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Time-Clustered Deaths and Substance Use Disorder among Young Adults*

Mathew D. Gayman,
Georgia State University

Andrew M. Cislo, and
University of Connecticut

Stephanie Hansard
Georgia State University

Abstract

This study assesses whether experiencing multiple deaths of loved ones clustered in time increases risk for substance use problems. Using survey data from a community sample of young adults in Miami, Florida (N = 1,747), time-clustered deaths were categorized based on the age of the respondent at the time of each death, with less time between deaths representing greater time-clustering. Results indicate that young adults experiencing multiple deaths that are highly time-clustered are at increased risk for substance use disorder and alcohol use. This study provides an alternative way of thinking about how young people may be affected by major life events. It suggests that the increased risk for substance use disorder associated with multiple deaths may be more likely to materialize when the deaths are highly clustered in time.

Keywords

Stress coping; Substance use; Major Life Events

Introduction

Substance use disorders (SUD) are among the most common, disabling, and costly health problems in the U.S. (Grant et al. 2004; National Institute on Drug Abuse 2011). Approximately 27 percent of the adult U.S. population meets lifetime criteria for a SUD (Kessler et al. 1994; Kessler et al. 2005), with an estimated annual cost exceeding \$600 billion in lost work productivity, health problems, and crime (NIDA 2011; ONDCP 2004; Rehm 2009). Given individual and societal costs, understanding risk factors associated with SUD is critical for population health and public health policy. In addition, because substance use problems often begin early in the lifecourse (Kessler et al., 2007) and can affect

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Corresponding author: Mathew D. Gayman, Assistant Professor, Department of Sociology, Affiliated Faculty for the Partnership for Urban Health Research, Georgia State University, 1080-A, P.O. Box 5020, Atlanta, GA 30302-5020, (404) 413-6510 (office), (404) 413-6505 (fax), mgayman@gsu.edu.

individuals throughout the lifecourse (Pitkänen, Kokko, Lyyra & Pulkkinen, 2008), research on risk factors for SUD among young adults is important for timely identification and intervention efforts.

More than fifty years of research demonstrates that stress exposure is a potent risk factor for behavioral health problems (Thoits, 2010; Turner, 2010). Although studies highlight the negative health consequences associated with experiencing multiple major life events (Edwards et al., 2003) and the accumulation of major events over the lifecourse (Turner et al., 1995; Wheaton, 1999), the negative health consequences of major life events remain modest, especially compared to chronic stressors (Turner, 2003; Turner & Avison, 2003; Turner & Lloyd, 1999; Turner, Wheaton, & Lloyd, 1995; Wheaton, 1999). Despite the modest effects, the potential for behavioral harm stemming from major negative life events should not be ignored. Rather, researchers may need to consider different ways in which people experience major stressful life events. For example, no community-based studies have investigated whether experiencing multiple major life events that are highly clustered in time (*time-clustered*) increases risk for problematic substance use.

Theory and research

Greater exposure to social stressors increases risk for behavioral and mental health problems (Pearlin et al. 1981; Pearlin 1999). The translation of social stress to poor health involves “environmental demands [which] tax or exceed the adaptive capacity of an organism, resulting in psychological and biological changes that may place persons at risk for disease” (Cohen, Kessler, and Gordon 1997:3). Early investigations on the health consequences of social stress focused largely on either a single life event or a count of major life events, such as being fired from a job or the death of a loved one (Dohrenwend et al. 1978; Elder 1974; Holmes and Rahe 1967; Langner and Michael 1963; Meyer 1951; Selye 1956). The question of whether experiencing multiple major life events in close proximity in time increases risk for behavioral health problems remains largely unexplored. Prior theory and research on stress-coping and grieving provides important insight into the potential behavioral health consequences of highly time-clustered deaths.

Stress-coping theory posits that individuals may engage in substance use as a way of coping with major life events by staving off negative emotions (Wills, 1986; Wills et al., 1996). It has even been argued that a psychological immune system in humans operates to deter the manifestation of negative affect stemming from potentially harmful life events (Gilbert et al. 1998). While the particular mechanism remains an empirical question that is beyond the scope of this exploratory investigation, research has demonstrated that greater exposure to major stressful life events is linked to increased alcohol, tobacco and illicit drug use (Bailey & Covell, 2011; Low et al., 2012; Robertson, Xu, & Stripling, 2010; Wills, 1986) and some adolescents specifically identify coping with major negative life events as a motivation for marijuana use (Bujarski et al., 2012). However, while there is also evidence indicating that experiencing multiple childhood adversities is linked to increased risk for substance use problems in adulthood (Dube et al., 2002), not all individuals who experience major negative life events develop poor health outcomes (Silver & Wortman, 1980; Wortman & Silver, 1989). It is possible that the increased risk for substance use disorders may be more

likely to manifest when individuals experience complicated grief within the bereavement process.

Bereavement involves the loss of a significant other and has been linked to morbidity and mortality, especially when it involves complicated grief (Shear et al 2011; Stroebe et al 2007). Complicated grief is marked by chronic and prolonged impairing symptomatology related to bereavement (Prigerson et al. 1999) and additional stressors surrounding complicated grief can increase the risk for physical and psychological problems (Shear et al 2011). Experiencing multiple deaths that are highly time-clustered may itself put an individual at risk for complicated grief and potentially intensify coping behaviors. Thus, chronic and intensified substance use as a means to cope with a barrage of loved ones' deaths may manifest as an increased risk for substance use disorders. This is consistent with a recent study on a small sample of participants in the Mothers Against Drunk Driving (MADD) organization, where those experiencing multiple deaths closer in time reported the longest time grieving (Mercer & Evans, 2006). In addition, those who face multiple major life events may have difficulty successfully grieving subsequent losses (Demb, 1989) and the experience of cumulative major life events may result in self-harming behavior (Leavitt et al., 1996). Although some evidence indicates that experiencing multiple deaths in a short period of time can produce behavioral and emotional problems (Kaufman & Kaufman, 2005; Mercer & Evans, 2006), these few studies involve either single-case or small convenience samples which do not allow for generalization. Thus, the question of whether experiencing greater time-clustered deaths increases risk for behavioral health problems remains largely unanswered.

Social distribution of stress exposure

Prior studies have demonstrated that exposure to social stress is unequally distributed across social statuses (Pearlin et al., 1981; Pearlin, 1999; Turner & Avison, 2003). As examples, groups with low socioeconomic status (Santiago, Wadsworth, & Stump, 2011; Turner, Wheaton & Lloyd, 1995), African Americans (George & Lynch, 2003) and women (Thoits, 2010; Turner, Wheaton & Lloyd, 1995) experience greater stress exposure. It has been argued that the increased risk for health problems among socially marginalized groups are, in large part, due to greater stress exposure (Turner et al. 1995; Turner and Avison 2003). However, it is unknown whether socially marginalized groups are at increased risk for experiencing time-clustered major life events.

Greater social and environmental stressors among low SES and race-ethnic minority groups may not only increase the risk for experiencing multiple deaths but also deaths that are highly time-clustered. Specifically, everyday exposure to toxic social and physical environments among low SES and race-ethnic minority groups may increase the risk for psychological and physical insult/injury (including mortality) of network members. While gender differences in the death of loved ones may not work in the same way, women may too be at greater risk for experiencing multiple and highly time-clustered deaths because they are more likely than men to have larger social networks (McLaughlin et al., 2012) and to be socialized to care about and be attuned to the experiences and conditions of their network members (Magen & Konasewich, 2011). While explaining group differences in

stress exposure and health disparities is beyond the scope of the current investigation, to the extent that experiencing greater time-clustered deaths is linked to behavioral and mental health problems, research identifying those at greatest risk for time-clustered deaths can help direct public health policy efforts. Indeed, research describing the social distribution of stress exposure is important for understanding the broader issue of health disparities (Turner & Avison, 2003).

Current study

Using data from a community sample of young adults, this study assesses whether experiencing multiple deaths in shorter succession increases risk for behavioral health problems. Specifically, using information on the age of the respondent at the time of each death of a loved one, this study tests whether experiencing multiple deaths that are in closer proximity in time increases risk for lifetime and past year substance use disorder, as well as past year alcohol use. In addition, we assess whether experiencing highly time-clustered deaths significantly varies across social statuses.

Method

Sample

Study procedures and the sample used in this investigation have been detailed previously (Turner & Gil, 2002; Vega & Gil, 1998). The data originated from a study that built upon a previous three-wave investigation of early adolescents in Miami-Dade County, Florida (Vega & Gil, 1998). The original three-wave study included all of the county's 48 public middle schools and 25 public high schools, as well as alternative schools. In the original study, surveys were administered to participating students annually between 1990 and 1993, beginning in grades 6 and 7 and finishing in grades 8 and 9. The original study was designed as an all-male study with the aim of assessing drug use among male adolescents; however, a small number of girls ($n = 410$) were also surveyed. A total of 5,924 youths were retained in Wave 3 of the original three-wave study. Although there was nearly 20 percent attrition between Waves 1 and 3, Wave 3 participants were highly representative of Wave 1 participants (Vega & Gil, 1998).

From the 5,924 Wave 3 participants in the original study, a follow-up study enrolled a representative subsample of 1,683 youths (1,273 men and 410 women). Also, based on class rosters from these early waves, a supplementary sample of 517 females were interviewed between 1998 and 2000 for the follow-up study. The interview success rate from Wave 3 of the original study to Time 1 of the follow-up study was 70.1 percent, and published attrition analyses have demonstrated no significant differences in early-adolescent behaviors or family characteristics (Turner & Gil, 2002).

Because more than 90 percent of all Miami-Dade County residents represent one of four ethnic groups, the study was designed such that approximately 25 percent of respondents self-identified as non-Hispanic white, Cuban, non-Cuban Hispanic, or African American. Analyses exclude seventeen cases involving those identifying a race-ethnic category not included in the study design. In addition, thirty-nine cases (1%) with missing values on any

study variable in the current analysis were excluded, with no missing values for substance use disorder or alcohol use. The analytic sample includes 1,747 young adults with a mean age of 20 years (SD=.94, range 18–23 years) and approximately half are male (n=924, 53%), with a race-ethnic make-up of non-Hispanic white (n=456, 26%), Cuban (n=420, 24%), non-Cuban Hispanic (n=444, 25%) and African American (n=427, 25%). The current analysis was approved by the Institutional Review Board at Georgia State University.

Measures

Substance use disorders—Data on lifetime alcohol/illicit drug abuse-dependence based upon DSM-IV diagnostic criteria (American Psychiatric Association, 1994) were obtained using computer-assisted personal interviews. The instrument used was the Michigan Composite International Diagnostic Interview (CIDI), which has been shown to have good reliability and validity for diagnoses of SUD (Nelson et al., 1996; Warner, Kessler, & Hughes, 1995; Wittchen et al., 1991).

Alcohol use—In order to better account for the temporal order between time-clustered deaths and substance use, this study also employs a measure of recent alcohol use. Recent alcohol use was measured using a single-item asking respondents “Think about the past 12 months. What is the largest number of drinks you had on any single day during that period?” While a single item is unlikely to capture the nuanced patterns of substance use, a past year reference point is recognized as important in limiting and balancing recall bias and underestimating use (see Dawson and Room 2000). The largest number of drinks also reflects the extreme end of recent alcohol consumption, which may serve as a signal for substance use problems. In addition, because this study also employs an indicator based on clinical-level criteria for substance use problems, concerns regarding the use of this single item are tempered.

Time-clustered deaths—Information was collected on the death of loved ones (parent, sibling, spouse/partner, child, grandparent, close friend, or other loved one) and the age of the respondent at the time of each death. The age of each death was recorded using a similar approach to the Life History Calendar (Freedman et al., 1988). Designed to aid in accuracy and to account for the temporal order of events, a chronological context was established within which respondents answered specific questions regarding the age at which major life events occurred. Among those who reported multiple deaths (2 or more), a time-clustered death indicator was constructed to represent deaths experienced in more (or less) close proximity in time. Although there is no *a priori* operationalization for a time-clustered death measure, we draw upon the stress-coping and grieving literatures highlighting the importance of time to recover from major negative life events without further disruption (Kaufman & Kaufman, 2005; Mercer & Evans, 2006). Specifically, the time-clustered indicator distinguishes between those reporting multiple deaths experienced (1) at the same or consecutive ages but no years between (examples: 15 and 15 yrs old or 15 and 16 yrs old); (2) one or two years between the closest deaths (examples: 15 and 17 yrs old or 15 and 18 yrs old); (3) three or four years between the closest deaths (examples: 15 and 19 yrs old or 15 and 20 yrs old); and (4) five or more years between the closest deaths (examples: 15 and 21 yrs old or 15 and 21+ yrs old).

Chronic stressors—To investigate the independent risk associated with time-clustered deaths, we adjust for daily chronic stressors. Chronic stressors were measured using a 36-item inventory developed by Wheaton (1991, 1994; see also Turner et al., 1995). The items relate to various social roles/domains/relations that include: general life experiences, employment/unemployment, social and intimate/marital relationships, health, children, residence, in school/not in school and parents/guardians. Items were summed to provide an index of chronic stress, with higher values representing greater stress exposure.

Social statuses—Gender was coded as 1 for female. Four race-ethnic categories include: non-Hispanic white, Cuban, non-Cuban Hispanic and African American. Because the study subjects were still in the transition to adulthood, family socioeconomic status (SES) was estimated based on parental education, income, and occupational prestige (Hollingshead, 1957). Scores on the three SES dimensions were standardized, averaged, and then re-standardized to the working sample so the mean is 0 and standard deviation is 1. For descriptive analysis, we also created a three-category measure; whereby, low SES represents 1 standard deviation *below* the mean, high SES represents 1 standard deviation *above* the mean, and middle SES represents between 1 standard deviation below and above the mean.

Data analysis

Descriptive statistics are provided for each study variable (Table 1). In order to assess whether the likelihood of experiencing time-clustered deaths varies by social statuses, descriptive statistics are stratified by gender, race-ethnicity and SES. Shown in Table 2, correlations are provided to assess the bivariate relationships across study variables; including variables that may serve as potentially confounding factors in the association between time-clustered deaths and substance use problems (number of deaths, age at first death, time since last death, and non-normative deaths). Presented in Table 3, logistic and ordinary least squares (OLS) regressions are used to estimate the risk of SUD (lifetime and past year) and past year alcohol consumption across the time-clustered death categories. Because past year alcohol consumption consists of a count measure, Poisson negative binominal regressions were used to predict alcohol use. All multivariate analyses control for chronic stressors and social statuses (gender, race-ethnicity, and family of origin SES). For each substance use outcome, we first compare those with no deaths (reference group) to those with only one death and those with multiple deaths with different degrees of time-clustering (Models I, IV and VII). Next, we compare those with one death (reference group) to those with multiple deaths with different degrees of time-clustering (Model II, V and VIII). Finally, among those with multiple deaths, we compare risk for substance use problems across those reporting different degrees of time clustered deaths (Models III, VI and IX) (reference group = least time-clustered group: 5 or more years between deaths).

Results

Descriptives

Shown in Table 1, thirty-seven percent of young adults met lifetime criteria for SUD (37.2%, n=649), with nearly one-quarter (23.7%, n=414) meeting criteria for past year SUD.

The mean for the largest number of drinks on any single day in the past twelve months was 1.8 (SD=1.8; Range=0–5). Three-fourths of the young adult sample reported at least one death (75.2%, n=1,314). Although the proportion of people reporting any deaths did not vary by gender or SES, there was a significant race-ethnicity group difference ($\chi^2_{(df=3)}=29.15$, $p=.000$), with African Americans most likely to report the death of a loved one (84.3%). Among all study respondents, the mean number of deaths was 1.1 (SD=.8; Range=0–5) and, among those with multiple deaths (not shown), the mean number of deaths is 2.31 (SD=.6, range=2–5). Among all study respondents, the mean number of deaths varied significantly by gender ($t=3.76$, $p=.000$) and race-ethnicity ($F=17.34$, $p=.000$), though these group differences are substantively minimal.

Also among all study participants, approximately five percent (5.4%, n=94) of young adults reported multiple deaths with five or more years between the closest deaths. Nine percent of study respondents (8.9%, n=155) reported multiple deaths with no years between the closest deaths – whereby the two closest deaths were reported at the same age or one year apart and no years between. Time-clustered death categories varied by gender ($\chi^2_{(df=5)}=16.66$, $p=.005$) and race-ethnicity ($\chi^2_{(df=15)}=63.89$, $p=.000$), but not SES categories. Generally, women and African Americans were most likely to report highly time-clustered deaths. Together the patterns highlight that, even among young adults, experiencing the death of a loved one and multiple deaths highly clustered in time are not uncommon.

Correlations

Table 2 shows correlations among study variables. Neither experiencing any deaths nor the overall number of deaths was associated with substance use problems. This supports the conclusion that it is important to consider more nuanced ways that people experience major life events, rather than solely considering the presence (or absence) or count of events. Indeed, the indicator of time-clustered deaths (ranging from no deaths to the most time-clustered category) is associated with an increased risk for lifetime SUD ($r=.057$, $p=.017$). While there does not appear to be statistically significant relationships between time-clustered deaths and past year SUD or past year alcohol consumption, the correlation results do not allow us to assess whether the potential negative behavioral consequences manifesting from multiple deaths occurs only when the deaths are most highly time-clustered in time.

Surprisingly, none of the anticipated control variables (number of deaths, age at first death, time since last death, and non-normative death) were linked to substance use problems. Thus any link between time-clustered deaths and substance use problems cannot be explained by these third variables (MacKinnon & Dwyer, 1993). However chronic stress was linked to both time-clustered deaths and SUD, thus underscoring the importance of controlling for everyday stress when assessing the independent behavioral health consequences of time-clustered deaths.

Time-clustered deaths and substance use problems

Table 3 presents logistic (for lifetime and past year SUD) and negative binomial regressions (for most drinks past year) assessing the relative behavioral health impact of

experiencing different degrees of time-clustered deaths. Models I–III report Odds Ratios predicting lifetime SUD and Models IV–VI report Odds Ratios predicting past year SUD. Models VII–IX report unstandardized OLS regression coefficients predicting the largest number of drinks on any single day in the past year. All models adjust for chronic stressors and social statuses. Given the high correlation between time-clustered deaths and the total number of deaths (shown in Table 2), diagnostic tests for multicollinearity were conducted on all models. Because the regression assumption of non-multicollinearity was violated in models including those with no deaths (models I, IV, VII), the number of deaths variable was excluded from these models. However, a control for the total number of deaths was included in models where violations of multicollinearity were not found (II, III, V, VI, VIII, IX), which relate to models addressing the central research question.

Compared to those reporting no deaths (Models I and IV) and those reporting one death (Models II and V), results indicate that the increased risk for lifetime and past year SUD among those experiencing multiple deaths is limited only to those experiencing the most time-clustered deaths (OR=1.65, OR=2.17). Among those reporting multiple deaths, those with the most time-clustered deaths are more than twice as likely to meet lifetime criteria for SUD (OR=2.34) and past year SUD (OR=2.20) than those experiencing the least time clustered deaths. Results predicting past year alcohol use are consistent with these patterns, whereby those experiencing the most time-clustered deaths drank more on one day sometime in the past year. The increased risk for substance use problems associated with time-clustered deaths is independent of chronic stressors, underscoring the importance of major life events for behavioral health problems. However, the findings suggest that the increased risk for behavioral health problems associated with experiencing multiple deaths is limited to those reporting the most highly time clustered deaths.

Sensitivity analyses were conducted (not presented) in order to further ensure that the increased risk for SUD among those who reported multiple deaths at the same age does not stem from losing multiple loved ones in a single event (e.g., car accident). Because we were not able to determine whether multiple deaths occurred in a single event, we excluded those who reported multiple deaths at the same age, leaving only those who reported the closest deaths at consecutive ages (but no years between) as representing the most highly time-clustered death group. All observed patterns were substantively identical to the results presented in Table 2, further supporting the conclusion that young adults with a history of experiencing multiple deaths in quick succession are at increased risk for SUD.

Discussion

The current work tested the hypothesis that experiencing multiple deaths close in time would put youths at higher risk for SUD beyond the risk presented simply by experiencing numerous deaths. We argued that the increased risk for substance use disorders may result from a barrage of loved ones' deaths close in time, possibly due to stress-coping and/or complicated grief associated with the bereavement process. The findings indicated that the total number of deaths was not associated with SUD. While those experiencing multiple deaths that were less time-clustered were also not at greater risk for SUD, those experiencing multiple deaths that are highly clustered in time were at increased risk for

developing a SUD. Indeed, compared to those reporting one death or no deaths, those experiencing the most time-clustered deaths (i.e., same age or consecutive ages with no years between) were more than twice as likely to meet criteria for SUD. Moreover, among those reporting multiple deaths, only those experiencing deaths that are *most highly clustered* were at increased risk for SUD. While we are unable to directly assess whether the increased SUD risk associated with highly time-clustered deaths is due to increasing substance use as a means to cope with repeated deaths in quick succession, the patterns are consistent with such an interpretation and call for further research on the nature of the relationship between time-clustered deaths, coping behaviors, and behavioral health problems. We were also unable to assess potential explanatory mechanisms associated with the grieving process, such as duration of grief or interruptions in the coping process. Future research should be designed to better address these and other possible mechanisms in the link between highly time-clustered deaths and substance use disorder.

In addition to assessing the behavioral health consequences of time-clustered deaths, this study also identified social groups at greatest risk for experiencing highly time-clustered deaths. Analyses on the social distribution of time-clustered deaths revealed that females are more likely than males to be in the most highly time-clustered death category. Possible explanations (reviewed in the background section) include the fact that females are more likely to have larger social networks than males and are more likely than males to be socialized to care about and be attuned to the experiences and conditions of their network members. In either case, the role of *gendering*, in the parlance of sociology, in this context is consistent with the slightly higher number of loved one deaths reported by females, which is unlikely to be a function of *sex as a biological distinction*.

In addition to the gendered patterns, experiencing time-clustered deaths also varied by race-ethnicity. Specifically, African Americans were more likely than non-Hispanic whites to be in the most highly time-clustered group. This is consistent with research indicating that African Americans experience disproportionately higher levels of stress exposure than their white counterparts (Turner & Avison, 2003; George & Lynch, 2003). However, consistent with prior research (Kessler et al., 1994; Kessler et al., 2005; Turner & Gil, 2002), results in Table 1 indicate that about half as many African Americans have a lifetime SUD and one third a past year SUD relative to non-Hispanic whites. Thus, while African Americans are more likely than non-Hispanic whites to experience highly clustered death events on the face of it, this doesn't appear to translate into risk for SUD. Further analysis, beyond the scope of the current paper, will be required to unpack potential race-ethnic variation in the time-clustered deaths – SUD relationship.

Limitations and future directions

This study provides a first step towards understanding the behavioral health consequences of time-clustered deaths using a community-based sample of young adults. Despite the advances this study makes in understanding the stress–health relationship, there are noteworthy limitations and we offer directions for future research. First, as with any cross-sectional study, caution should be taken when interpreting the causal (or even temporal) relationship between the death of loved ones and health. While this limitation may be

tempered by the inclusion of past year disorders and use/symptoms, longitudinal research is needed to establish the temporal order between the death of loved ones and health outcomes.

Second, this study focused solely on the death of loved ones as a major life event. Thus it is unclear whether the behavioral health consequences of highly time-clustered deaths extend to other major life events. While beyond the scope of the current investigation, future research should assess whether experiencing other major life events (such as violent altercations or being arrested) highly clustered in time increases risk for behavioral health problems. Other outcomes should also be explored, as the manifestation of social stressors is not specific to particular health problems (Aneshensel, 2005). Nevertheless, the current investigation demonstrates that substance use problems are one manifestation of experiencing multiple deaths highly clustered in time.

Third, while small frequencies in the most time-clustered categories prevented more nuanced analysis regarding the time-clustered deaths of specific network members, further research is needed to assess whether those experiencing time-clustered deaths of particular loved ones places individuals at greater risk for behavioral and mental health problems. For example, a reasonable question is whether those who experience highly time-clustered deaths which all involve immediate family members are at greater risk than those who experience highly time-clustered deaths involving only extended family members and/or non-family network members.

Fourth, future research should consider the relationship between time-clustered events and health outcomes at different periods of the lifecourse. Although the death of a loved one is relatively non-normative in young adulthood and may be particularly threatening to one's well-being during this lifecourse period, there is evidence to suggest that experiencing familial death during midlife (49–59 years) is particularly harmful for health compared to earlier or later stages of the lifecourse (Perkins & Harris, 1990). Future research should assess whether there are sensitive lifecourse periods in relation to the health consequences of time-clustered deaths.

Conclusion

While more than fifty years of research underscores the role of stress exposure for health (Thoits, 2010; Turner, 2010), the negative health consequences of major life events has been shown to be relatively modest compared to chronic stressors (Turner, 2003; Turner & Avison, 2003; Turner & Lloyd, 1999; Turner, Wheaton, & Lloyd, 1995; Wheaton, 1999). However, the current investigation underscores the importance of considering different ways in which people experience major stressful life events by demonstrating that multiple deaths highly clustered in time increases risk for substance use disorder, which represents a significant problem to individual and public health.

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Table 1

Descriptive Statistics

	Total (N=1,747)	Male (n=935)	Female (n=827)	Non-Hispanic White (n=456)	Cuban (n=427)	Non-Cuban Hispanic (n=449)	African American (n=430)	Low SES (n=286)	Middle SES (n=1,151)	High SES (n=325)
Lifetime Substance Use Disorder ^d	37.2 (649)	44.7 (413)	28.7 (236)	49.8 (227)	40.7 (171)	37.8 (168)	19.4 (83)	29.1 (83)	37.2 (424)	44.0 (142)
Past Year Substance Use Disorder ^d	23.7 (414)	30.7 (284)	15.8 (130)	35.1 (160)	26.4 (111)	20.7 (92)	11.9 (51)	19.3 (55)	22.8 (260)	30.7 (99)
Past Year Alcohol Use (M/SD) ^b	1.8 (1.8)	2.2 (1.8)	1.4 (1.6)	2.5 (1.7)	2.1 (1.8)	1.8 (1.8)	.8 (1.3)	1.3 (1.7)	1.7 (1.8)	2.5 (1.7)
Chronic Stressors (M/SD)	8.0 (4.6)	7.7 (4.5)	8.5 (4.6)	6.8 (3.9)	8.2 (4.6)	8.7 (4.6)	8.6 (4.9)	9.4 (4.8)	8.1 (4.5)	6.8 (4.1)
Any Deaths ^c	75.2 (1,314)	73.7 (681)	76.9 (633)	72.8 (332)	75.0 (315)	69.1 (307)	84.3 (360)	76.5 (218)	75.2 (857)	74.0 (239)
Number of Deaths (Mean/SD)	1.1 (.8)	1.0 (.8)	1.1 (.9)	1.0 (.8)	1.0 (.7)	.9 (.8)	1.3 (.9)	1.1 (.9)	1.0 (.8)	1.0 (.8)
Time-Clustered Deaths										
No Deaths	24.8 (433)	26.3 (243)	23.1 (190)	27.2 (124)	25.0 (105)	30.9 (137)	15.7 (67)	23.5 (67)	24.8 (282)	26.0 (84)
One Death	52.4 (916)	53.9 (498)	50.8 (418)	50.7 (231)	57.9 (243)	50.0 (222)	51.5 (220)	52.3 (149)	52.9 (602)	51.1 (165)
Multiple Deaths (5 or more years between)	5.4 (94)	4.6 (42)	6.3 (52)	5.7 (26)	3.8 (16)	5.0 (22)	7.0 (30)	3.9 (11)	5.7 (65)	5.8 (18)
Multiple Deaths (3 or 4 years between)	3.4 (60)	3.6 (33)	3.3 (27)	3.7 (17)	2.6 (11)	3.8 (17)	3.5 (15)	3.2 (9)	3.4 (39)	3.7 (12)
Multiple Deaths (1 or 2 years between)	5.1 (89)	5.1 (47)	5.1 (42)	5.9 (27)	2.6 (11)	3.6 (16)	8.2 (35)	5.6 (16)	4.9 (56)	5.3 (17)
Multiple Deaths (no years between) ^d	8.9 (155)	6.6 (61)	11.4 (94)	6.8 (31)	8.1 (34)	6.8 (30)	14.1 (60)	11.6 (33)	8.3 (95)	8.4 (27)

Notes. N=1,747. Unless otherwise noted, shown are % with frequencies in ().

^a DSM-IV criteria for lifetime/12-month alcohol or illicit drug abuse or dependence.

^b Largest number of drinks on any single day in past 12 months.

^c Lifetime deaths include: mother, father, sibling, intimate partner, child, grandparent, another loved one, or close friend.

^d Deaths reported at the same age or consecutive ages with no years between. Values in bold indicate statistically significant overall group differences using Chi-square tests and One-Way ANOVA (p .05).

Table 2

Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1. Lifetime SUD ^a	-									
2. Past Year SUD ^a	.708***	-								
3. Past Year Alcohol Use ^b	.508***	.464***	-							
4. Any Deaths ^c	-.000	-.020	-.009	-						
5. Number of Deaths ^d	.033	.003	.010	.714***	-					
6. Time-Clustered Deaths ^e	.057*	.023	.032	.539***	.891***	-				
7. Age at First Death ^f	-.003	-.001	-.012	n.a.	-.316***	-.135***	-			
8. Time Since Last Death ^g	-.010	-.018	.017	n.a.	-.255***	-.208***	-.681***	-		
9. Non-Normative Death(s) ^h	.038	.023	-.014	n.a.	.421***	.421***	-.028	-.248***	-	
10. Chronic Stress	.099***	.071**	-.005	.022	.091***	.072**	-.019	-.029	.103***	-

Notes. Pairwise correlation coefficients shown.

^aDSM-IV criteria for lifetime/12-month alcohol or illicit drug abuse or dependence.

^bLargest number of drinks on any single day in past 12 months.

^cOne or more deaths=1, no deaths=0.

^dTotal number of deaths (range = 0–5).

^eIncludes no deaths, one death, and all time-clustered death categories.

^fAge of respondent when first death occurred.

^gDifference (in years) between age at time of interview and age at the time of most recent death.

^hAny deaths involving loved ones other than grandparents.

† p .10;

* p .05;

*** p .01;

100' d

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Table 3

Substance Use Regressed on Time-Clustered Deaths

	Lifetime SUD ^a I	Lifetime SUD ^a II	Lifetime SUD ^a III	Past Year SUD ^a IV	Past Year SUD ^a V	Past Year SUD ^a VI	Past Year Alcohol Use ^b VII	Past Year Alcohol Use ^b VIII	Past Year Alcohol Use ^b IX
No Deaths	Ref.			Ref.			Ref.		
One Death	1.02 (.8–1.3)	Ref.		.92 (.7–1.2)	Ref.		.04 (–.1–.2)	Ref.	
Time-Clustered Multiple Deaths									
5 or more years between (least clustered)	1.08 (.7–1.8)	1.13 (.6–2.1)	Ref.	1.24 (.7–2.1)	1.45 (.7–2.9)	Ref.	.04 (–.2–.3)	–.01 (–.2–.2)	Ref.
3 or 4 years between	1.37 (.8–2.5)	1.47 (.7–3.0)	1.25 (.6–2.6)	.71 (.4–1.4)	.87 (.4–2.0)	.63 (.3–1.5)	.10 (–.2–.4)	.06 (–.2–.3)	.05 (–.3–.4)
1 or 2 years between	1.65 [†] (1.0–2.7)	1.77 (.9–3.5)	1.55 (.8–3.0)	1.17 (.7–2.0)	1.43 (.7–3.1)	1.01 (.5–2.1)	.33 ^{**} (.1–.6)	.28 [*] (–.1–.5)	.27 [†] (0–.6)
No years between (most clustered)	2.17 ^{***} (1.5–3.3)	2.34 [*] (1.2–4.7)	2.20 [*] (1.2–4.1)	1.73 [*] (1.1–2.7)	2.12 [†] (1.0–4.6)	1.53 (.8–3.0)	.35 ^{***} (.2–.5)	.30 ^{***} (–.1–.5)	.30 [*] (0–.6)
	N=1,747	N=1,314	N=398	N=1,747	N=1,314	N=398	N=1,747	N=1,314	N=398

Notes: N=1,747. Models I–VI present Odds ratios and 95% confidence intervals in (); Models VII–IX presents coefficients from negative binomial regressions with 95% confidence intervals in (). All models adjust for chronic stressors, gender, race-ethnicity, and family of origin SES. A control for the total number of deaths was also included in models where violations of multicollinearity were not found (II, III, V, VI, VIII, IX).

^a DSM-IV criteria for lifetime/12-month alcohol or illicit drug abuse or dependence.

^b Largest number of drinks on any single day in past 12 months.

[†] p .10;

* p .05;

** p .01;

*** p .001