997, p. 303) as a predictor of SUD symptomatology may confound the LEs-SUDs outcome relationship, because substance use consequences may also be SUD symptomatology (Hart and Fazaa, 2004). However, the exclusion of SUD-related LEs may result in an underestimation of an individual's LE milieu, thereby potentially portraying the individual's life experiences as less severe and biasing the prediction of substance use. Thus, the inclusion of SUD-related LEs may be warranted within the conceptualization that LEs and substance use are reciprocally related across time. Finally, no studies have used longitudinal statistical techniques that can test the dynamic bidirectional association between LEs and treatment outcomes at multiple time points over time, thereby ignoring how LEs that may be consequences of substance use and may affect subsequent use.

The use of statistical techniques for longitudinal data applied to AUD clinical course data may provide the methods required to appropriately examine the LEs-AUD treatment outcome relationship (Hedeker and Mermelstein, 1996). Witkiewitz (2011) used bivariate latent change score analysis (BLCS; McArdle, 2001) to address the complex relationships described in the dynamic model. BLCS analysis is a statistical approach to modeling dynamic relationships that is especially relevant for examining determinants of change and thus can be used to test the dynamic model. It has not been applied to the LEs-AUD treatment outcome relationship.

Lastly, within the dynamic model, distal risks represent factors that may predispose an individual to substance use, thereby increasing the individual's sensitivity to proximal factors. The extent to which past LEs predispose individuals to subsequent use has received limited research attention within AUD/SUDs treatment literature. One study showed that, among U.S. military Veterans with SUD, presence of chronic stressors did not affect the relationship between acute LEs and substance use (Tate et al., 2006).

In summary, the literature on the relationship between LEs and substance use is inconsistent, which may be due to limited examination of LEs within a theoretical framework using appropriate statistical analyses. Specifically, the majority of the LEs-SUDs treatment outcome literature has focused on the unidirectional influence of LEs on subsequent use, has neglected the potential reciprocal relationship between these factors, and the extent to which prior LEs predispose an individual to subsequent use remains unclear.

1.1. Current study

Given the gaps in the literature, the current study aimed to examine the bidirectional association between proximal negative LEs and AUD treatment outcome, as described in the dynamic model of relapse using appropriate analytic techniques to guide future research in this area. We tested a series of BLCS models that represent potential associations between negative LEs and alcohol use. We hypothesized that increases in proximal negative LEs are associated with increases in subsequent alcohol use over time, and increases in alcohol use predict increases in subsequent proximal negative LEs over time. Additionally, it was expected that higher levels of distal negative LEs predict greater dynamic risk between proximal negative LEs and alcohol use over time. Given

the inconsistencies reported in the literature regarding the negative LEs-alcohol use relationship, cross-validation was conducted to determine stability of findings.

2. Method

2.1. Participants

Data were collected as part of the Relapse Replication and Extension Project (RREP; Lowman et al., 1996). RREP was designed to examine the course of alcohol involvement following treatment initiation. Adults with DSM-III-R alcohol abuse or dependence were recruited from inpatient and outpatient addictions treatment programs across three sites. Data from two sites were used in this study because the third site did not administer a key questionnaire.

Eligibility criteria included: ≥ 18 years of age (21 years at one site), presence of alcohol abuse or dependence within the past six months, absence of more severe concurrent drug diagnoses other than alcohol, no intravenous drug use in the past six months, absence of comorbid severe mental illness, at least eighth grade reading ability, completed detoxification, and signed informed consent. Across the two sites, 417 participants met eligibility criteria and consented to participate.

2.2. Procedures and measures

Assessments occurred at baseline and bimonthly over 12 months. Baseline, 6-month, and 12-month interviews were conducted in-person, while 2-, 4-, 8-, and 10-month follow-ups were phone interviews. Only measures relevant to the current study are described.

2.2.1. Life events

LEs were assessed at baseline for the previous 12 months and at 6- and 12-months for the previous 6 months using the Life Experiences Survey (LES; Sarason et al., 1978), which has demonstrated adequate reliability and validity. The LES is a self-report questionnaire that lists 46 positive, neutral, and negative events, with space to add four additional events. Participants identified events that occurred, indicated the date of each endorsed event, and rated the subjective desirability/undesirability of each endorsed event on a 7-point Likert-type scale from -3 (*extremely negative)* to 3 (*extremely positive)*. Only negatively rated events (scores between -3 and -1) were included in the analyses.

A composite LEs variable was used in analyses and consisted of the number of endorsed negative LEs and the mean desirability rating of those events (Maisto et al., 2006). Endorsed negative events were recoded to values from 1 to 3, with higher values indicating greater undesirability. Non-endorsed events were assigned a value of 0 so that participants who did not experience any LE during a timeframe would be included in analyses. Ratings were summed across events for each timeframe.

For distal LEs, the composite variable included all negative LEs and associated desirability ratings endorsed during the baseline assessment. Composite variables for proximal LEs were computed for 2-month intervals for the duration of the 12-month study, resulting in scores at six timepoints. Baseline interview date and event dates were used to determine in which 2-month interval LEs occurred.

2.2.2. Alcohol use

The Form-90: A Structured Assessment Interview for Drinking and Related Behaviors (Miller, 1996) was used to assess daily quantity of alcohol consumption. Participants were assessed for the 90 days prior at baseline and bimonthly for 12 months. Missing drinking data from missed assessments were collected at the subsequent interview.

Percent heavy drinking days (PHD) was used as the alcohol outcome variable because it is a clinical indicator of severity that accounts for both frequency and intensity of alcohol use. PHD was computed by dividing the number of heavy drinking days (≥ 5 drinks for men, ≥ 4