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The Unique Role of Stressful Life Events in Suicidal Thoughts and Behaviors Among  
Adolescents

THESIS

submitted in partial satisfaction of the requirements  
for the degree of

MASTER OF ARTS

in Social Ecology

by

Frank Samuel Deryck

Thesis Committee:  
Professor Roxane Cohen Silver, Chair  
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Lecturer with Security of Employment Joanne Zinger

2016



## **DEDICATION**

This thesis is dedicated to Jacob Cooke,  
the constant I have found in a world full of variables.

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## **ABSTRACT OF THE THESIS**

The Unique Role of Stressful Life Events in Suicidal Thoughts and Behaviors Among  
Adolescents

By

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Master of Arts in Social Ecology

University of California, Irvine, 2016

Professor Roxane Cohen Silver, Chair

Depressive symptomatology is a significant predictor of adolescent suicide, but it may be insufficient to explain what motivates a suicide attempt. By comparison, stressful life events potentially explain aspects of suicide that depressive symptomatology is unable to, but research on this relationship is scarce. Secondary analyses were conducted on data from a nationally representative sample of adolescents (“Add Health,”  $N = 17,561$ ) to examine the hypothesis that stressful events are a unique predictor of suicide attempts. Results indicated that stressful life events were a significant predictor of overall suicidality (thoughts or attempts), although the association was partially mediated by depressive symptomatology. However, both the accumulation of events and specific experiences of violence and bereavement predicted suicide attempts among adolescents who reported suicidal thoughts. These associations were significant when adjusting for depressive symptomatology, demographics, and other common suicide risk factors such as illicit substance use and exposure to the suicide of a close friend or family member. Findings are consistent with previous studies that discuss the limitations of depressive symptomatology as a predictor of suicide. Stressful life events are prevalent experiences that place adolescents at higher risk for both suicidal ideation and suicide attempts.



## Introduction

The suicide rate in the United States has reached an all-time high, accounting for 41,149 deaths in 2013 (Centers for Disease Control, 2016). This number includes many adolescents. In fact, suicide is the second-leading cause of death in the U.S. for those aged 10-24 (Centers for Disease Control, 2016). Thus, it is critical to study its risk factors. Researchers have identified many such factors, including female gender, homo- or bisexual orientation, alcohol abuse, substance use, impulsivity, unsupportive parents, and exposure to a loved one's completed or attempted suicide (Barbosa et al., 2014; Evans, Hawton, & Rodham, 2004; Hawton & van Heeringen, 2009; Kitts, 2005; Nock et al., 2008; Pompili et al., 2012; Russell & Joyner, 2001; Spirito & Esposito-Smythers, 2006).

Depressive symptomatology is also a leading predictor of adolescent suicide (Evans et al., 2004). This is largely due to feelings of hopelessness and entrapment that often accompany depression (McLaughlin, Miller, & Warwick, 1996; Minkoff, Bergman, & Beck, 1973; Spirito & Esposito-Smythers, 2006). Hopelessness often leads to negative expectations about the future (McLaughlin et al., 1996; Minkoff et al., 1973). Adolescents lack the cognitive abilities and life experiences to cope with these expectations, and instead consider their lives as permanently negative (McLaughlin et al., 1996; Mullis & Chapman, 2000; Spivack & Shure, 1985). Adolescents may then identify suicide as a means to escape or to get relief from their state of mind (Boergers, Spirito, & Donaldson, 1998; Dube et al., 2001; Hawton, Rodham, Evans, & Weatherall, 2002; Kienhorst, De Wilde, & Diekstra, 1995; O'Connor, 2011; Wilcox & Fawcett, 2012). The relationship between depression and suicide is well documented in adolescence, as most suicide victims meet the criteria for a depressive disorder at the time of their death (Beautrais, 2003; Brent, 1995; Hawton & van Heeringen, 2009; Mann, 1998; Portzky,

Audenaert, & van Heeringen, 2005; 2009). Thus, many scholars consider depressive symptomatology as the key predictor of adolescent suicide (Beautrais, 2003; Dube et al., 2001; Fergusson, Woodward, & Horwood, 2000; Horesh, Sever, & Apter, 2003; Liu & Tein, 2005; Wilcox & Fawcett, 2012).

Other researchers, however, have argued that depressive symptomatology alone is insufficient to fully explain suicidal behavior (Mann, Waternaux, & Haas, 1999; Molnar, Berkman, & Buka, 2001; Nock, Hwang, Sampson, & Kessler, 2010; O'Connor, 2011).

Depressive symptomatology often predicts an onset of suicidal thoughts, but is insufficient at determining who will progress to attempting suicide (Brodsky et al., 2001; DeJong, Overholser, & Stockmeier, 2010; Mann et al., 1999; Nock et al., 2010; Wetzler et al., 1996). Most depressed adolescents never attempt suicide (Brodsky et al., 2001; Haw & Hawton, 2014; Molnar et al., 2001), with only a minority progressing towards suicidal action (McFeeters, Boyda, & Neill, 2015; Nock et al., 2008). This suggests that factors separate from depressive symptomatology motivate a suicide attempt (McFeeters, Boyda, & O'Neill, 2015; O'Connor, 2011). Research has yet to fully explore these factors (Klonsky & May, 2013; Liu & Miller, 2014), although increased attention is being paid to the predictive role of stressful life events (Liu & Miller, 2014; McFeeters, Boyda, & O'Neill, 2015).

Stressful life events – such as witnessing violence or being physically abused – are frequently experienced by adolescents (Green et al., 2010; Liu & Miller, 2014). Suicidal youth are more likely to have been exposed to stressful events than their non-suicidal peers (Barbosa et al., 2014; Borges et al., 2008; Cheng, Chen, Chen, & Jenkins, 2000; Dube et al., 2001; Liu & Tein, 2005; Portzky et al., 2009). Both the *number* and *type* of experienced events predict suicidal behaviors. That is, adolescents often face an increasing number of stressors preceding a

suicide attempt (Borges et al., 2008; Kienhorst et al., 1995; Molnar et al., 2001), and the experience of several specific events predict suicidal behaviors, including childhood experiences of abuse (Barbosa et al., 2014; Hadland et al., 2012; Jeon et al., 2009), the death of a parent (Jakobsen & Christiansen, 2011), and violence (Flannery, Singer, & Wester, 2001; Haynie, Petts, Maimon, & Piquero, 2008; Stack, 2013). The frequency of stressful events also predicts the difference between suicidal thoughts, making a suicide plan, and attempting suicide among adolescents (Liu & Miller, 2014; Taliaferro & Muehlenkamp, 2013). However, research is still unclear on how the relationship between stressful life events and suicidality is impacted by the presence of depressive symptomatology.

Stressful life events frequently predict depressive symptomatology (Adkins, Wang, & Elder, 2009; Brockie, Dana-Sacco, Wallen, Wilcox, & Campbell, 2015; Chapman et al., 2004; Waaktaar, Borge, Fundingsrud, Christie, & Torgersen, 2004), with the experience of stressors often preceding depressive symptoms. Depressive symptomatology has also been suggested to mediate the relationship between stressful life events and suicidality. However, evidence is mixed. Some researchers have found that the association between stressful life events and suicide is largely explained by depressive symptomatology (Beautrais, 2003; Dube et al., 2001; Fergusson et al., 2000; Horesh et al., 2003; Liu & Tein, 2005; Wilcox & Fawcett, 2012). Other researchers contend that these stressful events predict a suicide risk that is distinct from the experience of depressive symptomatology (Borges et al., 2008; Foster, Gillespie, McClelland, & Patterson, 1999; Nanayakkara, Misch, & Chang, 2013; Spirito & Esposito-Smythers, 2006; Wang et al., 2012). Presently, the associations between stressful life events, depressive symptomatology, and suicide remain understudied (Liu & Miller, 2014; McFeeters, Boyda, & Neill, 2015).

Additionally, the literature also lacks studies that examine how common suicide risk factors, such as substance use and alcohol consumption, are implicated in the relationship between suicidal behaviors and stressful life events. Much like depressive symptomatology, many often cited risk factors predict suicidal behaviors without explaining what prompts a suicide attempt (Klonsky & May, 2013). Little is known about how other risk factors are implicated in predicting suicidal behaviors alongside stressful life events.

### **Present Research**

The present study was conducted to address gaps within the existing adolescent suicide literature. This study examined whether stressful life events were significant predictors of suicidal thoughts and behaviors, even when adjusting for depressive symptomatology, suicide risk factors (e.g., illicit substance use, poor family social support), and demographics (e.g., gender, race, age). The hypotheses were as follows:

- 1) Depressive symptomatology will fail to fully mediate the relationship between stressful life events and suicidality.
- 2) Stressful life events will significantly predict overall suicidal thoughts and attempts for adolescents when adjusting for depressive symptomatology, relevant risk factors, and demographics.
- 3) Both the number and the type of stressful life events will predict overall suicidal thoughts and attempts for adolescents.
- 4) Exposure to stressful life events will differ significantly between adolescents who think about suicide and adolescents who attempt suicide, with the number and type of event predicting the difference between the two groups.

## Method

Data were drawn from the nationally representative *National Longitudinal Study of Adolescent to Adult Health* ("Add Health;" Harris et al., 2009). The study collected four waves of data among over 18,000 adolescents from 1994 until 2009, using a multi-stage stratified clustering sample that stratified by region, urbanicity, school type, and percentage of Caucasian students. Adolescents were first interviewed when they were in middle school or high school. They were assessed three times over the next 15 years, concluding the study when they were in their mid-thirties. Throughout the study, adolescents and their family members were interviewed about many domains of their lives, including school, living conditions, sexual behaviors, physical well-being, aspirations for the future, suicidal behaviors, and experienced stressful life events. Our analysis primarily used the first wave of data, which was collected during the 1994-1995 school year. Both adolescents and their parents were assessed using a mixture of face-to-face interviews and audio-assisted computer questionnaires in which adolescents themselves completed surveys regarding sensitive topics such as sexual and suicidal behaviors.

### *Predictor Variables*

**Stressful life events.** At each wave of data collection, adolescents were asked if they had experienced certain types of stressful life events. The present study selected 15 total events drawn from Waves I and III. Events were selected by referencing stressful life event checklists (Adkins et al., 2009; Seery, Holman, & Silver, 2010) and matching events to relevant variables in the Add Health data. Responses were dichotomously coded (No = 0, Yes = 1). Table 1 displays the list of events, the questions that adolescents were asked, and the strategy used to code each individual stressful life event. These events were then summed to create a composite of cumulative stressful life events. Events were also collapsed into five dichotomous categories

*Table 1. Stressful life event survey questions and coding strategies<sup>a</sup>*

Stressful life event	Question asked to adolescents	Event timing	Dichotomously coded “1” if...
Involved in physical fight	“You got into a physical fight.”	Past 12 months	Experienced 1+ times
Threatened with a weapon	“Someone pulled a knife or gun on you.”	Past 12 months	Experienced 1+ times
Jumped	“You were jumped.”	Past 12 months	Experienced 1+ times
Witnessed shooting or stabbing	“You saw someone shoot or stab another person.”	Past 12 months	Witnessed 1+ times
Stabbed	“Someone cut or stabbed you.”	Past 12 months	Experienced 1+ times
Raped <sup>b</sup>	“Were you ever physically forced to have sexual intercourse against your will?”	Ever	Experienced
Shot	“Someone shot you.”	Past 12 months	Experienced 1+ times
Parents on welfare	“Does [your mother] receive public assistance, such as welfare?” “Does [your father] receive public assistance, such as welfare?”	Current	Either or both parents are on welfare
Living in unsafe neighborhood	“Do you usually feel safe in your neighborhood?”	Current	Adolescent report not feeling safe in current neighborhood
Serious injury	“Which of these best describes your worst injury during the past year?”	Past 12 months	Adolescent self-rated injury as “serious,” “very serious,” or “extremely serious”
STI diagnosis	“Have you ever been told by a doctor or a nurse that you had: chlamydia, syphilis, gonorrhea, HIV or AIDS, genital herpes, genital warts, trichomoniasis, or hepatitis B?”	Ever	Diagnosed with 1+ STIs

Physically abused	“How often had your parents or other adult care-givers slapped, hit, or kicked you?”	Before 6 <sup>th</sup> grade	Experienced 6+ times
Neglected	“How often had your parents or other adult care-givers not taken care of your basic needs, such as keeping you clean or providing food or clothing?”	Before 6 <sup>th</sup> grade	Experienced 3+ times
Sexually abused	“How often had one of your parents or other adult care-givers touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations?”	Before 6 <sup>th</sup> grade	Experienced 1+ times
Death of mother	“Is [your biological mother] still living?”	Ever	Mother is deceased
Death of father	“Is [your biological father] still living?”	Ever	Father is deceased

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<sup>a</sup> Most stressful life events were assessed during Wave I. The only exceptions are physical abuse, neglect, and sexual abuse, which were asked during Wave III.

<sup>b</sup> This question was only asked of females.

based on event categories used in previous research (Blum, Silver, & Poulin, 2014; McFeeters, Boyda, & O Neill, 2015): (1) Injury/illness, (2) death of one or both parents (bereavement), (3) exposure to violence, (4) economic hardship, and (5) abuse. Adolescents were coded into a category if they reported experiencing one or more events in that category. Table 2 displays the prevalence of exposure to these events and categories.

**Depressive symptomatology.** Adolescents responded to 10 items similar to the CES-D 10 (Radloff, 1977). The items assessed how often adolescents had experienced depressive symptomatology in the seven days prior to their interview. Examples include “*You felt sad*” and “*You felt you could not shake off the blues, no matter how hard you tried.*” Scores for each item ranged from 0 (“*Never*”) to 3 (“*Almost all the time or always*”). Scores were summed to create a composite with a maximum of 30. Higher scores represented higher frequencies of depressive symptomatology. Our analyses showed that the composite had an adequate reliability ( $\alpha = .86$ ).

#### *Outcome Variables*

**Suicidality – Thoughts and Attempts.** Adolescents indicated on the self-report questionnaire if they had seriously thought about or attempted suicide in the 12 months preceding their interview. Two dichotomous variables were coded from their responses. The first assessed overall prevalence of suicidal behavior by comparing adolescents who reported suicidal ideation or having attempted suicide (coded “1”) to adolescents who reported neither suicidal ideation nor any suicide attempts (coded “0”). The second examined a subset of the sample ( $n = 2,277$ ) who reported suicidal behaviors, and compared adolescents who attempted suicide to those who only expressed suicidal ideation.

#### *Risk Factors*



Table 2. Prevalence of stressful life events among non-suicidal and suicidal adolescents (N = 17,561)<sup>ab</sup>

	No suicidal thoughts		Suicidal thoughts		Suicide attempt		Total	
	(weighted n = 15,313)		(weighted n = 1,581)		(weighted n = 667)		(weighted N = 17,561)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<b>Violence</b>	<b>6,059</b>	<b>39.57</b>	<b>817</b>	<b>51.68</b>	<b>426</b>	<b>63.87</b>	<b>7,302</b>	<b>41.58</b>
Involved in physical fight	4,696	30.67	625	39.53	344	51.57	5,665	32.26
Threatened with a weapon	1,684	11.00	272	17.20	183	27.44	2,139	12.18
Jumped	1,573	10.27	242	15.31	137	20.54	1,953	11.12
Witnessed shooting or stabbing	1,517	9.91	225	14.23	151	22.64	1,897	10.80
Stabbed	601	3.92	118	7.46	90	13.49	810	4.61
Raped	374	2.44	114	7.21	84	12.59	574	3.27
Shot	163	1.06	25	1.58	23	3.45	211	1.20
<b>Economic hardship</b>	<b>2,738</b>	<b>17.88</b>	<b>314</b>	<b>19.86</b>	<b>198</b>	<b>29.69</b>	<b>3,251</b>	<b>18.51</b>
Parents on welfare	1,591	10.39	153	9.68	107	16.04	1,851	10.54
Living in unsafe neighborhood	1,410	9.21	205	12.97	128	19.19	1,744	9.93
<b>Injury/Illness</b>	<b>2,398</b>	<b>15.66</b>	<b>332</b>	<b>21.00</b>	<b>169</b>	<b>25.34</b>	<b>2,899</b>	<b>16.51</b>
Serious injury	2,181	14.24	286	18.09	146	21.89	2,615	14.89
STI diagnosis	269	1.76	58	3.67	33	4.95	360	2.05
<b>Abuse</b>	<b>1,436</b>	<b>9.38</b>	<b>237</b>	<b>14.99</b>	<b>123</b>	<b>18.44</b>	<b>1,796</b>	<b>10.23</b>
Physically abused	808	5.28	137	8.67	83	12.44	1,029	5.86
Neglected	500	3.27	72	4.55	37	5.55	609	3.47
Sexually abused	436	2.85	68	4.30	47	7.05	551	3.14
<b>Bereavement</b>	<b>655</b>	<b>4.28</b>	<b>58</b>	<b>3.67</b>	<b>42</b>	<b>6.30</b>	<b>757</b>	<b>4.31</b>
Death of father	508	3.32	39	2.47	28	4.20	574	3.27
Death of mother	167	1.09	19	1.20	17	2.55	204	1.16
<b>Exposure to 1+ events</b>	<b>9,086</b>	<b>59.34</b>	<b>1,113</b>	<b>70.40</b>	<b>543</b>	<b>81.41</b>	<b>10,742</b>	<b>61.17</b>

<sup>a</sup> Numbers within categories may add up to more than 100% because an adolescent could report more than one stressful life event.

<sup>b</sup> All statistics reported within the table are weighted using post-stratification weights.

**Alcohol consumption.** Alcohol use was measured by combining three items assessing the frequency of alcohol consumption during the 12 months prior to assessment: (1) “...on how many days did you drink alcohol?” (2) “...on how many days did you have five or more drinks in a row?” (3) “...on how many days have you gotten drunk or ‘very, very high’ on alcohol?” Response options were recoded to reflect increasing use. Responses ranged from 0 (“Never”) to 6 (“Every day or almost every day”). Items were summed and averaged. Higher scores indicated higher frequency of alcohol use. This coding strategy was previously used with these data (Fish & Pasley, 2015) and demonstrates high reliability ( $\alpha = .91$ ).

**Illicit drug use.** Adolescents reported their lifetime usage of illicit substances during Wave 1, including cocaine, ecstasy, marijuana, LSD, and other illicit drugs. Responses for each substance were dichotomized because of low endorsement rates. Adolescents were coded if they had ever used any illicit substance (No = 0, Yes = 1).

**Suicide exposure.** Adolescents were dichotomously coded as being exposed to suicide if a friend or family member had attempted or completed suicide in the past 12 months (No = 0, Yes = 1).

**Access to firearms.** Adolescents were positively coded if they reported easy access to a firearm at home (No = 0, Yes = 1).

**Impulsiveness.** Adolescents reported their agreement with the statement “You go with your gut feeling.” Agreement was rated on a five-point scale, which was reverse-coded to reflect higher impulsivity (1 = “Strongly disagree,” 5 = “Strongly agree”).

**Poor family social support.** A measure to reflect unsupportive parents was coded based on previous research (Ryabov, 2015). Adolescents reported if they agreed or disagreed that: (1) their parents cared about them, (2) people in their family understood them, (3) their family had fun together, and (4) their family pays attention to them. Responses were on a five-point scale.

Responses were reverse-coded and summed. Scores ranged from 0-16. Higher scores reflected higher absence of familial support.

### *Covariates – Demographics*

Many demographic factors were included as covariates in the analyses.

**Age.** Adolescents reported their age. 75.9% of adolescents were missing these data. Adolescents missing this information had the mean age of their peers in their grade level substituted.

**Sex.** Adolescents reported their biological sex as female (0) or male (1).

**Race.** Adolescents reported if they were White, Black, Asian/Pacific Islander, Native American, and/or another unspecified race. A dummy coded variable was created based on these reports.

“Native American” and “Other” were combined due to low endorsement. An additional category for mixed race was coded. The final dummy coded variable included White, Black, Asian/Pacific Islander, Native American/Other, and Mixed.

**Ethnicity.** Adolescents reported whether they were Hispanic or Latino/a (No = 0, Yes = 1).

**Lesbian, gay, and bisexual (LGB) attraction.** Adolescents reported if they had experienced romantic attractions towards males and/or females. Sexuality was coded depending on the adolescent’s sex and reported attractions. Responses were dichotomized to compare LGB attraction (1) to non-LGB attraction (0).

**SES: Parents’ education level.** Parents’ education level was substituted for income.

Adolescents reported the education level for both parents, which ranged from 1 (“*Parent did not go to school*”) to 9 (“*Professional degree*”). The average education level was computed between both parents. Single parent households used the present parent’s education level. 60.73% of adolescents were missing these data. Missing data were substituted with the mother’s self-reported education level.

## Overview of Analyses

STATA statistical software (Version 13; StatsCorp, College Station, TX) was used for analyses as it is designed to handle weighted complex longitudinal survey data. Post-stratification weights were provided by Add Health and were applied using the `surveyset` command so that results were representative of the United States population.

Two Sobel tests of mediation were run to examine whether depressive symptomatology mediated the relationship between cumulative stressful life events and suicidal thoughts and/or attempts. The Sobel test was selected due to its ability to conduct mediational analyses in which the dependent variable is dichotomous (Baron & Kenny, 1986). Common mediation tests such as structural equation modeling require a continuous dependent variable, and thus would be incorrect models to test the dichotomous suicide outcome variables (Kenny, 2016).

Five logistic regression models with hierarchical variable entry strategies examined the association between stressful life events, depressive symptomatology, and suicidal thoughts and attempts. All models included demographic covariates and other suicide risk factors. The first model examined predictors of both suicidal thoughts and attempts. Blocks of variables were tested for inclusion in the model: (a) demographics, (b) depressive symptomatology, (c) other suicide risk factors, and (d) cumulative stressful life events. A fifth model (e) replaced the cumulative stressful events measure with the five stressful life event category variables (described above). Suicidal thoughts and attempts were combined in this model to compare suicidal adolescents to those who did not report any suicidal thoughts or attempts.

The second set of models used the same strategy to examine predictors of suicide attempts within the subsample of suicidal adolescents. Only adolescents who reported experiencing suicidal thoughts in the past year were included in this set of analyses.

In each model, significant predictors from the groups of variables (depressive symptomatology, stressful life events, other suicide risk factors, and demographics) were tested for inclusion in the final models. Nonsignificant variables ( $p > .05$ ) were excluded for parsimony in the final models.

## **Results**

### **Missing data**

Adolescents could refuse to answer any questions that they were asked. Additionally, adolescents reported if they did not know the answer to a question. These instances were treated as missing data in the analyses. Some cases had values substituted, as described above for missing data for parental education or age. Any cases that could not be substituted in this way were ultimately excluded from analyses.

Data regarding sexual abuse, physical abuse, and neglect were missing for approximately 5,500 adolescents. This is because the abuse variables were not assessed during Wave I, but rather 6-8 years later during Wave III. The adolescents were college-aged in Wave III, and 5,500 withdrew from the study following Wave I. Thus, any adolescents who did not continue to Wave III were missing abuse data in the present analyses.

A sensitivity analysis was performed to identify how best to impute the missing abuse data. Models were run under three conditions. The first involved listwise deletion of adolescents with missing abuse data. The second used a technique called Multiple Imputation of Chained Equations (MICE), which was selected due to its ability to handle imputation when multiple variables are missing data (Royston & White, 2011). The third substituted non-response values (“0”) for missing abuse data. Analyses showed no significant difference between results when using either MICE data imputation or non-response values. Non-response values were ultimately

substituted for the missing abuse data as we were uncomfortable imputing stressful life events data.

### **Sample Demographics**

The total number of adolescents in the sample was 17,561 out of an original 18,924; thus 92.8% of the sample were retained. Almost three-quarters of the sample were white (70.43%), 14.73% Black, 3.41% Asian/Pacific Islander, 4.08% mixed, and 7.03% Indian or other race. Adolescents with Hispanic/Latino ethnicity comprised 11.69% of the sample. Females comprised 49.63% of the sample. Ages ranged from 10- to 19-years-old, and the average age was 14.8 years (SD = 1.63). 5.93% reported LGB attractions. On average, the parental education level ranged from high school graduates to college graduates. These demographic reports are weighted to bring the demographic makeup of the sample back to the U.S. Census Bureau 1993 benchmarks (U.S. Department of Commerce, 1993). The exception is LGB attractions, where Add Health has a higher number than the national average due to issues in how sexual orientation was assessed during Wave I (Savin-Williams & Joyner, 2014).

### **Suicidality – Thoughts and Attempts**

Almost 13% (12.8%) of adolescents in the sample reported either recent suicidal thoughts or both thoughts and a suicide attempt. Approximately 3.80% of our sample had made an actual suicide attempt, with 29.68% of adolescents who reported suicidal thoughts also reporting a suicide attempt. A logistic regression with suicidality (either thoughts and/or attempts) as the outcome shows that girls, older adolescents, and LGB attractions predict higher odds of suicidality (all  $ps < .05$ ). Girls and LGB attraction predict higher odds of attempting suicide (all  $ps < .05$ ). Older age predicted lower odds of a attempt suicide (all  $ps < .05$ ).

### **Mediation Analyses**

The frequency of stressful life events is positively associated with both the odds of suicidality for the entire sample ( $N = 17,561$ ;  $OR = 1.30$ ,  $SE = .03$ ,  $p < .001$ ), and the odds of suicide attempts among a subsample of adolescents expressing suicidal ideation ( $n = 2,277$ ;  $OR = 1.25$ ,  $SE = .03$ ,  $p < .001$ ). Two Sobel tests were conducted to test whether depressive symptomatology mediated the relationship between stressful life events and suicide.

The first Sobel test examined whether depressive symptomatology mediated the relationship between stressful life events and overall suicidality for the entire sample ( $N = 17,561$ ). The frequency of stressful life events is positively associated with odds of suicidality. When depressive symptomatology is included in the model, stressful life events remain positively associated with odds of overall suicidality ( $OR = 1.18$ ,  $SE = 0.02$ ,  $p < .001$ ). The Sobel test suggests a partial mediation to be present. The proportion of stressful life events mediated by depressive symptomatology is 45% ( $Sobel = 17.81$ ,  $SE = .04$ ,  $p < .001$ ). Thus, depressive symptomatology explains part, but not all, of the relationship between stressful life events and suicidality.

The second Sobel test examined whether depressive symptomatology mediated the relationship between the number of stressful life events and suicide attempts among a subsample of suicidal adolescents ( $n = 2,277$ ). Stressful life events were positively associated with odds of attempting suicide. When depressive symptomatology is included in the model, the frequency of stressful life events remain positively associated with odds of attempting suicide ( $OR = 1.23$ ,  $SE = .02$ ,  $p < .001$ ). The Sobel test suggests a partial mediation to be present. The proportion of stressful life events mediated by depressive symptomatology is 36.87% ( $Sobel = 12.58$ ,  $SE = .03$ ,  $p < .001$ ). Thus, depressive symptomatology explains part, but not all, of the relationship between stressful life events and suicide attempts.

## Predicting Suicidal Thoughts and Attempts Among Adolescents

Table 3 presents the odds ratios for predictors of overall suicidality (suicidal ideation and/or a suicide attempt) for the entire sample of adolescents ( $N = 17,561$ ). A logistic regression model with a hierarchical variable entry strategy examined demographics, depressive symptomatology, relevant suicide risk factors, and stressful life events as predictors of suicidality.

Demographics were entered in Model 1. The odds of reporting overall suicidality were significantly higher for adolescents who were of mixed race (compared to White), older, or expressed LGB attractions (all  $ps < .05$ ). The odds of reporting overall suicidality were significantly lower for adolescents who were male or Black (compared to White; all  $ps < .05$ ). No other demographics were associated with suicidality.

Depressive symptomatology was entered in Model 2. Increasing reports of depressive symptomatology significantly predicted higher odds of reporting suicidality, when adjusting for demographics ( $OR = 1.24$ ,  $SE = .01$ ,  $p < .001$ ).

Other suicide risk factors (suicide exposure, poor family social support, lifetime drug use, alcohol consumption, easy access to a firearm, and impulsiveness) were entered in Model 3. All of these risk factors were significantly associated with higher odds of reporting suicidality (all  $ps < .05$ ), except impulsiveness, which failed to reach significance ( $p > .05$ ). Depressive symptomatology remained a significant predictor of suicidality, even after the inclusion of other suicide risk factors ( $OR = 1.17$ ,  $SE = .01$ ,  $p < .05$ ).

Cumulative stressful life events were entered in Model 4. Greater number of stressful events was significantly associated with higher odds of suicidality when adjusting for





demographics, depressive symptomatology, and other suicide risk factors ( $OR = 1.08$ ,  $SE = .03$ ,  $p = .003$ ). Depressive symptomatology and the other suicide risk factors remained significant predictors of suicidality after the inclusion of stressful life events in Model 4 (all  $ps < .05$ ).

The cumulative stressful life events were replaced with the stressful life event categories in Model 5. Of the five categories, only two were significantly associated with higher odds of suicidality: exposure to violence ( $OR = 1.22$ ,  $SE = .10$ ,  $p = .019$ ) and abuse ( $OR = 1.29$ ,  $SE = .13$ ,  $p = .014$ ). Injury/illness, bereavement, and economic hardship were not associated with suicidality (all  $ps > .05$ ). Depressive symptomatology and the other suicide risk factors remained significant predictors of suicidality after the inclusion of the stressful life event categories in Model 5 (all  $ps < .05$ ).

### **Predicting Suicide Attempts Among Adolescents Reporting Suicidal Thoughts**

Table 4 presents the odds ratios for predictors of suicide attempts among a subsample of adolescents who reported suicidal thoughts ( $n = 2,277$ ). Logistic regression models with hierarchical variable entry strategy examined demographics, depressive symptomatology, relevant suicide risk factors, and stressful life events as predictors of suicide attempts. Adolescents who did not experience suicidal thoughts were excluded from the model.

Demographics were tested in Model 1. The odds of attempting suicide were significantly higher for adolescents with LGB attractions ( $OR = 2.88$ ,  $SE = .38$ ,  $p = .002$ ). Age and male sex were negatively associated with odds of attempting suicide (all  $ps < .05$ ). Race, Hispanic/Latino ethnicity, and parent education level were not associated with suicide attempts (all  $ps > .05$ ).

Depressive symptomatology was added in Model 2. Depressive symptomatology was positively associated with odds of suicide attempts when adjusting for demographics ( $OR = 1.07$ ,  $SE = .02$ ,  $p < .001$ ).

Other suicide risk factors (suicide exposure, poor family social support, lifetime drug use, alcohol consumption, easy access to a firearm, and impulsiveness) were entered in Model 3. While a majority of these factors had been significant predictors of overall suicidality (Table 3), only two risk factors significantly predicted suicide attempts. Suicide exposure ( $OR = 1.47$ ,  $SE = .21$ ,  $p = .006$ ) and lifetime drug use ( $OR = 1.98$ ,  $SE = .32$ ,  $p < .001$ ) both predicted higher odds of suicide attempts. Poor parent social support, alcohol use, easy access to a firearm at home, and impulsiveness did not predict suicide attempts (all  $ps > .05$ ). Depressive symptomatology remained a significantly predictor of suicide attempts when adjusting for demographics and other suicide risk factors ( $OR = 1.06$ ,  $SE = .02$ ,  $p = .001$ ).

Cumulative stressful life events were added in Model 4. Greater number of stressful events was positively associated with the odds of attempting suicide ( $OR = 1.20$ ,  $SE = .05$ ,  $p < .001$ ) when adjusting for demographics, depressive symptomatology, and other suicide risk factors. Depressive symptomatology, suicide exposure, and lifetime drug use all remained significant after the inclusion of stressful life events in Model 4 (all  $ps < .05$ ).

The cumulative stressful life events were replaced with the stressful life event categories in Model 5. Only bereavement ( $OR = 1.90$ ,  $SE = .44$ ,  $p = .006$ ) and violence ( $OR = 1.42$ ,  $SE = .19$ ,  $p = .010$ ) were significantly associated with higher odds of suicide attempts when adjusting for demographics, depressive symptomatology, and other suicide risk factors. Injury/illness, economic hardship, and abuse failed to reach significance (all  $ps > .05$ ).

## **Discussion**

This study suggests that stressful life events are a significant predictor of both suicidal thoughts and attempts among adolescents. The association of exposure to these events with both

Table 4. Logistic regression models predicting suicide attempts compared to adolescents with only suicidal thoughts ( $n = 2,277$ )<sup>a</sup>

	Model 1			Model 2			Model 3			Model 4			Model 5		
	OR	SE	95%CI	OR	SE	95%CI	OR	SE	95%CI	OR	SE	95%CI	OR	SE	95%CI
Sex <sup>b</sup>	0.62***	.08	[0.49, 0.80]	0.67**	.08	[0.52, 0.86]	0.65**	.09	[0.49, 0.84]	0.55***	.08	[0.41, 0.74]	0.60***	.08	[0.45, 0.80]
Age	0.84***	.04	[0.77, 0.92]	0.83***	.04	[0.76, 0.90]	0.81***	.04	[0.74, 0.88]	0.82***	.04	[0.75, 0.90]	0.81***	.04	[0.74, 0.88]
LGB attraction <sup>c</sup>	2.88**	.38	[1.27, 2.80]	1.74***	.36	[1.16, 2.62]	1.57*	.33	[1.04, 2.38]	1.50	.32	[0.98, 2.28]	1.61*	.34	[1.06, 2.46]
Depressive symptomatology				1.07***	.02	[1.04, 1.11]	1.06**	.02	[1.02, 1.09]	1.05**	.02	[1.01, 1.08]	1.05**	.02	[1.02, 1.09]
Suicide exposure <sup>d</sup>							1.47**	.21	[1.12, 1.94]	1.34*	.19	[1.01, 1.78]	1.41*	.20	[1.07, 1.86]
Lifetime drug use <sup>e</sup>							1.98***	.32	[1.44, 2.72]	1.67**	.26	[1.23, 2.27]			
Cumulative stressful life events										1.20***	.05	[1.11, 1.29]			
Stressful life event categories															
Bereavement <sup>f</sup>													1.90**	.44	[1.20, 2.99]
Violence <sup>g</sup>													1.42*	.19	[1.09, 1.85]

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

<sup>a</sup> Variables that failed to reach significance in preliminary analyses were excluded from the final model. These variables are: race, Hispanic/Latino ethnicity, parent education level, poor parent social support, alcohol use, easy access to firearm at home, impulsiveness, injury/illness, economic hardship, and abuse.

<sup>b</sup> Reference group = female

<sup>c</sup> Reference group = no expressed LGB attractions

<sup>d</sup> Reference group = no exposure to the attempted or completed suicide of a friend or family member

<sup>e</sup> Reference group = no use of any illicit drug

<sup>f</sup> Reference group = adolescents with both birth parents still alive

<sup>g</sup> Reference group = no exposure to any violent stressful life events

suicidal thoughts and attempts were partially mediated by the presence of depressive symptomatology. However, stressful life events were strong predictors of suicide attempts among a subsample of adolescents who have reported suicidal ideation. Both the number of prior stressful events and the specific exposure to prior violence and bereavement predicted suicide attempts, even when adjusting for depressive symptomatology, other suicide risk factors, and demographics.

These results are consistent with past research that suggest depressive symptomatology to be an insufficient predictor of suicide attempts (DeJong et al., 2010; Mann et al., 1999; Nock et al., 2010). Levels of depression are similar between those who ideate and attempt suicide (Hawton & van Heeringen, 2009). By comparison, many adolescents who attempt or complete suicide show an increased number of events preceding their attempt (Borges et al., 2008; Kienhorst et al., 1995; Molnar et al., 2001). Thus, the present results suggest that stressful life events indeed explain an additional element of suicide that depressive symptomatology is unable to. This is consistent with previous findings that demonstrate a similar relationship between depressive symptomatology and stressful life events (Beristianos, Maguen, Neylan, & Byers, 2016; Liu & Miller, 2014; McFeeters, Boyda, & O'Neill, 2015; Nanayakkara et al., 2013; Wang et al., 2012).

It is important to address why stressful life events significantly predicted suicide attempts in the presence of depressive symptomatology, despite previous conflicting research findings (Beautrais, 2003; Dube et al., 2001; Fergusson et al., 2000; Horesh et al., 2003; Liu & Tein, 2005; Wilcox & Fawcett, 2012). Two explanations are possible. First, some studies have small sample sizes, especially if they rely on clinical samples. Certain stressful life events occur infrequently, and thus the low endorsement rates for those events may have failed to provide

enough statistical power to detect an effect (Liu & Miller, 2014). The present study used a large, national sample, which provided a better representation of uncommon events. The present analysis showed low rates for particular events (e.g., bereavement), but nevertheless provided sufficient numbers for analysis. Second, there is a lack of consistency in what prior studies have considered as a “stressful life event” (Liu & Miller, 2014). For example, some studies focus solely on violence or abuse (Stack, 2013), while others include items related to school performance and moving to a new house (Liu & Tein, 2005; Waaktaar et al., 2004). We do not suggest that one event is inherently “more stressful” than another, as stress and coping is a person-specific process (Silver & Wortman, 1980). However, the present study demonstrated that exposure to certain events, such as the death of a parent and violence, are associated with suicide attempts, while other events, such as abuse or injury, are not. This highlights the necessity of continuing to study which factors – stressful life events included – predict suicidal thoughts and attempts among youth.

To our knowledge, this study is the first to use a nationally representative sample of adolescents to critically examine the role of stressful life events in predicting suicidal thoughts and attempts. Many previous studies on this topic have largely focused primarily on adult samples, and have subsequently found different types of events – such as financial concerns and job stress – to be predictive of suicide (DeJong et al., 2010; McFeeters, Boyda, & O Neill, 2015; Wang et al., 2012). Alternatively, the present study suggests violence, abuse, bereavement, drug use, and suicide exposure all predict, to varying levels, suicidal thoughts and behaviors in adolescents. These results were still significant when adjusting for depressive symptomatology, demographics, and other suicide risk factors such as illicit substance use and suicide exposure.

Below, we discuss how each of these event types might be associated with suicidal thoughts and behaviors.

### **Violence and Abuse**

Exposure to violence and abuse are traumatic due to the impact they can have on an adolescent's worldviews. People often perceive the world to be safe and that other people are largely benevolent. However, experiences of violence and/or abuse may "shatter" these perceptions (Janoff-Bulman, 1992). This may leave adolescents feeling vulnerable and unsafe, and they may perceive the world to be filled with greater risk (Blum et al., 2014). Therefore, the effects of childhood violence and abuse can have longstanding consequences that may last into adolescence and adulthood (Jeon et al., 2009). The association of violent exposures with mental health is well known, with victims of violence displaying higher depressive symptomatology and suicide risk (Adams et al., 2013; Dunn, Gilman, Willett, Slopen, & Molnar, 2012; Flannery et al., 2001; Haynie et al., 2008). In addition, many adults who attempt or complete suicide report a history of childhood abuse (Jeon et al., 2009; Roy, 2011; Sarchiapone, Carli, Cuomo, & Roy, 2007).

### **Bereavement**

Less is known regarding the relationship between the death of a parent and subsequent suicidality, which is likely due to the rarity of parent death (Jakobsen & Christiansen, 2011). Parent death is an uncommon, albeit challenging, event for an adolescent to experience (Dowdney, 2005). In the present study, bereavement did not predict overall suicidal thoughts or attempts. Rather, bereavement only predicted suicide attempts in the subsample of adolescents with suicidal thoughts. Our measure of bereavement included the death of a parent at any point in the adolescent's lifetime, which could range from early childhood to weeks or days before

their assessment. Despite this time frame, parent death still significantly predicted suicide attempts in the sample. Certain theories may explain these results. Parental death is a significant change that alters the family structure, removing what is likely to be an important source of support for the adolescent (Gray, 1987). The absence of the parent excludes a primary source of social support for the adolescent, who may feel helpless and confused during an emotionally turbulent period. While we were unable to examine the recency of parent death and suicide attempts, these results display a significant relationship that warrants further exploration.

### **Illicit Substance Use**

Substance use is a common precursor of suicide, with studies positing substances to lower inhibition and increase impulsiveness leading up to an attempt (Pompili et al., 2012). Substance use has been documented as an independent predictor of suicide (Liu, Case, & Spirito, 2014). In addition, the relationship between substance use and suicide is potentially mediated by related variables such as anxiety, depressive symptomatology, hopelessness, and childhood physical abuse. This may in part explain the significance of bereavement in the present study, as substance use increases following parent death. Death leads adolescents to recognize their own mortality. They may subsequently challenge their mortality by engaging in risky behaviors such as substance use (Dowdney, 2005). This suggests a potential pathway in which substance usage mediates parent death and suicidal attempts. However, this relationship needs to be explored before any definite conclusions can be drawn.

### **Suicide Exposure**

Exposure to the suicide of a friend or family member is a critical risk factor for suicide attempts, as suicidality has a complex social element. Those bereaved by suicide are often at a higher risk of attempting suicide themselves (Hawton & van Heeringen, 2009; Spirito &



Esposito-Smythers, 2006). Interestingly, rates of suicide increase following the deaths of both strangers and loved ones alike. Suicide rates spiked after Marilyn Monroe's death (Joiner, 2003), and calls to a Seattle crisis center increased upon the news of Kurt Cobain's suicide (Jobes, Berman, O'Carroll, Eastgard, & Knickmeyer, 1996). However, "contagious" suicide may differ when the adolescent has an interpersonal relationship with a suicidal peer. Suicidal youth may be likely to seek out and form relationships with other suicidal peers (Joiner, 2003). Alternatively, suicide survivors may adopt the emotional distress from a suicidal peer, and consequently display the behaviors themselves (Mueller & Abrutyn, 2015).

Given the pronounced association of suicide exposure on predicting suicide, it was necessary to include suicide exposure in the analyses. Some studies consider it to be a stressful life event, given that it is a violent loss event (Blum et al., 2014). Our results further support suicide exposure as a strong risk factor for adolescent suicide. More research is necessary to understand the social aspects of suicide exposure.

### **Study Strengths**

Distinctive features of the present study strengthen our confidence that stressful life events uniquely predict suicidal thoughts and attempts in adolescents. First, this study employed data collected from a nationally representative sample of non-clinical adolescents. A number of previous suicide studies have relied on clinical in-patient samples or adolescents who were hospitalized for a medically serious suicide attempt (e.g., Beautrais, 2003; Boergers, Spirito, & Donaldson, 1998; Roy, 2011), which are not representative of the general population. Scholars have noted the need for studies that use non-clinical populations (e.g., Liu & Miller, 2014), which our study achieved. Additionally, the large sample size allowed analyses of sensitive topics. Despite being a leading cause of death in adolescence, suicide is fortunately uncommon –

approximately 3.80% of our sample had made an actual suicide attempt. Our large sample size provided enough power to conduct an analysis of these adolescents to examine the variables predicting their attempts. The Add Health study took additional precautions to appropriately assess sensitive data. Adolescents reported on topics such as illicit, sexual, and suicidal behaviors using audio-assisted laptop computers so that responses were less likely to be swayed due to embarrassment or the desire to avoid disclosing socially unacceptable behavior.

### **Limitations**

Despite the merit of this study, we must acknowledge limitations. As Add Health was conducted primarily as a health behaviors study, several assessment issues arose. Some stressful life events were assessed as happening 12 months prior to assessment, while others were assessed if they had *ever occurred* in the adolescent's lifetime. Although it has been suggested that there is a "spike" of events relatively close to an adolescent's suicide attempt (Sandin, Chorot, Santed, & Valiente, 1998), we were unable to control for the timing of events in the analyses. Another assessment issue arose when adolescents were asked a) if their birth parents are still alive, and b) if a family member had recently committed suicide. These events were considered as two separate variables in our analyses. However, a parent may have died from suicide, thus counting the adolescent as having experienced both variables. Unfortunately, we were unable to separate these variables as Add Health did not ask adolescents *how* their parents died. Additionally, the measure of impulsivity was weak, as it was only a single item measure. The fact that it failed to reach significance in the analyses may be due to it being an unreliable measure. We also encountered issues with missing data (e.g., the lack of abuse variables collected on a portion of the sample, as explained earlier). While our sensitivity analysis suggested non-response values were an appropriate substitution, it is less desirable than having

complete data. Finally, we were unable to control for previous suicide attempts as a predictor of current suicidal behavior. Add Health only assessed whether the adolescent had seriously ideated or attempted suicide during Wave 1, without assessing the number of previous attempts.

### **Conclusion**

The current study contributes evidence that stressful life events are a unique and significant predictor of suicide attempts among adolescents. It addresses previous calls for continued research on how such stressful life events are associated with suicide. Studies should continue to explore the factors that predict the difference between suicidal thoughts and attempts to better understand what places adolescents at heightened risk of suicide.

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