Suicidal Ideation and Its Recurrence in Boys and Men from Early Adolescence to Early Adulthood: An Event History Analysis

David C. R. Kerr, **Lee. D. Owen**, and **Deborah M. Capaldi**
Oregon Social Learning Center, Eugene, Oregon

Abstract

Occurrence and recurrences of suicidal ideation (SI) were modeled among boys/men assessed annually from ages 12 to 29 years. Multiple-spell discrete-time event history analyses permitted (a) determination of whether risk for SI escalates with prior experiences of SI (Spell effects), (b) while accounting for changes in risk with time (Period effects), and (c) controlling for vulnerability factors. Self-reported SI (presence/absence in past week), depressive symptoms, alcohol/substance use, and antisocial behavior, and official arrest records were collected annually from 205 boys recruited on the basis of community risk for delinquency. Parents' self-reported psychopathology and SES were collected in childhood. Period effects supported decreasing risk for SI over time. Spell and time-varying, 1-year lagged substance use and depressive symptoms independently predicted increased risk for SI. Models involving SI with intent were explored. Consistent with interpersonal psychological theory, risk for young men's SI increases with past experience of SI, even with key propensities controlled; however, risk also decays over time. Targeting conditions that confer risk for SI is essential. Preventing and delaying SI occurrence and recurrence may represent independent mechanisms by which prevention efforts operate.

Keywords

suicidal ideation; adolescence; survival analysis; longitudinal studies; interpersonal psychological theory

Suicidal ideation is a known risk factor for suicide attempt, which in turn increases risk for completed suicide (C. A. King, 1997). Although less common among boys and men, suicidal thinking predicts suicide attempt regardless of gender (e.g., Evans, Hawton, Rodham, & Deeks, 2005; Reinherz, Tanner, Berger, Beardslee, & Fitzmaurice, 2006). Suicidal thinking also is associated with major depressive disorder and, among adolescents, relates to more negative clinical features, including earlier onset, longer episodes, and shorter time to episode recurrence (Lewinsohn, Clarke, Seeley, & Rohde, 1994). Given recent emphasis on the identification and treatment of depression in men (Kuehn, 2006; National Institute of Mental Health, 2003), a better understanding of the course of boys' and men's suicidal ideation is of special interest.

Thoughts of killing oneself are relatively common during adolescence (Evans et al., 2005). Longitudinal studies indicate that peak prevalence of suicidal ideation occurs in midadolescence and that a significant numbers of new "cases" emerge across adolescence (Fergusson, Woodward, & Horwood, 2000; Kerr, Owen, Pears, & Capaldi, in press; Rueter & Kwon, 2005). However, few prospective data exist on the recurrence or chronicity of suicidal ideation across adolescence, much less across the transition to adulthood. Elucidating such

David C. R. Kerr, Ph.D., Oregon Social Learning Center, 10 Shelton McMurphey Blvd., Eugene, OR 97401, Phone: 541-485-2711, FAX: 541-485-7087, davidk@oslc.org.

patterns over time will increase understanding of risk for suicidal behavior among adolescents, who are believed to move in and out of risk status over time (Berman & Jobes, 1995).

Suicidal thoughts vary in associated risk for suicidal behavior. Silverman, Berman, Sanddal, O'Carroll, and Joiner (2007) emphasize the presence of intent to die when differentiating among suicide-related ideations and proposed as additional features the casual, transient, passive, active, and/or persistent nature. Some question the importance or clinical utility of common and seemingly transient suicidal ideation (Schwenk, 2005). However, it is not clear whether suicidal thinking at any level of intent can be dismissed as trivial musings. For example, prior research with the present sample found that 59% of young men who met a low threshold of suicidal ideation (i.e., "I think about killing myself but would not do it" or higher) reached the clinical cut off on a concurrent depression measure, compared with 3% of never-ideating participants (Kerr et al., in press). Furthermore, suicidal thinking of an ostensibly low severity in adolescence predicts suicidal ideation and attempts in adulthood (Fergusson, Horwood, Ridder, & Beautrais, 2005; Reinherz et al., 2006). On the other hand, the prevalence of suicidal ideation declines markedly by adulthood (e.g., Kerr et al., in press), and most adolescents who report ideation do not attempt suicide. What then accounts for whether suicidal ideation is a developmentally transient experience for some but marks a chronic, impairing, and potentially life-threatening trajectory for others? To help answer this question, in the present study we consider how boys' psychosocial vulnerabilities relate to the timing of experiences of suicidal ideation across adolescence and early adulthood. A primary focus is whether the experience of suicidal ideation itself contributes uniquely to ongoing vulnerability.

Joiner et al. (2005) demonstrated that past and future suicidal thoughts and behaviors are persistently associated even, as they put it, "when everything but the kitchen sink is covaried." This component of Joiner's interpersonal-psychological theory holds that the experience of suicidal behavior itself increases the risk for subsequent suicidal behavior and that the association between past and future behaviors is a causal one. In contrast to Joiner's "crescendo" or "state-dependence hypothesis," a "heterogeneity" or "trait hypothesis" predicts that a pre-existing propensity fully accounts for lifetime suicidal behavior patterns. This latter model was found to offer the most parsimonious account of suicide attempts reported by adult patients with an affective disorder across a 2-year period (Clark, Gibbons, Fawcett, & Scheftner, 1989). However, Joiner et al. (2005) argue that an elaborated crescendo model provides a more comprehensive account of trajectories of suicidal behavior. They have articulated a theory that individuals who engage in serious suicidal behavior must *acquire* the ability to carry out lethal self-harm; habituation and opponent processes are two mechanisms by which repeated suicidal behavior may confer ongoing and escalating risk (e.g., Joiner, 2005).

Joiner's theory directly applies to the pathways by which self-harm and suicide attempt lead to increasingly lethal suicide attempts and to suicide. Whether the experience and course of suicidal ideation can be integrated into this theory is not yet clear. Unlike suicide attempts, suicidal thoughts are not physically dangerous or painful and, thus, may not evoke intense affective responses that make opponent processes so powerful. Yet, Joiner et al. (2005) speculated that repeated suicidal ideation may lead to the capacity to enact self-harm. Another possibility is that only severe suicidal thinking (e.g., with suicidal intent) is implicated in the continuity and escalation of suicidality over time. Yet, in studies that include suicidal thoughts with an expressed lack of intent (Reinherz et al., 2006), suicidal ideation in adolescence predicts suicidal thoughts and lifetime suicide attempt at age 30 years. Thus, even "mild" suicidal ideation may be on the continuum of risk behaviors that can become progressively more frequent and serious.

Suicidal thoughts might be self-perpetuating through several mechanisms. First, habituation may apply to taboo and anxiety-provoking cognitions, just as it does to intensely distressing events and behaviors. Thus, repeated experience with even milder suicidal thoughts may make them increasingly tolerable for longer periods and with greater elaboration. Second, repeated experiences with suicidal thoughts may make these responses to distress readily available or automatic (Beck, 1996). Third, suicidal thinking may offer distraction--real and imagined relief from anxiety, guilt, rage, and other suffering--and a sense of ultimate control in the midst of overwhelming hopelessness (Everall, Bostik, & Paulson, 2006; Hendin, 1991). To the extent that suicidal ideation is partially effective as a coping strategy, it is negatively reinforced. Fourth, efforts to suppress negative cognitions may bind thoughts and mood states, such that the same mood state at a subsequent time more strongly elicits the previously suppressed thought (Wenzlaff, Wegner, & Klein, 1991). By this paradoxical process, individuals who attempt to rid themselves of distressing suicidal thoughts may ultimately experience them more frequently. Indeed, adolescents' tendencies to suppress unwanted thoughts have been linked to the presence and greater frequency of self-injurious behavior, suicidal ideation, and suicide attempt (Najmi, Wegner, & Nock, 2007). Finally, suicidal ideation may be associated with a ruminative style of protracted focus on negative emotional states. Such patterns of suicidal thinking may be self-perpetuating because rumination is known to prolong and exacerbate depressive states and interfere with productive coping and problem solving (Lyubormisky & Nolen-Hoeksema, 1993; Ward, Lyubormisky, Sousa, & Nolen-Hoeksema, 2003).

Even if a causal linkage does exist between past and current suicidality, an important question remains: For how long do suicidal experiences confer a burden of increased risk? For example, if an individual last reported suicidal thinking 3 years ago, should he be considered at increased risk for suicidal thoughts and behavior today? Cross-sectional research does not typically examine how long ago "past" suicidal behavior occurred. Prospective studies have been limited in duration (e.g., Clark et al., 1989; McKeown et al., 1998) or have not addressed whether linkages between suicidal thoughts and behaviors at widely spaced intervals are explained by short-term continuities (e.g., Reinherz et al., 2006). One key study on the persistence of risk established timelines of first onset of suicidal ideation, plan, and attempt on the basis of retrospections in a large national sample (Kessler, Borges, & Walters, 1999). Risk for progression from suicidal ideation to plan, and from plan to suicide attempt, was highest in the first year following onset of the prior condition. Furthermore, the risk of suicide attempt among those with ideation but no reported plan was almost entirely limited to the next year. Findings suggest that, although strong, the association between past and future suicidality may abruptly decay over a short period, perhaps especially in the absence of intent. However, study conclusions are limited by the unreliability and state dependence of retrospection, which are well documented in this area (Clark et al., 1989; Goldney, Smith, Winefield, Tiggeman, & Winefield 1991; Klimes-Dougan, Safer, Ronsaville, Tinsley, & Harris, 2007). Thus, prospective studies are needed.

The extent to which the association between past and future suicidality weakens with the passage of time may depend on developmental period (e.g., if the individual who last expressed suicidal thoughts 3 years ago is 15 versus 28 years of age). Suicidal ideation may be more transient in adolescence, reflecting children's initially limited problem-solving abilities, coping resources, and autonomy, which develop dramatically in adolescence (Kovacs, Goldston, & Gatsonis, 1993). In contrast, suicidal ideation in adulthood is less common but may be linked more strongly to psychopathology and impairment and may be more stable over time.

Prior studies demonstrate the need to account for potential propensities for suicidal ideation when studying patterns of recurrence (e.g., Clark et al., 1989). Foremost, depressive symptoms may mark a vulnerability for repeated suicidal thinking, given how closely the phenomena are linked (e.g., Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993). Also, depressive episodes

are often recurrent and may show a "kindling" effect. In parallel with the contrasting trait- and state-dependence models of suicidal behavior, increasing sensitivity to depression may be a result of vulnerabilities evident prior to onset and/or "scarring" from prior episodes (Kendler, Thornton, & Gardner, 2001; Rohde, Lewinsohn, & Seeley, 1990).

Antisocial behavior may further explain susceptibility to suicidal thinking, via direct (Thompson, Ho, & Kingree, 2007) and indirect paths through negative life consequences and depressive symptoms (e.g., Capaldi & Stoolmiller, 1999). Alcohol/substance use may impact suicidal ideation through developmental failures (Conner & Goldston, 2006), by undermining or replacing adaptive coping efforts, and through the proximal effects of intoxication on problem-solving and negative mood states (e.g., Khantzian, 1997; Schuckit, 1984). Finally, parental depressive symptoms, parental alcohol/substance use, and family economic adversity may confer enduring risk, likely indirectly through the young men's characteristics and psychopathology (e.g., Fergusson et al., 2000; R. A. King et al., 2001).

The present prospective study modeled the timing of repeated experiences of suicidal ideation reported across an extended period of men's lifespan (ages 12 to 29 years), while accounting for key vulnerabilities. The following hypotheses and issues were addressed:

1. Past suicidal ideation will predict subsequent suicidal ideation. Specifically, (1a) occurrence of suicidal ideation will predict recurrence, and recurrence will predict further recurrence(s); (1b) effects of occurrence and recurrences on subsequent recurrences will persist when time-varying markers of risk propensity are controlled; and (1c) associations between past and future suicidal ideation may or may not be stronger in adulthood.

2. Risk for suicidal ideation will be strongest initially and then will diminish over time. Specifically, risk for the first occurrence of suicidal ideation will decrease with development, and risk for recurrence of suicidal ideation will decay as years free of suicidal ideation pass. However, also considered is (2a) whether hazard curves for occurrence and recurrence are shaped differently, such as may be the case if risk for first occurrence decreases with time, but individuals with recurrent suicidal ideation remain at long-term elevated risk for further recurrence, and (2b) whether the shapes of hazard curves differ in adolescence and adulthood.

3. Vulnerability factors are examined in relation to the timing of observed suicidal ideation and its recurrences, according to specific hypotheses. Increased risk for suicidal ideation will be predicted by (3a) parental depressive symptoms, alcohol/ substance use, and low SES during participants' childhood; and (3b) participants' developmentally unfolding vulnerabilities in the areas of antisocial behavior and alcohol/substance use; furthermore, (3c) participants' depressive symptoms will increase risk for suicidal ideation and will at least partially account for the associations between other predictors and outcomes.

4. Finally, the perpetuation of suicidal thinking over time may depend on whether suicidal intent is evident. That is, when more severe thoughts are involved, several aforementioned mechanisms (e.g., habituation, emotional binding) may further strengthen the associations between past and future ideation. The distinction between suicidal ideation with and without intent to die is highlighted in proposed nomenclature in suicidology (Silverman et al., 2007), given its association with suicidal behavior (e.g., Miranda et al., 2008). However, the role that intent plays in the continuity and escalation of suicidal ideation over time is poorly understood. Most prospective studies of nonclinical samples have not made this distinction (Fergusson et al., 2005; Reinherz et al., 2006), and even large samples lack sufficient variability to permit great confidence in findings (McKeown et al., 1998). Likewise, low rates

of intent observed in the present sample allow only a limited examination of its occurrence and recurrence over time. Still, the extent to which risk for suicidal ideation with intent decays with time and development was considered, as were the following exploratory hypotheses: (4a) Participants who experienced some level of suicidal intent will be at increased risk for subsequent experience of it, after propensity factors are controlled, and (4b) suicidal ideation without intent will confer increased risk for subsequent ideation with intent.

Method

Participants

Participants ($n = 205$) were from the Oregon Youth Study, a longitudinal study of 206 boys and their families that began when the boys were ages 9 to 10 years. One boy participated at ages 9 and 10 years but did not participate again until age 21 years; therefore, he was not included in the analyses. The original purpose of the study was to identify individual, family, and community risk factors for boys' delinquency. Fifteen of the 43 public schools in a medium-sized metropolitan area in the Pacific Northwest were identified as higher risk for juvenile delinquency on the basis of juvenile court data (frequency of delinquent episodes reported by police). From these 15 schools, 6 were randomly selected, and the entire fourth-grade classes of boys were invited to participate; 74% were recruited in two cohorts during the 1983–1984 and 1984–1985 school years ($ns = 102$ and 104, respectively). Assessments occurred annually from ages 9 to 29 years, with the exception of the assessment at age 26 years, which consisted of a short phone interview only. Annual participation rates ranged from 92% to 99%. As of 2007, 4 participants had died: 1 accidental (age 20 years), 1 confirmed suicide (age 22 years), 1 drug overdose (age 25 years), and 1 for reasons not disclosed (age 31 years). Participating boys were primarily White Caucasians (90%) from lower-class and working-class families (75%). At Year 1, 33% of families were receiving welfare or food stamps, and 21% included no employed parent. Additional details regarding the sample at recruitment are published in Capaldi and Patterson (1989). Throughout the present study, assessment years are referenced according to the lower age bound (Year 1 = age 9, Year 21 = age 29 years), even though some variability existed.

Participant Measures

Suicidal ideation—At each assessment, from ages 12 through 25 years and ages 27 through 29 years, participants completed a suicidal ideation item, adapted from the Beck Depression Inventory (Beck, 1967), that was appended to other measures of depressive symptoms. Only study staff were present when participants completed self-report questionnaires. Participants who answered 1 (*I think about killing myself but would not do it*), 2 (*I would like to kill myself*), or 3 (*I would kill myself for sure if I had the chance*) based on the past week were classified as reporting suicidal ideation (responses were recoded to 1). Those who responded 0 (*I do not think about killing myself*) were classified as denying suicidal ideation. According to Goldston (2000), this threshold among adolescents has "generally been found to be much more sensitive in predicting later suicidal ideation and attempts than scores of $> 1''$ (p. 73). Thus, unless otherwise specified, *suicidal ideation* refers to this dichotomous outcome.

For exploratory analyses, participant responses were recoded on the basis of the absence (score = 0 or 1) or presence (score = 2 or 3) of ideation with some intent. Kerr et al. (in press) report that Oregon Youth Study participants endorsed suicidal ideation at any level at an annual rate of 2.6% to 16.3% across ages 12 to 29 years; rates of ideation with intent were 0% to 3.5%. Additionally, 57.3% of the men reported suicidal ideation at any level at one or more assessments; 9.7% endorsed ideation with intent at least once. Using the approach described by Kerr et al. (in press), 80% of participants who endorsed ideation with some intent and 59%

of those who only ever endorsed ideation without intent met a clinical threshold (≥ 16) on the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) at years positive for ideation, compared to 3% of those who never endorsed suicidal ideation (mean across all years).

Of note, measurement of suicidal ideation likely began after some participants' first occurrence, and annual measurement of past-week suicidal ideation did not capture whether participants thought about suicide one or more other times during the prior year.

Depressive symptoms—The Depression Self-Rating Scale for children (DSRS; Birleson, 1981) was administered at ages 11, 12, and 13 years. The CES-D was given annually from ages 14 to 25 years and ages 27 to 29 years. The reliability and validity of both scales are documented (Birleson, 1981; Birleson, Hudson, Buchanan, & Wolff, 1987; Lewinsohn, Rohde, & Seeley, 1998). The DSRS was discontinued given that the CES-D was more developmentally appropriate in adolescence and adulthood and was used more widely in the literature. Internal consistencies ranged from .76 to .93 (mean $\alpha = .87$). Scores on both scales were standardized before analyses. Neither the DSRS nor the CES-D total scores included a suicidal ideation item. The DSRS included the item "I think life isn't worth living"; this item was retained in total scores because it was judged to be sufficiently distinct from suicidal ideation.

Antisocial behavior—Participants responded to an identical version of the 30-item Elliott Delinquency Scale (Elliott, Ageton, Huizinga, Knowles, & Canter, 1983) at each assessment year from ages 12 to 25 years and ages 27 to 29 years. Items varied in terms of severity and represented various forms of antisocial behavior, such as theft, property damage, and violence. Internal consistencies were modest at ages 27 ($\alpha = .47$) and ($\alpha = .55$) 29 years but otherwise ranged from .69 to .93 (M of all $\alpha = .77$). Because these reports began at age 12 years, antisocial behavior could not be considered as a lagged predictor at age 12 years.

Arrests—Every year (ages 9 to 25, 27 to 29 years), participants listed where they had lived since their previous assessment, and then official court data from relevant jurisdictions were obtained. The total number of times participants were arrested during the calendar year of each assessment year was calculated; although it was possible for multiple arrests to occur in 1 day, multiple charges within the same police encounter were not counted (e.g., drug possession discovered when arrested for assault). Some arrest types were not counted, including minor traffic violations (e.g., driving with lights off or without proper insurance) and violation of parole and court administrative rules (e.g., contempt, failure to appear or pay fine).

Alcohol/substance use—During annual interviews, participants answered questions regarding their alcohol and substance use. Participants reported the number of times they consumed beer, wine, and/or liquor in the previous year. We summed and then recoded their raw count responses for each type of alcohol to a nine-category variable (*never* and *once or twice in the previous year* to *2–3 times per day*) to reduce the effects of skewness and outliers. Frequency of marijuana use was assessed similarly, using a single raw-count response recoded to a categorical variable.

At ages 11 through 17 years, frequency of use of drugs other than marijuana was assessed using a single raw count of "other" drugs used. At ages 18 and 19 years, frequency counts of alcohol and marijuana were assessed, but "other" drug use was not. At ages 20 to 25 years and ages 27 to 29 years, frequencies of past-year usage were obtained for eight categories of other drugs (e.g., amphetamines, hallucinogens, opiates). These counts were summed to match the "other" drug-use classification assessed in prior years and then were recoded using the nine-category approach described above. Cronbach's alphas for the annual substance-use measures based on the three substance-use frequency indicators (alcohol, marijuana, and other drugs), ranged

from .34 to .81, with the lower alphas occurring in the earliest and latest assessment years, before and after the years of peak usage. Still, indicators were considered face valid; thus, a mean was used to represent global alcohol/substance use at each assessment year.

Parent and Family Measures

Parental depressive symptoms—Mothers and fathers completed the CES-D when participating sons were ages 9, 10, and 11 years (α = .76 to .92) and within-year correlations between mother and father ranged from .22 to .37 (all $p < .05$). Given acceptable levels of internal consistency (α = .74), a mean parental depressive symptoms score was created from mothers' and fathers' self-reports across the 3 assessment years.

Parental substance use—Parents' self-reported alcohol use was assessed using the Michigan Alcoholism Screening Test (Selzer, 1971) when participating sons were age 9 years, and self- and spouse report of tobacco, alcohol, marijuana, and other drug use were collected using internally developed questionnaires (Oregon Social Learning Center, 1984) when the boys were ages 9 and 11 years. Alphas ranged from .34 to .85. However, all items were retained as face-valid measures of parent behavior. Self- and spouse reports were all significantly correlated, $p < .05$. The Michigan Alcoholism Screening Test and substance-use indicators collected when sons were age 9 years were significantly correlated ($r = .22$ for mothers and .34 for fathers, $p < .01$), as were global substance use indicators ($r = .60$, $p < .001$) collected when sons were ages 9 and 11 years.

Family socioeconomic status (SES)—SES was assessed via parent interviews when boys were ages 9 and 11 years; parent education, occupation, income, and whether parents were looking for work were indicators. SES indicators were first formed separately for mothers and fathers and then combined within the assessment year. The final construct was calculated as the mean of the scores at the 2 assessment years, $r = .73$ ($p < .001$).

Data Analyses

Multiple-spell discrete-time event-history analyses (Willett & Singer, 1995) were used to predict participants' self-report of any suicidal ideation in the prior week at each of 17 assessment years from ages 12 to 29 years; exploratory analyses of suicidal ideation with intent are described in the Results section. The present analytic approach is similar to survival analysis (i.e., single-spell continuous time-event history) used to model a population hazard function, but it differs in that: (a) time is marked in discrete time units (e.g., years), during which the outcome event can occur, thus permitting the inclusion of time-varying predictors; (b) once participants experience the outcome event of interest, they are not removed from the dataset, as in traditional survival analysis--rather, they continue to contribute observations to the prediction of recurrences (i.e., multiple spells) of the event--and (c) once transpired, event occurrence and recurrences themselves become predictors of ongoing, increased, or decreased vulnerability to subsequent event recurrences.

The approach can be understood as simultaneous logistic regressions run to predict (a) the first observed occurrence of suicidal ideation from a set of predictors, including the time that has passed since the study began; (b) observed recurrence of suicidal ideation among those with a first observed occurrence from the predictors, including time passed since the year of the first observed occurrence; and (c) continued recurrence(s) among those with observed recurrences of suicidal ideation from the predictors, including time passed since the prior recurrence.

Additional predictors were either time invariant to account for preexisting vulnerability (e.g., family SES) factors or time varying to reflect developmentally sensitive variation in unfolding vulnerabilities (e.g., depressive symptoms). Considering preexisting vulnerability factors to

be time varying is an especially conservative approach to testing potential unique effects of suicidal ideation on subsequent experiences of it. This approach was preferred over limiting measurement of propensity markers to preadolescence, given the developmental span of the study and the developmental course of psychopathology (e.g., vulnerability to substance use is largely unexpressed in preadolescence; relations between past and future depressive symptoms may be causal). We lagged time-varying predictors by 1 year to maintain temporal separation from the outcome and to account for the longer-term negative consequences of some behavior.

Under the multiple-spell paradigm, once individuals first experience the event of interest, they are retained in the data set but move from Spell 1 (i.e., at risk for the first observed occurrence of the event at the subsequent assessment year) to Spell 2 (i.e., at risk for a second observed occurrence at the subsequent year). Period identifies the number of assessment years that have passed within a given spell and, thus, corresponds to the number of consecutive years at which the individual denied suicidal ideation. When assessments of suicidal ideation began, all boys were considered to be in Spell 1, Period 1. Those who denied suicidal ideation remained in Spell 1 (i.e., at risk for first observed suicidal ideation) and advanced sequentially through periods (e.g., Period 2, 3) until either the end of the study (i.e., suicidal ideation denied across the entire study) or their first endorsement of suicidal ideation. Once participants first reported suicidal ideation at an assessment year, they exited Spell 1 and moved into Spell 2, Period 1. They then advanced in period (but not spell) until the end of the study or until the second endorsement of suicidal ideation, at which point they entered Spell 3, Period 1. So, for example, Spell 4, Period 8 indicates that a participant had endorsed suicidal ideation in 3 prior assessment years, was at risk for his fourth occurrence, and had denied suicidal ideation in the prior 7 years.

The units of the event-history analysis were person years. Because there were 17 assessment years in the study, a participant with no missing data contributed 17 person years. Although 17 Spells were theoretically possible, no participant endorsed suicidal ideation in all assessment years, and few reported it in more than 5 occasions. To avoid modeling unobserved combinations of spell and period and to generate a parsimonious solution, we modeled data from men ($n = 23$) with five or more Spells as though these men remained in Spell 5 (i.e., returned to risk for a sixth occurrence). The difference between the full model and this reduced model was nonsignificant, $\Delta\chi^2$ (8, $n = 3383$) = -10.911. Because additional simplification to four Spells yielded an inferior model, $\Delta\chi^2$ (1, $n = 3383$) = -4.527, $p = .03$,[1] a five-spell model was used.

Thus, time was parameterized using two sets of dummy variables: one set of five Spell variables (Spell 1, Spell 2 … Spell 5+) and one set of 17 period variables (Period 1, Period 2 … Period 17). The temporal "location" of each person-year observation in terms of Spell and Period is represented by coding one dummy variable from each set with a 1 and the remaining 20 dummy variables with a 0. Thus, a row of data for each person-year observation consisted of values on each of the 22 spell and period dummy variables, the time-varying and time-invariant predictors (all Z-transformed), and a dependent variable coded 0 for denial or 1 for endorsement of suicidal ideation at that assessment year.

Analyses followed steps outlined in Willett and Singer (1995) and Singer and Willett (1993). First, period and spell variables were entered in the first two blocks of a hierarchical logistic regression. Second, potential predictors (e.g., SES) were examined in separate univariate

---

[1]Whether further simplifications of spell would yield corresponding decrements in explained variance was examined, given the relevance to Hypothesis 1. Modeling three, as opposed to four, spells yielded a significant worsening of the model, χ^2 (1, $n = 3383$) = -9.195, $p = .002$, whereas modeling two versus three spells did not, χ^2 (1, $n = 3383$) = -0.10, $p = n.s.$ The two spell model (prediction of suicidal ideation from any number of prior reports) was highly significant, spell χ^2 (1, $n = 3383$) = 19.12, $p < .001$. Thus, effects of occurrence and recurrences were needed to adequately model the data.

logistic regressions that controlled for period and spell. A goal of the study was to offer a stringent test of spell effects by maximizing the extent to which variance in the outcome could be better explained by competing predictors. Therefore, predictors significant at $p < .05$ were retained in final models despite possible Type I error. As recommended, significant linear predictors also were tested for quadratic and cubic effects. Third, to ensure that effects of predictors were constant over time, we also considered the multiplicative interactions of significant predictors with period and spell variables and omitted them if they were nonsignificant. Fourth, we entered univariately significant predictors in theoretically defined blocks to examine multivariate relations with hazard probability and potential reductions in the effects of other predictors. Finally, we stepped the block of spell predictors out of the final model to quantify decrements in model chi-square and, therefore, the extent to which Spell effects were unexplained by markers of risk propensity.

Missing data—Because yearly participation rates were high, there were minimal missing data. Suicidal ideation and time-varying predictors were not measured when men were age 26 years. Therefore, age 26 years was ignored in the analysis, with spells and/or periods proceeding directly from age 25 to age 27 years. The current analyses include only those time points at which men participated; data were not imputed. To examine the effects of seven men who did not participate at 2 or more consecutive assessment years, we ran the final analyses with and without these cases. As the findings (significance and magnitude of effects) did not change substantially, these cases were retained in all analyses.

Results

Zero-Order Effects of Recurrence and Time on Risk for Future Suicidal Ideation

Hypotheses 1 and 2 concerned increases in risk for suicidal ideation associated with repeated experiences, and decreases in risk associated with development and the passage of time free of ideation. The full matrix of means for suicidal ideation within observed combinations of spell and period for all 3,383 person years was examined with regard to hypothesized patterns (see Table 1). Means reflect percentages of reporting suicidal ideation (coded 0, 1) within each observed combination of spell and period. Despite unstable estimates from cell to cell, two important trends were evident. First, consistent with Hypothesis 1, there was a positive association between spell and risk within period. The effects are shown most clearly in the total row at the bottom of Table 1; for example, 6% of observations in Spell 1 showed endorsement of suicidal ideation in the subsequent year, compared with 28% of those in Spell 5. Thus, the more years at which suicidal ideation was reported, the greater the risk was for a subsequent report. Second, the negative association between period and risk within spell supported Hypothesis 2. Namely, the more time that passed since the last report of suicidal ideation, the greater was the decline in subsequent risk. This effect is evident in the total column at the right of Table 1; on average, 15% of observations in Period 2 (cases in which suicidal ideation was not reported in the prior year) reported subsequent year ideation, compared with 5% in Period 7 (i.e., 6 years passed without suicidal ideation).

Multiple-Spell Discrete-Time Event History Analyses

Does risk for suicidal ideation change with repeated experience and time?—
Models were run to test period and spell effects observed in Table 1, although only five spells were needed to model the data. Shown in Table 2 are the results of the models in which period and spell blocks were considered as predictors of suicidal ideation. Consistent with Hypothesis 2, the block of period predictors demonstrated that risk for reported suicidal ideation decreased as years in which suicidal ideation was denied passed (Table 2, Model1). In support of Hypothesis 1, the block of Spell predictors demonstrated that risk for suicidal ideation increased if it had been reported in the past (Table 2, Model 2). Taken together,[2] the individual and block

effects for Spell variables supported the interpretation that, with additional reports of suicidal ideation, the probability of subsequent reports was increased. In addition, as noted previously, modeling up to five spells better accounted for patterns of observations than did more simplified parameterizations. Thus, risk for suicidal ideation seemed to increase with past occurrence, recurrence, and *multiple* recurrence. Hypothesis 2a related to whether declines in risk for suicidal ideation over time depended on the number of years in which ideation was reported. Period by Spell interactions (not shown) were not significant, indicating that the general shape of the hazard function (declining risk with years free of ideation) did not depend on how many times suicidal ideation had been reported.

Do effects of repeated experience of suicidal ideation and time depend on age? —Hypotheses 1c and 2b concerned whether age affected the magnitude of increases in risk associated with the experience of suicidal ideation or of decreases in risk associated with the passage of time. Age did not significantly predict risk or interact with period or spell to do so, whether age was considered as a time-varying predictor or categorical marker of broad developmental period (adolescence [ages 12 to 18 years] vs. adulthood [age 19 to 29 years]). Thus, there was no evidence that effects of repeated experience of suicidal ideation (spell) or decay in risk with years free of ideation (period) differed with development, to the extent that the variables could be disentangled (e.g., a 15 year old could not be in Spell 3, Period 6).

Does risk propensity explain effects of repeated experience of suicidal ideation?—Next, a central study hypothesis (1b) was examined: that the experience of suicidal ideation would continue to predict further experiences of it, even after potent competing indicators of risk propensity were controlled. To this end, potential predictors were first examined separately after the entry of period and spell predictors. Time-invariant parental depressive symptoms and participants' time-varying, lagged substance use, depressive symptoms, and quadratic depressive symptoms each were significant ($p < .05$).[3] Of note, the predictors also were significant after adjusting for multiple comparisons ($p < .007$), thus justifying interpretation of specific hypothesized effects. Next, the predictors had to be tested for unhypothesized interaction with period or spell (Singer & Willett, 1993). None of the interactions were significant, indicating that effects of the predictors did not depend on the passage of time free of suicidal ideation or the number of prior reports of ideation.

Predictors that were significant at the univariate level were entered in blocks subsequent to period and spell. Results are summarized in Table 2. Consistent with Hypothesis 1, the effects of having experienced suicidal ideation (spell) remained significant once other predictors were controlled in the final model (Table 2, Model 4). Furthermore, when all spell indicators were removed from the final model (not shown), the model chi-square was significantly worsened, $\Delta\chi^2 (4, n = 3347) = -16.11$, $p < .01$, confirming that Spell effects, $\chi^2 (4, n = 3347) = 33.54$, $p < .001$ (see Table 2), were not wholly mediated by the predictors.

Effects of propensity factors on risk for suicidal ideation—Hypotheses 3a and 3b received limited support (Table 2, Model 3). Of the proposed childhood risk factors, only parental depressive symptoms were associated with increased probability of suicidal ideation after controlling for period and spell. Consistent with Hypothesis 3b, participants' substance

---

[2]Individual effects of spell predictors are not directly interpretable. Effects are in reference to spell 1 (i.e., no prior report of suicidal ideation) and control for other spell effects on which they may be conditional. Thus, it is unclear how to interpret, for example, the independent effect of reporting ideation three times after controlling for the effect of reporting it five times.
[3]The unhypothesized quadratic effect of depressive symptoms was explored. A strong linear effect of depressive symptoms was evident when person-year observations in the second through fifth pentiles on depressive symptoms were compared on rate of subsequent-year suicidal ideation. However, observations in the first pentile were associated with a slightly, but statistically significantly, higher rate of subsequent year ideation compared with observations in the second pentile (4.30% vs. 2.95%). We did not interpret this term but retained it in the models to preserve confidence in the modeling of the effects of depression and other predictors.

use predicted risk for suicidal ideation; however, arrests and self-reported delinquency did not. As hypothesized (3c), participants' depressive symptoms were associated with increased risk for suicidal ideation (Table 2, Model 4). Depressive symptoms did not appear to fully account for the effects of other predictors, as the magnitude of the effects of participants' substance use and parental depressive symptoms did not change dramatically from Block 3 to Block 4.

Exploratory Analyses of Suicidal Ideation with Some Level of Intent

Prevalence of recurrent suicidal ideation with intent—Participants reported suicidal ideation with some intent at low rates across the 17 annual assessments: once by 7.8% ($n =$ 16), twice by 1.0% ($n = 2$), and three times by another 1.0% ($n = 2$). The majority (80%, $n =$ 16) of the 20 participants who ever reported ideation with intent reported it first in adolescence (by age 18 years), and the remaining four reported it first by age 24 years. Thus, participants' risk for recurrence was observed for 5 or more years after ideation with intent, ruling out the possibility that findings were an artifact of right censoring at age 29 years.

Exploratory multiple-spell discrete-time event history analyses—Given the low rates of suicidal ideation with intent, only two spells could be considered. In Spell 1, participants were at risk for a first occurrence of ideation with intent. Those at risk for a recurrence entered Spell 2, and those at risk for a second recurrence reentered Spell 2. Model testing directly paralleled primary analyses described above, except that suicidal ideation without intent also was considered as a predictor of ideation with intent. This time-varying predictor was concurrent at age 12 years (when measurement began), but otherwise was lagged by 1 year and entered in Block 3 (after period and spell and before other predictors).

After entry of Period, χ^2 (17, $n =3349$) = 4384.91, $p < .001$, spell was significant, ($B =1.07$, $SE = .48$, Exp(B) = 2.92, $p < .05$), suggesting that participants who reported ideation with intent were at significantly increased odds for recurrence. The Period by Spell interaction was not significant, χ^2 (15, $n = 3349$) = 7.91; thus, the general shape of the hazard function (declining risk for suicidal thinking with intent as time in the absence of such ideation passes) did not depend on whether ideation with intent had occurred (or recurred). In the next block, prior-year suicidal ideation without intent increased risk for ideation with intent, ($B =1.38$, $SE = .46$, Exp(B) = 3.97, $p < .01$). The effect of spell remained significant, ($B =1.23$, $SE = .49$, Exp(B) = 3.41, $p < .05$). Therefore, suicidal thinking without intent in the prior year increased risk for more severe suicidal ideation, independent of the risk conferred by previously reporting ideation with intent. Next, parental depressive symptoms and participants' depressive symptoms showed independent effects on risk for ideation with intent, (Exp(B) = 1.74 and 1.70, respectively ($p < .01$); alcohol/substance use and quadratic depressive symptoms were not significant. At this final step, the effect of spell was nonsignificant, Exp(B) = 1.15. However, the model was considered underpowered to detect this effect (again, $n = 4$ showed recurrence). The remaining effect of lagged suicidal ideation without intent approximately doubled the odds for ideation with intent but failed to reach significance, Exp(B) = 2.17, $p = .12$.

Discussion

The present study considered predictors of the observed occurrence and recurrences of boys' suicidal ideation over time. This long-term, prospective study of these phenomena represents a significant advance over retrospective studies, in which the recall of past suicidal thoughts may be inaccurate or dependent on current functioning (see Klimes-Dougan et al., 2007). In addition, the use of event-history methodology permitted (a) analysis of not just whether but *when* suicidal ideation occurred; (b) consideration of suicidal ideation events first as outcomes and then, once transpired, as predictors; (c) modeling of individuals' trajectories in reference

to their own life histories, rather than in relation to arbitrary study constraints (as in a short-term longitudinal study); and (d) added statistical power to predict low base-rate events (e.g., a third occurrence of suicidal ideation in a sample of 205 men). An additional strength of the present study was the developmental scope of data collection, which spanned early adolescence to early adulthood. This period of the lifespan is highly relevant to the understanding of normative and pathological features of suicidal thoughts and behavior. During these years, suicidal ideation reaches peak prevalence, and suicide is a leading cause of death (Centers for Disease Control and Prevention, 2006). The long-term longitudinal design of the Oregon Youth Study also overcame many of the typical limitations of community samples for studying suicidal ideation, such as inadequate variability in predictors of interest. Final strengths included the consideration of an at-risk community sample and high retention rates that enhance confidence in the generalizability of findings to similar populations.

Results strongly supported that past suicidal ideation, even defined using a relatively low threshold (i.e., expressed absence of intent), was associated with increased risk for future suicidal ideation among boys and young men. A prior study based on this sample (Kerr et al., in press) showed that boys' and men's suicidal ideation was associated with clinically significant elevations in concurrent depressive symptoms relative to that of those who consistently denied suicidal ideation (i.e., between participants), as well as relative to that of ideating boys/men during assessments at which ideation was denied (i.e., within participants). Exploratory analyses, though limited in statistical power, suggested that suicidal ideation without intent also increased risk for ideation with intent. Taken together, these results suggest that thoughts of killing oneself, although common among boys and young men, are not inconsequential and ephemeral but, rather, are often associated with significant distress, risk for recurrence, and perhaps escalation. The present study could not determine whether the occurrence and recurrences of suicidal ideation were associated with changes in type (e.g., from passive ideation to active planning), duration, or frequency of suicidal thoughts, or escalation from ideation to self-harm. Other research is consistent with such progressions, although it is primarily based on retrospective or short-term longitudinal designs and studies of highly selected clinical populations.

It is notable that the association between past and future suicidal ideation persisted when potentially salient markers of family and individual psychopathology were controlled. Such findings disconfirm a pure heterogeneity or trait model hypothesis, by which pre-existing diatheses (e.g., genetic, family, personality) fully account for patterns of occurrence and recurrence of suicidal ideation observed across the lifespan. This hypothesis was stringently tested, given the use of dynamic measures of individual risk propensities of antisocial behavior, substance use, and depressive symptoms, as opposed to static vulnerability factors that significantly predated the outcomes. Suicidal ideation with intent recurred so infrequently that models could not rule out whether vulnerability factors fully explained observed patterns.

Primary findings that suicidal ideation increased risk for recurrences beyond the effects of vulnerability factors are consistent with some effect of state dependence and with Joiner's (2005) broader theory of the trajectory of suicidal thoughts and behavior over time. That is, psychopathology is associated with suicidality, but suicidal thoughts and behaviors may themselves play a role in the maintenance and escalation of suicide risk over time. Although mechanisms were not examined, a number are possible, including: (a) desensitization to anxiety and taboo, (b) increasing accessibility and automaticity of suicide-related cognitions as responses to distress, (c) the short-term effectiveness of suicidal fantasies as a coping strategy, (d) paradoxical effects of efforts to suppress suicidal thoughts, and/or (e) linkages with a ruminative style that prolongs negative mood and interferes with adaptive coping.

Examination of hazard functions suggested that risk for a first observed occurrence of any suicide ideation generally decreased with age and that risk for recurrence among those who reported suicidal ideation one or more times also generally decreased with the passage of time that was free from further suicidal thinking. Models for suicidal ideation with and without intent could not be directly compared. However, ideation with intent showed similar developmental patterns of decreasing prevalence as well as infrequent recurrence. Thus, the risk for occurrence and recurrence of more severe suicidal ideation also decayed. These patterns of decrease, although not entirely surprising, bear emphasis; few others have examined suicidal ideation prospectively or across a significant period of the lifespan. Thus, present findings supplement studies that have used long-term retrospective (e.g., Kessler et al., 1999) and short-term prospective (e.g., McKeown et al., 1998) methods to delineate the timing of escalating suicidality. Findings also build upon long-term longitudinal studies of the point and cumulative prevalence of suicidal ideation across adolescence (e.g., Kerr et al., in press; Rueter & Kwon, 2005) and prospective research on the relative instability of suicidal thinking across adolescents' depressive episodes (Lewinsohn, Pettit, Joiner, & Seeley, 2003). Such information is highly clinically relevant. For example, Emslie et al. (2007) recently responded to a hypothetical case study regarding a 15-year-old boy showing moderate depression; after being treated with fluoxetine for 14 days, the boy reported, for the first time, suicidal ideation with a plan without intent to act. Given these limited details, the authors considered the possibility (or thought it probable) that the patient's ideation was not truly his first occurrence. Their analyses also implied that a positive or negative history of suicidal thinking would inform their judgment regarding whether fluoxetine had precipitated the symptom. Thus, clinical decision making involves assumptions about the shapes of hazard curves for the occurrence and recurrences of suicidal ideation, specifically, that new cases of suicidal ideation are unusual among 15-year-old boys and that the ongoing risk for suicidal thinking remains relatively elevated among adolescents with a past history of such ideation.

The present findings suggested that risk for first observed suicidal ideation decreased over time, as did risk for one or more recurrences after years free of observed suicidal ideation. However, the result that the shapes of these hazard functions did not differ by Spell does not imply similar underlying processes. The general decline with age in risk for first occurrence may demonstrate that, with development, adolescents develop stronger problem-solving abilities, establish supportive relationships, and enjoy a greater number of response options when encountering distress (e.g., Kovacs et al., 1993). To the extent that youth encounter significant hardships and surmount them productively, they may become increasingly resilient to suicidal thinking. The decline in risk over time that was observed among participants who had multiple occurrences of suicidal ideation may reflect this normative development and a weakening or failure of the self-perpetuating processes described in Joiner's (2005) theory. There was no evidence that spell or period interacted with age, suggesting that reports of suicidal ideation and the recency of the last occurrence contribute to risk for subsequent ideation similarly in adolescence and young adulthood. Notably, this test was limited by the sometimes inextricable links among age, spell, and period (i.e., advances in all three are time dependent). However, Spell by Period interactions also were nonsignificant, further supporting this interpretation. It is unclear whether different patterns of risk and persistence occur in later adulthood or among those who show adult onset of suicidal thinking. Testing such models would be challenging, given the low prevalence and incidence of suicidal ideation that were estimated across the early adult years in this sample (Kerr et al., in press).

Participants' substance use, depressive symptoms, and, to a limited extent, their parents' depressive symptoms were significant predictors of risk for suicidal ideation occurrence and recurrences. Thus, to be clear, findings supported a model of suicidal ideation over time that is both state (i.e., links between past and future ideation) and trait dependent. There was no evidence that predictors interacted with spell, as might have been expected if a kindling process

occurred (i.e., if lower and lower stimulus or vulnerability thresholds were needed to trigger an event). Notably, our models used predictors that were either time invariant or that had relatively long time lags and, thus, were somewhat limited as tests of such a hypothesis.

The relations that alcohol/substance use and depressive symptoms had to risk for suicidal ideation are consistent with decades of past research on the correlates of suicidal ideation and predictors of more severe suicidal behavior (e.g., C. A. King, 1997). Unexpectedly, there was no evidence that the effects of alcohol/substance use on risk for suicidal ideation were mediated by depressive symptoms. These findings contrast with those of others, such as Esposito and Clum (2002), who considered diagnosis-based measures of adolescent depression and alcohol/ substance abuse/dependence in relation to suicidal ideation in a high-risk community sample. That our measurement focused on frequency of use, rather than associated impairment and negative consequences, may account for the differences in findings. Frequent alcohol/ substance use may directly mark a propensity for suicidal ideation because of associations with poor affect regulation, the tendency to seek short-term solutions, and ineffective coping efforts.

It was surprising that measures of antisocial behavior, including self-reports and official arrest records, were unrelated to suicidal ideation. This contrasts with a recent study by Thompson et al. (2007), who found an association between delinquency and suicidal thoughts, although notably, a stronger one among adolescent girls than boys. Given the interpersonal stressors and salient negative consequences associated with aggressive and disruptive behavior, we expected that such behavior would, at a minimum, impact suicidal ideation risk via depressive symptoms (e.g., Capaldi, 1992). It is possible that our design and analysis were most sensitive to detecting effects of global, trait-based features of antisocial behavior on risk for suicidal thoughts, rather than more time-sensitive chains of events, such as from problem behavior to negative consequences to suicidal thinking. Additionally, antisocial behavior may be more relevant to severe suicidal thinking and impulsive suicidal behaviors (Brent & Mann, 2005) that were not examined presently.

Study Limitations

The present study had some limitations. Participants were racially and ethnically homogeneous (90% White Caucasian) and were recruited on the basis of community risk for delinquency. Thus, results may not generalize to other racial/ethnic groups or to individuals living in areas of greater economic opportunity. Given gender differences in the prevalence of suicidal thoughts and other phenomena examined here (e.g., depressive symptoms and antisocial behavior), findings may not generalize to girls and women. In addition, the sample size, although adequate for longitudinal research, was small relative to samples used in epidemiologic studies to derive stable estimates of prevalence and transition probabilities.

Internal consistency was limited for some measures of antisocial behavior and alcohol/ substance use, likely attributable to developmentally expected changes in variability. However, the advantages of modeling with face-valid, time-varying covariates outweighed the disadvantages of ignoring theoretically important influences. Other measurement limitations were specific to our use of dichotomously coded reports suicidal ideation. Patterns of ideation with some intent were explored but could not be examined comprehensively. It is notable that the limited analyses that were possible, however, did not support dramatic differences in patterns and offered some support that experiencing ideation without intent increases risk for later ideation with intent. It remains possible that more severe levels of intent that were not assessed, such as those involving greater resolve, planning, preparation, and rehearsal, may show greater persistence over time.

An additional measurement limitation concerned the past-week time frame on the annual reports of suicidal ideation. First, it is likely that the rate of ideation in this sample was

underestimated, and spell may have been misspecified in some or many cases (e.g., a participant could remain in Spell 1, despite multiple experiences of suicidal ideation, none of which coincided with annual assessments). A second potential limitation was our treatment of suicidal ideation as an event, when it may be more properly considered a state. This distinction has implications for our interpretation of spell effects. Namely, it could not be determined whether past-week suicidal ideation that was endorsed at multiple adjacent study years represented multiple distinct occurrences or the continuation of one chronic occurrence. On the other hand, this pattern had a corresponding pattern of dummy coding (advancing in spell without advancing in period). Thus, to the extent that this phenomenon significantly affected participants' risk profiles, it was represented in the model.

On balance, limiting endorsement of suicidal ideation to the past week had advantages. This method ensured a temporal distinction between the outcome and lagged predictors. Also, measures of suicidal thoughts and behavior that demand additional retrospection have been found to underestimate rates relative to those with shorter time frames (e.g., Goldney et al., 1991; Klimes-Dougan, 1998). Similarly, Evans et al. (2005) meta-analysis of studies of adolescent suicidal ideation yielded prevalence estimates that were not consistent with reporting periods (i.e., past month, past year, and lifetime estimates were 30.7%, 19.3%, and 29.9%, respectively). Of note, Rueter and Kwon (2005) examined past week prevalence of suicidal ideation in their prospective study of adolescents and generally replicated developmental trends in rates of suicidal ideation reported in prior studies that used wider time frames.

Conclusions

As is repeatedly emphasized in the literature, effective suicide prevention and intervention efforts must target enduring, underlying risk conditions and not just acute crises (e.g., Goldston, 2003). An implication of the present findings and of Joiner's (2005) broader model is that such efforts may have multiple mechanisms of action, including diminishing key risk condition substrates (e.g., mood and behavioral dysregulation) but also disrupting the formation of positive feedback loops of suicidal thoughts and behavior by delaying onset and recurrence. Viewed from this perspective, suicide intervention and prevention trials may consider not only general symptom reduction and absence of suicidal thoughts and behavior as favorable outcomes but also delay of onset and recurrence of suicidal thoughts and behavior.

Acknowledgements

References

Beck, AT. Depression: Clinical, experimental, and theoretical aspects. New York: Harper and Row; 1967.

Beck, AT. Beyond belief: A theory of modes, personality, and psychopathology. In: Salkovskis, PM., editor. Frontiers of cognitive therapy. New York: Guilford; 1996. p. 1-25.

Berman AL, Jobes DA. Suicide prevention in adolescents (age 12–18). Suicide and Life-Threatening Behavior 1995;25:143–154. [PubMed: 7631368]

Birleson P. The validity of depressive disorder in childhood and the development of a self-rating scale: A research report. Journal of Child Psychology and Psychiatry 1981;22:73–88. [PubMed: 7451588]

Birleson P, Hudson I, Buchanan DG, Wolff S. Clinical evaluation of a self-rating scale for depressive disorder in childhood (Depression Self-Rating Scale). Journal of Child Psychology and Psychiatry 1987;28:43–60. [PubMed: 3558538]

Brent DA, Mann JJ. Family genetic studies, suicide, and suicidal behavior. American Journal of Medical Genetics 2005;133C:13–24. [PubMed: 15648081]

Capaldi DM. The co-occurrence of conduct problems and depressive symptoms in early adolescent boys: II. A 2-year follow-up at Grade 8. Development and Psychopathology 1992;4:125–144.

Capaldi, DM.; Patterson, GR. Psychometric properties of fourteen latent constructs from the Oregon Youth Study. New York: Springer-Verlag; 1989.

Capaldi DM, Stoolmiller M. Co-occurrence of conduct problems and depressive symptoms in early adolescent boys: III. Prediction to young-adult adjustment. Development and Psychopathology 1999;11:59–84. [PubMed: 10208356]

Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS). 2006 [Retrieved December 15, 2006]. from www.cdc.gov/ncipc/wisqars

Clark DC, Gibbons RD, Fawcett J, Scheftner WA. What is the mechanism by which suicide attempts predispose to later suicide attempts? A mathematical model. Journal of Abnormal Psychology 1989;98:42–49. [PubMed: 2708639]

Conner KR, Goldston DB. Rates of suicide among males increase steadily from age 11 to 21: Developmental framework and outline for prevention. Aggression and Violent Behavior 2006;12:193–207.

Elliott, DS.; Ageton, SS.; Huizinga, D.; Knowles, BA.; Canter, RJ. National Youth Survey Report No. 26. Boulder, CO: Behavioral Research Institute; 1983. The prevalence and incidence of delinquent behavior: 1976–1980.

Emslie GJ, Waslick B, Weller EB, Kloos A, Weller RA, Kratochvil CJ. Antidepressant management in the context of suicidal ideation. Journal of the American Academy of Child and Adolescent Psychiatry 2007;46:1222–1225. [PubMed: 17712247]

Esposito CL, Clum GA. Psychiatric symptoms and their relationship to suicidal ideation in a high-risk adolescent community sample. Journal of the American Academy of Child and Adolescent Psychiatry 2002;41:44–51. [PubMed: 11800204]

Evans E, Hawton K, Rodham K, Deeks J. The prevalence of suicidal phenomena in adolescents: A systematic review of population-based studies. Suicide and Life-Threatening Behavior 2005;35:239–249. [PubMed: 16156486]

Everall RD, Bostik KE, Paulson BL. Being in the safety zone. Emotional experiences of suicidal adolescents and emerging adults. Journal of Adolescent Research 2006;21:370–392.

Fergusson DM, Horwood LJ, Ridder EM, Beautrais AL. Suicidal behavior in adolescence and subsequent mental health outcomes in young adulthood. Psychological Medicine 2005;35:983–993. [PubMed: 16045065]

Fergusson DM, Woodward LJ, Horwood LJ. Risk factors and life processes associated with the onset of suicidal behaviour during adolescence and early adulthood. Psychological Medicine 2000;30:23–39. [PubMed: 10722173]

Goldney RD, Smith S, Winefield AH, Tiggeman M, Winefield HR. Suicidal ideation: Its enduring nature and associated morbidity. Acta Psychiatrica Scandinavica 1991;83:115–120. [PubMed: 2017908]

Goldston, DB. Assessment of suicidal behaviors and risk among children and adolescents (Contract No 263-MD-909995). Bethesda, MD: National Institute of Mental Health; 2000.

Goldston, DB. Measuring suicidal behavior and risk among children and adolescents. Washington, DC: American Psychological Association; 2003.

Hendin H. Psychodynamics of suicide, with particular reference to the young. American Journal of Psychiatry 1991;148:1150–1158. [PubMed: 1882991]

Joiner, TE. Why people die by suicide. Boston: Harvard University Press; 2005.

Joiner TE, Conwell Y, Fitzpatrick KK, Witte TK, Schmidt NB, Berlim MT, Fleck MP, Rudd MD. Four studies on how past and current suicidality relate even when "everything but the kitchen sink" is covaried. Journal of Abnormal Psychology 2005;114:291–303. [PubMed: 15869359]

Kendler KS, Thornton LM, Gardner CO. Genetic risk, number of previous depressive episodes, and stressful life events in the predicting onset of major depression. American Journal of Psychiatry 2001;158:582–586. [PubMed: 11282692]

Kerr DCR, Owen LD, Pears KC, Capaldi DM. Prevalence of suicidal ideation among boys and men assessed annually from ages 9 to 29 years. Suicide and Life-Threatening Behavior. in press

Kessler RC, Borges G, Walters EE. Prevalence of and risk factors for lifetime suicide attempt in the National Comorbidity Survey. Archives of General Psychiatry 1999;56:617–626. [PubMed: 10401507]

Khantzian EJ. The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. Harvard Review of Psychiatry 1997;4(5):231–44. [PubMed: 9385000]

King, CA. Suicidal behavior in adolescence. In: Maris, R.; Silverman, M.; Canetto, S., editors. Review of suicidology. New York: Guilford Press; 1997.

King RA, Schwab-Stone M, Flisher AJ, Greenwald S, Kramer RA, Goodman SH, et al. Psychosocial and risk behavior correlates of youth suicide attempts and suicidal ideation. Journal of the American Academy of Child and Adolescent Psychiatry 2001;40:837–846. [PubMed: 11437023]

Klimes-Dougan B. Screening for suicidal ideation in children and adolescents: Methodological considerations. Journal of Adolescence 1998;21:435–444. [PubMed: 9757408]

Klimes-Dougan B, Safer MA, Ronsaville D, Tinsley R, Harris SJ. The value of forgetting suicidal thoughts and behavior. Suicide and Life-Threatening Behavior 2007;37:431–438. [PubMed: 17896883]

Kovacs M, Goldston D, Gatsonis C. Suicidal behaviors and childhood-onset depressive disorders: A longitudinal investigation. Journal of the American Academy of Child and Adolescent Psychiatry 1993;32:8–20. [PubMed: 8428888]

Kuehn BM. Men face barriers to mental health care. Journal of the American Medical Association 2006;296:2303–2304. [PubMed: 17105786]

Lewinsohn PM, Clarke GN, Seeley JR, Rohde P. Major depression in community adolescents: Age at onset, episode duration, and time to recurrence. Journal of the American Academy of Child and Adolescent Psychiatry 1994;33:809–818. [PubMed: 7598758]

Lewinsohn PM, Hops H, Roberts RE, Seeley JR, Andrews JA. Adolescent psychopathology: I. Prevalence and incidence of depression and other DSM-III-R disorders in high school students. Journal of Abnormal Psychology 1993;102:133–144. [PubMed: 8436689]

Lewinsohn PM, Pettit JW, Joiner TE, Seeley JR. The symptomatic expression of major depressive disorder in adolescents and young adults. Journal of Abnormal Psychology 2003;112:244–252. [PubMed: 12784834]

Lewinsohn PM, Rohde P, Seeley JR. Major depressive disorder in older adolescents: Prevalence, risk factors, and clinical implications. Clinical Psychology Review 1998;18:765–794. [PubMed: 9827321]

Lyubormisky S, Nolen-Hoeksema S. Self-perpetuating properties of dysphoric rumination. Journal of Personality and Social Psychology 1993;65:339–349. [PubMed: 8366423]

McKeown RE, Garrison CZ, Cuffe SP, Waller JL, Jackson KL, Addy CL. Incidence and predictors of suicidal behaviors in a longitudinal sample of young adolescents. Journal of the American Academy of Child and Adolescent Psychiatry 1998;27:612–619. [PubMed: 9628081]

Miranda R, Scotte M, Hicks R, Wilcox HC, Munfakh JLH, Shaffer D. Suicide attempt characteristics, diagnoses, and future attempts: Comparing multiple attempters to single attempters and ideators. Journal of the American Academy of Child and Adolescent Psychiatry 2008;47:32–40. [PubMed: 18174823]

Najmi S, Wegner DM, Nock MK. Thought suppression and self-injurious thoughts and behaviors. Behaviour Research and Therapy 2007;45:1957–1965. [PubMed: 17074302]

National Institute of Mental Health. NIMH launches first public health education campaign to reach men with depression. 2003 Apr [Retrieved January 11, 2207]. from www.menanddepression.nimh.nih.gov/infopage.asp?id=18

Oregon Social Learning Center. Parent Substance Use. 1984. Unpublished instrument

Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. Applied Psychological Measurement 1977;1:385–401.

Reinherz HZ, Tanner JL, Berger SR, Beardslee WR, Fitzmaurice GM. Adolescent suicidal ideation as predictive of psychopathology, suicidal behavior, and compromised functioning at age 30. American Journal of Psychiatry 2006;163:1226–1232. [PubMed: 16816228]

Rohde P, Lewinsohn PM, Seeley JR. Are people changed by the experience of having an episode of depression?: A further test of the scar hypothesis. Journal of Abnormal Psychology 1990;99:264–271. [PubMed: 2212276]

Rueter MA, Kwon H. Developmental trends in adolescent suicidal ideation. Journal of Research on Adolescence 2005;15:205–222.

Schuckit, MA. Drug and alcohol abuse: A clinical guide to diagnosis and treatment. 2. New York: Plenum Press; 1984.

Schwenk, TL. Is detecting suicidal ideation good?; Annals of Family Medicine. 2005 [Retrieved January 8, 2207]. p. 529www.annfammed.org/cgi/eletters/3/6/529%3696

Selzer ML. The Michigan Alcoholism Screening Test: The quest for a new diagnostic instrument. American Journal of Psychiatry 1971;127:1653–1658. [PubMed: 5565851]

Silverman MM, Berman AL, Sanddal ND, O'Carroll PW, Joiner TE. Rebuilding the Tower of Babel: A revised nomenclature for the study of suicide and suicidal behaviors. Part 2: Suicide-related ideations, communications, and behaviors. Suicide and Life-Threatening Behavior 2007;37:264–277. [PubMed: 17579539]

Singer JD, Willett JB. It's about time: Using discrete-time survival analysis to study duration and the timing of events. Journal of Educational Statistics 1993;18(2):155–195.

Thompson MP, Ho C, Kingree JB. Prospective associations between delinquency and suicidal behaviors in a nationally representative sample. Journal of Adolescent Health 2007;40:232–237. [PubMed: 17321423]

Ward A, Lyubormisky S, Sousa S, Nolen-Hoeksema S. Can't quite commit: Rumination and uncertainty. Personality and Social Psychology Bulletin 2003;29:96–107. [PubMed: 15272963]

Wenzlaff RM, Wegner DM, Klein SB. The role of thought suppression in the bonding of thought and mood. Journal of Personality and Social Psychology 1991;60:500–508.

Willett JB, Singer JD. It's Déjà vu all over again: Using multi-spell discrete-time survival analysis. Journal of Educational and Behavioral Statistics 1995;20(1):41–67.

Table 1

Means for Suicidal Ideation (Equivalent to Percent Reporting Suicidal Ideation[a]) Within Observed Combinations of Spell and Period

	Spell										Total
	1	2	3	4	5	6	7	8	9	10[b]	
Period 1	.14 (205)	.30 (116)	.23 (77)	.30 (40)	.61 (23)	.29 (17)	.40 (10)	.33 (6)	.67 (3)	1.0 (1)	.25 (501)
2	.14 (176)	.10 (80)	.19 (57)	.14 (28)	.33 (9)	.25 (12)	.17 (6)	.50 (4)	1.0 (1)	.	.15 (374)
3	.07 (152)	.19 (70)	.09 (44)	.13 (23)	.00 (6)	.22 (9)	.33 (3)	.00 (2)	.	.	.11 (310)
4	.06 (141)	.07 (57)	.00 (36)	.11 (19)	.00 (6)	.17 (6)	.00 (1)	.00 (1)	.	.	.06 (267)
5	.05 (133)	.10 (50)	.03 (33)	.00 (17)	.20 (5)	.20 (5)	.	.	.	.	.06 (243)
6	.07 (127)	.11 (44)	.07 (30)	.27 (15)	.00 (4)	.00 (3)	.	.	.	.	.09 (223)
7	.05 (118)	.03 (38)	.04 (25)	.10 (10)	.00 (3)	.00 (1)	.	.	.	.	.05 (195)
8	.05 (112)	.03 (37)	.09 (23)	.00 (7)	.00 (3)	.00 (1)	.	.	.	.	.05 (183)
9	.04 (106)	.03 (34)	.00 (20)	.00 (7)	.00 (3)	.00 (1)	.	.	.	.	.03 (171)
10	.01 (101)	.07 (30)	.00 (18)	.00 (7)	.00 (2)	.00 (1)	.	.	.	.	.02 (159)
11	.04 (100)	.04 (28)	.00 (14)	.00 (6)	.00 (1)	.	.	.	.	.	.03 (149)
12	.02 (95)	.00 (24)	.11 (9)	.00 (6)	.	.	.	.	.	.	.02 (134)
13	.04 (93)	.10 (20)	.00 (6)	.00 (2)	.	.	.	.	.	.	.05 (121)
14	.00 (87)	.15 (13)	.00 (5)	.	.	.	.	.	.	.	.02 (105)
15	.03 (86)	.00 (10)	.00 (2)	.	.	.	.	.	.	.	.03 (98)
16	.00 (79)	.00 (4)	.	.	.	.	.	.	.	.	.00 (83)
17	.00 (67)	.	.	.	.	.	.	.	.	.	.00 (67)
Total	.06 (1978)	.12 (655)	.10 (399)	.14 (187)	.28 (65)	.21 (56)	.30 (20)	.31 (13)	.75 (4)	1.0 (1)	.09 (3383)

Note: *ns* are reported in parenthesizes following the means.

[a]For example, of the 23 men in Spell 3, Period 8 (i.e., 2 reported occurrences of suicidal ideation, and 7 years since it was last reported), 9% reported suicidal ideation in the past week.

[b]Complete data are not shown for the one individual represented in the Spell 10, Period 1 cell as he progressed to Spell 13, Period 3.

Table 2

Results of Multiple-Spell Discrete-Time Event-History Analysis: Prediction of Suicidal Ideation from Period, Spell, Parental Depressive Symptoms, and Participants' Alcohol/Substance Use and Depressive Symptoms (N = 3347)

Predictor	Model 1 B (SE)	Model 1 Exp(B)	Model 2 B (SE)	Model 2 Exp(B)	Model 3 B (SE)	Model 3 Exp(B)	Model 4 B (SE)	Model 4 Exp(B)
Period 1	-1.10 (.10)	.33***	-1.49 (.14)	.23***	-1.51 (.14)	.22***	-1.52 (.15)	.22***
2	-1.73 (.15)	.18***	-2.07 (.17)	.13***	-2.09 (.17)	.12***	-1.98 (.17)	.14***
3	-2.09 (.18)	.12***	-2.41 (.20)	.09***	-2.42 (.20)	.09***	-2.30 (.20)	.10***
4	-2.87 (.28)	.06***	-3.17 (.29)	.05***	-3.15 (.29)	.04***	-3.01 (.29)	.05***
5	-2.79 (.28)	.06***	-3.06 (.29)	.05***	-3.05 (.29)	.05***	-2.89 (.29)	.06***
6	-2.30 (.24)	.10***	-2.55 (.25)	.08***	-2.55 (.25)	.08***	-2.34 (.25)	.10***
7	-3.03 (.34)	.05***	-3.25 (.35)	.04***	-3.22 (.35)	.04***	-3.05 (.35)	.05***
8	-2.94 (.34)	.05***	-3.16 (.35)	.04***	-3.13 (.35)	.04***	-2.95 (.35)	.05***
9	-3.48 (.45)	.03***	-3.71 (.46)	.02***	-3.68 (.46)	.03***	-3.48 (.46)	.03***
10	-3.95 (.58)	.02***	-4.16 (.59)	.02***	-4.13 (.59)	.02***	-3.92 (.59)	.02***
11	-3.36 (.46)	.04***	-3.54 (.46)	.03***	-3.53 (.46)	.03***	-3.30 (.46)	.04***
12	-3.78 (.58)	.02***	-3.94 (.59)	.02***	-3.93 (.59)	.02***	-3.74 (.59)	.02***
13	-2.94 (.42)	.05***	-3.08 (.42)	.05***	-3.06 (.42)	.05***	-2.89 (.43)	.06***
14	-3.94 (.71)	.02***	-4.04 (.72)	.02***	-4.02 (.72)	.02***	-3.83 (.72)	.02***
15	-3.41 (.59)	.03***	-3.49 (.59)	.03***	-3.49 (.59)	.03***	-3.28 (.59)	.04***
16	-8.20 (6.72)	<.01	-8.24 (6.71)	<.01	-8.20 (6.69)	<.01	-8.00 (6.66)	<.01
17	-8.20 (7.38)	<.01	-8.20 (7.38)	<.01	-8.18 (7.37)	<.01	-8.01 (7.31)	<.01
Spell 2			.54 (.16)	1.71**	.47 (.16)	1.60**	.32 (.16)	1.38†
3			.24 (.20)	1.27	.20 (.20)	1.22†	.04 (.20)	1.05
4			.55 (.24)	1.74*	.46 (.24)	1.58†	.33 (.25)	1.39
5			1.16 (.21)	3.20***	1.09 (.21)	2.97***	.84 (.22)	2.32***
Parent Dep					.17 (.07)	1.18*	.12 (.07)	1.13†
Alc/Sub					.21 (.07)	1.23**	.17 (.07)	1.18
Dep							.52 (.10)	1.69***
Dep²							-.13 (.04)	.88***

Model Statistics	1 Model		Model 2		Model 3		Model 4	
Block χ²	2820.61***		33.54***		14.02**		32.73***	
df	17		4		2		2	
Model χ²	2820.61***		2854.15***		2868.17***		2900.90***	
df	17		21		23		25	
-2LL	1819.32		1785.78		1771.76		1739.03	
R²	.759		.765		.767		.773	

Notes. Exp(B) = exponentiated *B*; Parent Dep = parental depressive symptoms; Alc/Sub = 1-year lagged alcohol/substance use; Dep = 1-year lagged depressive symptoms; Dep² = 1-year lagged quadratic depressive symptoms; -2LL = -2 log likelihood; R^2 refers to Nagelkerke R^2.

†
p < .10.

*
$p < .05.$

**
$p < .01.$

***
$p < .001.$