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Risk for Suicidal Ideation and Suicide Attempts Associated with Co-occurring Depression and Conduct Disorders in Early Adolescence

Ann Vander Stoep, Ph.D.^{1,2}, Molly Adrian, Ph.D.², Elizabeth McCauley, Ph.D.^{1,4}, Sheila Crowell, Ph.D.³, Andrea Stone, Ph.D.⁵, and Cynthia Flynn, Ph.D.⁴

¹Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA, USA

²Department of Epidemiology, University of Washington, Seattle, WA, USA

³Department of Psychology, University of Washington, Seattle, WA, USA

⁴Division of Child and Adolescent Psychiatry, Children's Hospital and Regional Medical Center, Seattle, WA, USA

⁵Department of Interdisciplinary Arts and Sciences, University of Washington Bothell, Bothell, WA, USA

Abstract

This study investigates the early manifestation of co-occurring depression and conduct disorders as a predictor of heightened risk for later suicidal ideation and behavior in a community sample of 521 adolescents. Self-reported symptoms of depression and conduct disorder were evaluated in early 6th grade. Suicidal thoughts and behaviors were tracked through multiple assessments carried out over the middle school years. Compared to adolescents with depression symptoms only, conduct disorder symptoms only, or low psychopathology, those with co-occurring depression and conduct disorder symptoms had the highest risk for subsequent suicidal ideation, recurrent suicidal behaviors, and suicide attempts.

Introduction

Research focused on the co-occurrence between depression and conduct disorders indicates that these two symptom profiles co-occur with greater frequency than would be expected by chance (Angold & Costello, 1993; Capaldi, 1991) and that their co-occurrence heightens the risk for a number of adverse outcomes. By late adolescence, comorbidity across the internalizing and externalizing spectra has been linked with alcohol and substance abuse, involvement with criminal justice systems, risk for Axis II psychopathology, poor general adaptive functioning, and death by suicide (Birmaher et al., 1996; Lewinsohn, Rohde, & Seeley, 1995; Rockhill, Vander Stoep, McCauley, & Katon, 2009).

Suicide is an outcome associated with co-occurring internalizing and externalizing problems that may raise the most concern. Among adolescents and young adults, suicide is the third leading cause of mortality in the United States (Centers for Disease Control and Prevention [CDC], 2010). Moreover, suicide attempts are costly to individuals, families, and society (Eaton et al., 2008) and place substantial strain on the health care system due to high utilization of emergency room and hospital services (CDC, 2002; Bennewith, Sharp,

Gunnell, Peters, & Stocks, 2001; Sim, Adrian, Zeman, Cassano, & Friedrich, 2009). For these reasons, suicide prevention is a national priority (U.S. Public Health Service, 1999).

Effective suicide prevention hinges on the identification of youth who are at risk. Recent epidemiological findings suggest that approximately 14.5% of 9–12th grade students seriously considered suicide, nearly 7% made a suicide attempt, and 2% made an attempt requiring medical attention (Eaton et al., 2008). Suicide ideation and attempts are well-established risk factors for later suicide (Cooper et al., 2005) and may negatively affect social functioning and other developmental processes (e.g., Crowell et al., 2005). Although the severity of suicidal ideation ranges from fleeting thoughts about suicide to intrusive and chronic preoccupation with self-destruction, adolescents with recurrent ideation appear to be at highest risk for self-harm (Brent et al., 1993). Prospective recognition of suicide risk in younger adolescents (6th–8th grades), however, remains an extremely challenging task. Early identification is particularly difficult given that most young adolescents have not begun to engage in behaviors with well-established links to suicide completion, such as suicide attempts, non-suicidal self-injury, and alcohol or substance use (Berman, Jobes, & Silverman, 2006). Furthermore, many psychological disorders linked with suicide have either not emerged or are not clearly diagnosable during the early adolescent period (Steinberg, 2005). By the time more proximal risk-factors are identified, opportunities to provide effective interventions that are less intensive and costly have been missed. Thus, understanding the factors that influence the development of suicidal ideation risk and recurrence could represent a significant advance in preventive care.

Several studies have linked suicide and suicidal behaviors with concurrent psychopathology, particularly mood disorders and externalizing behavior problems (e.g., conduct disorder, Attention Deficit Hyperactivity Disorder, and substance use disorders; Goldston, et al., 2009), as well as overlapping internalizing and externalizing psychopathology (Verona, Sachs-Ericsson, & Joiner, 2004). Longitudinal studies confirm that these forms of psychopathology confer future risk, particularly among males. Indeed, co-occurring conduct and internalizing problems in early childhood, based on parent and teacher reports, were found to be the strongest predictors of later suicide among males followed from age 8 to 24 (Sourander et al., 2009), suggesting that psychological risk factors for suicide emerge earlier and are more chronic than had previously been assumed. There are, however, several limitations to the few existing longitudinal studies, including over-reliance on clinical samples (e.g., Kelly, Lynch, Donovan, & Clark, 2001), the use of retrospective accounts of earlier psychological history (e.g., Sourander et al., 2009), lengthy evaluation periods with few intermediate assessments (e.g., Borges, Angst, Nock, Ruscio, & Kessler, 2008), and failure to identify youth early, prior to the emergence of more severe behavioral problems (e.g., Thompson, Kuruwita, & Foster, 2009). To our knowledge, there are no prospective studies that have evaluated suicide risk among children from the general population who are just beginning the transition into adolescence.

Early adolescence represents an optimal period for the identification of suicide risk factors. Although studies with younger children have failed to reveal significant associations between self-reported risk factors and later suicidal behaviors (Sourander et al., 2009), by age 11, many youth have developed sufficient insight into their emotional experiences to provide valid self-report of mood symptoms (Reynolds, 1993). Even more importantly, the transition into adolescence is a period of increased prevalence for the spectrum of suicide risk behaviors, including completed suicide. Even though suicide occurs infrequently among younger adolescents (e.g., ages 10 to 14), suicide rates increase significantly later in adolescence and in young adulthood (CDC, 2010). Thus, the early adolescent years provide a unique window where emotional insight and mental health problems are increasing, but suicide risk has not yet peaked. It is yet unknown whether self-report assessment of

depressive symptoms and conduct problems during early adolescence would be useful in predicting subsequent suicide risk.

Based upon the above review, we hypothesize that both depression and conduct disorder symptoms, and particularly co-occurring symptoms, reported by eleven year-olds will serve as a useful marker of risk for suicidal ideation and attempts during the middle school years. We tested this hypothesis in a community-based sample of youth followed longitudinally. Participants were screened for co-occurring depression and conduct disorder symptoms in 6th grade and were subsequently assessed for suicide risk five times over the course of middle school. In this developmental study, we sought to address the following questions:

1. Are young adolescents with co-occurring depression and conduct problems at higher risk for suicidal ideation, recurring suicidal ideation, and suicide attempts compared with those who have depressive or conduct problems only?
2. How much of the association between psychopathology and suicide attempts in early adolescence can be explained by recurrent ideation?
3. Do depression and conduct disorder symptoms act synergistically or independently to affect suicide risk?

Method

Design and Sample

The Developmental Pathways Project (DPP) is a community-based epidemiological study, approved by the University of Washington Human Subjects Division that was conducted in two stages. As seen in Figure 1, Stage 1 involved universal classroom-based screening of 6th grade students for symptoms of depression and conduct problems. Stage 2 was a prospective cohort study in which in-home assessments were conducted at 6-month intervals with a stratified random sample of children screened in Stage 1 and a parent/guardian. Data analyzed for this paper were derived from screening and from five longitudinal study assessments conducted between 6th and 8th grades. The Stage 1 sampling frame included students who were 6th graders enrolled in four public schools in an urban school district in the Pacific Northwest from 2001–2004. Screening was carried out in the fall quarter of the school year. Schools were selected that represented the varied geographic areas and the demographic diversity of students enrolled in the school district.

The screening questionnaire was administered in classrooms and included 30 items from the Mood and Feelings Questionnaire (MFQ; Angold & Costello, 1987) and the 30 externalizing items from the Youth Self-Report (YSR; Achenbach, 1991). Stage 1 participants did not differ significantly from non-participants on the basis of gender, race, or Hispanic origin, (all p s $> .05$). For the purpose of selecting a stratified random sample for longitudinal study, all adolescents who were screened in Stage 1 were assigned to one of four groups: (1) high depression and high conduct disorder symptom scores (CM), (2) high depression and low conduct problem scores (DP), (3) low depression and high conduct problem scores (CD), and (4) low depression and conduct problem scores (NE). Group placement for the three high-risk groups was determined by using a cutoff of .5 SD above the screening sample mean for the MFQ and the YSR externalizing scales. Eligibility for longitudinal study participation was determined on the basis of residence in the local geographic area at the time of study recruitment and the ability for both the student and an adult caregiver to undergo lengthy, English-language interviews about personal information.

To enhance the likelihood of observing psychopathology and related outcomes over the course of middle school, children whose screening scores were high on depression and/or

conduct dimensions were over-sampled for participation in the longitudinal study. A target number of children were randomly selected from the four cells at a ratio of approximately 1 CM : 1 DP : 1 CD : 2 NE. In the general school population the ratio is close to 1 CM: 1 DP : 1 CD: 6 NE. Therefore, this sampling approach yielded an over-representation of children in the CM, DP, and CD groups relative to their representation in the general middle school population.

Baseline in-person interviews were conducted within 3 months of screening, and four additional in-person interviews were conducted at 6, 12, 18, and 24 months after the baseline interview. Of the participants originally enrolled, 81–90% were retained at each follow-up interview, including over 80% in each psychopathology risk category. There were no significant differences in attrition from the four psychopathology groups over time.

Mean age at baseline for the 521 longitudinal study participants was 12.02 years ($SD = .43$). The study sample included 272 (52.2%) boys and 249 (47.8%) girls; 148 (28.4%) were African American; 97 (18.6%) were Asian American (including children whose families were of Asian and Pacific Islander origin); 21 (4.0%) were Native American; and 255 (48.9%) were European American. Of the study sample, 53 (10.2%) were of Hispanic origin. Participating families spanned a wide range of lower and middle income levels, with 26.7% of families having a total household annual income of under \$25,000, and 30.9% of families having a household income of over \$75,000. Mean socioeconomic status (Hollingshead, 1975) for the full sample was 39.13 ($SD = 14.13$).

Measures

Psychopathology Status—Depression and conduct problem status was ascertained at screening using the .5 SD cutoffs described above. Cutoffs of .5 SD above the mean were selected because they reflect elevated psychopathology risk status in young adolescents and are consistent with the classification approach used in previous studies of comorbid depression and conduct problems in this age group (Capaldi 1991; Ingoldsby et al. 2006; Miller-Johnson et al. 1998). The MFQ is a self-report measure of depression designed for youth ages 8 to 18. The scale has 33 items that evaluate DSM-IV diagnostic criteria for depressive disorders as well as common affective, cognitive, and vegetative features of childhood depression (Costello & Angold, 1988). Previous validation studies have demonstrated high content and criterion validity, showing concordance with depressive diagnoses derived from standardized diagnostic interviews (Wood, Kroll, Moore, & Harrington, 1995; Kent, Vostanis, & Feehan, 1997; Daviss et al., 2006). For our purposes, we removed the five items comprising suicide ideation when testing associations between depression screening scores on the MFQ and later suicidality. This resulted in a 28-item version of the MFQ. The Cronbach's alpha coefficient for the 28-item depression symptom scale was .91. The YSR externalizing scale with items reflecting both rule-breaking and aggressive behavior served as our measure of conduct problems. The YSR is a widely used assessment tool and has been validated in several large epidemiological samples (Achenbach, 2001; U.S. SAMHSA, 1996; 1997; 1998; 1999). The Cronbach's alpha coefficient for the YSR externalizing scale score in the study sample was .90. Both the YSR and MFQ included response options of "not true," "sometimes," and "true". Using these cutoffs, 209 adolescents were defined low in depression and conduct problems [neither (NE)], 107 as high in depression symptoms, low in conduct problems (DP), 81 as high in conduct problems and low in depression symptoms (CD), and 124 as high in depression symptoms and high in conduct problems (CM).

Suicide Risk Outcomes—We examined three suicide risk outcomes across five semi-annual assessments beginning in 6th grade and continuing into 8th grade. These included (1)

suicidal ideation, (2) recurrent ideation over two or more assessments, and (3) suicide attempt. A description of how these outcomes were measured follows.

Suicidal ideation—The full 33-item MFQ was administered at each of the five longitudinal assessments. The MFQ item “I thought about killing myself” was administered at each timepoint. Response options for this item included: “not true;” “sometimes true;” and “true” in the past two weeks and were coded 0, 1, or 2. One additional suicidal ideation item was garnered from the adolescent interviews at each timepoint, resulting in 26 more endorsements of suicidal ideation. The suicidal ideation item from the CDISC “Have you thought seriously about killing yourself?” from timepoints one, three, and five, and the YSR suicidal ideation item “I think about killing myself” at timepoints two and four, were incorporated with the MFQ item into the suicide ideation indicator.

Recurrent ideation—To measure recurrence of ideation from 6th through 8th grades, we created an index based on how many times individuals endorsed suicidal ideation. Scores of recurrent ideation ranged from a low of zero (never endorsed ideation) to four (endorsed suicidal ideation at four of the five assessments). Consistent with empirical and theoretical work, recurrence was defined as endorsing suicidal ideation at two or more assessments (Borges, Angst, Nock, Ruscio, & Kessler, 2008; Hintikka, Pesonen, Saarinen, Tanskanen, Lehtonen, & Viinamaki, 2001; Joiner and Rudd, 2001).

Suicide attempt—Suicide attempts were assessed at baseline, 12, and 24-month follow-up through administration of the Diagnostic Interview Schedule for Children (DISC; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000) to the adolescent and a parent/guardian. The DISC has been widely used (Bird et al., 1988; Pine, Cohen, Johnson, & Brook, 2002; Roberts, Roberts, & Xing, 2007; Shaffer et al., 1996) and has acceptable internal consistency, test-retest reliability, and criterion validity (Schwab-Stone et al., 1996). The interviewers queried each adolescent and the parent (separately and privately) whether in her/his whole life, the adolescent had tried to kill her/himself or made a suicide attempt. A positive endorsement to this item was followed with a query of whether the youth had attempted suicide over the past twelve months. The participant was coded positive for attempted suicide if either the adolescent or the parent endorsed this item. Because the DISC measures symptoms retrospectively, the timeframe for reports of attempted suicide was longer than for other measures (i.e., past year vs. past two weeks). This allowed us to examine attempted suicide across two years from mid-6th through mid-8th grades. Sufficient information was available to determine the two-year incidence of suicide attempts for 432 of the original 521 study participants. Whether complete data were available did not vary across psychopathology groups or gender. We were able to ascertain suicide attempt status for between 80 and 86% of participants in each of the four psychopathology groups.

Analytic approach

We conducted logistic regression analyses to evaluate our first set of questions: *Are young adolescents with co-occurring depressive and conduct problems at higher risk for suicidal ideation, recurring ideation, and attempts compared to adolescents who have depressive or conduct problems only?* For this analysis we defined the outcome variables as any ideation, recurrent ideation (defined as endorsing suicidal ideation in more than one of the five assessments), or any suicide attempt and tested whether the odds of these outcomes were higher for adolescents who screened into the CM group as compared with those in the other three groups (DP, CD, NE). The psychopathology groups were entered as dummy variables with the CM group as referent. For our second question: *How much of the association between psychopathology and suicide attempts in adolescence is mediated by recurrent ideation?* We entered the recurrent ideation indicator into the logistic regression model to

determine whether recurrent ideation accounted for a significant amount of the variance in attempts that had been explained by psychopathology group status. For the third question: *Do conduct problems and depressive symptoms make independent contributions to the risk of attempting suicide, and does their joint contribution to risk of suicide attempts exceed that which would be expected on the basis of their independent contributions alone?* We utilized the continuous depression and conduct disorder symptom scores from the MFQ and YSR, respectively. Again, we used logistic regression to test the significance of a depression $\times$ conduct problem interaction term.

Results

Suicidal ideation in psychopathology groups

The proportion of adolescents who reported suicidal ideation is shown at each follow-up assessment, according to 6th grade screening psychopathology group status in Table 1. Over the follow-up period, 3.35% of the NE group of adolescents (low depression and externalizing scores), 11.11% of the CD group, 10.28% of the DP group, and 26.61% of the CM group endorsed suicidal ideation at one or more of the five follow-up assessments. Pairwise examination of the psychopathology groups revealed that the CM group was more likely than the NE, CD, and DP groups to endorse suicidal ideation at one or more timepoints within the 2-year study period. In comparison with the CM group, the odds of ever endorsing SI was decreased by 90% for adolescents in the NE group, decreased by 65% for adolescents in the DP group, and decreased by 68% for adolescents in the CD group. Examining suicidal ideation at each of the five timepoints separately reveals, for adolescents in the CM group, the odds of endorsing suicidal ideation was significantly higher relative to adolescents in the NE group at the first three assessments (OR=.13, 95%CI=.04-.41 at T1; OR=.09, 95%CI=.03-.31 at T2; OR=.08, 95%CI=.01-.69 at T3), higher relative to adolescents in the CD group at one assessment (OR=.18, 95%CI=.04-.80 at T2)¹, and higher relative to the DP group over the first two assessments (OR=.33, 95%CI=.11-.95 at T1 and OR=.06, 95%CI=.01-.46 at T2).

Recurrent ideation in psychopathology groups

Table 2 shows the proportion of adolescents in each psychopathology group who had recurrent ideation over the course of early adolescence. This table illustrates that adolescents in the CM group had a higher incidence of recurrent ideation than adolescents in the other psychopathology groups. Approximately 6% of those exhibiting comorbid depression and conduct disorder symptoms endorsed suicidal ideation at two or more follow-up assessments. For adolescents in the CM group, the odds of endorsing suicidal ideation in two or more assessments was an estimated 6.25 times (95% CI = 1.27–33.33, $p = 0.02$) higher relative to the odds in the NE group. The odds of endorsing suicidal ideation in the CM group was not significantly different from the DP group (OR=2.08, 95% CI = .52–8.33, $p > .05$). There were no adolescents in the CD group who were classified as having recurrent ideation².

¹Three comparisons could not be made because no adolescents endorsed SI. To calculate an estimate of the OR, a value of 1 was imputed into the NE T5, and CD T4 and T5. Results were significant comparing the CM to NE group at T5 (OR=.07, 95%CI=.01-.61, $p=.02$). Comparing the CM to CD groups at T4 and T5, estimates of the OR were .36 and .17 respectively, but results were nonsignificant with large confidence intervals (T4 95%CI=.04-3.27, T5 95%CI=.01-2.86, $p>.10$). Power calculations revealed that our sample size would need to be greater than 599 to detect significant differences with 80% power.

²To calculate an estimate of the OR, a value of 1 was imputed in the cell for the CD recurrent ideation group. When compared to the CM group, the OR was nonsignificant (OR=.21, 95%CI=.03-1.73, $p>.10$).

Suicide attempts

Over the 24-month period from 6th through 8th grades, 24 (4.6%) of adolescents made a suicide attempt. The weighted 2-year incidence of suicide attempt in the sample was 35/1,000. Descriptive information showing cross-classifications of adolescents by psychopathology group membership, suicidal ideation, and suicide attempts is presented in Table 3. One third of the 24 attempters endorsed suicidal ideation at one or more of the longitudinal assessments. Half of the adolescents (50%) who had attempted suicide were in the CM group. The odds of making an attempt was significantly higher for adolescents in the CM group relative to the odds of attempting suicide in the NE group (OR=.23, 95% CI=.08–.67, $p < .01$). No significant differences were observed relative to the DP (OR=.16, 95% CI=.10–1.34, $p > .05$) and CD groups (OR=.24, 95% CI=.05–1.09, $p > .05$).

Testing a mediation model

To further understand the strong association between comorbid depression and conduct disorder symptoms and attempted suicide, the impact of recurrent ideation was examined as a mediator. Experiencing recurrent ideation conferred additional risk for suicide attempt over and above comorbid psychopathology status (OR= 13.00, CI= 3.60–46.95, $p < .01$). As shown in Figure 2, recurrent ideation was shown to mediate the association between comorbid psychopathology status and suicide attempts (Sobel test = 2.27, $p = .02$).

Testing for independent and multiplicative effects of depression and conduct disorder symptoms on recurrent ideation and suicide attempts

A series of steps were undertaken to understand the independent, adjusted, and multiplicative effects of depression and conduct disorder symptoms on suicide risk. First, conduct disorder symptoms were entered alone into logistic regression models predicting ideation and then attempts. Without accounting for the shared variance of depression symptoms, conduct disorder symptoms were not significantly associated with recurrent suicidal ideation (Wald=2.60, $p > .10$, OR 1.06, 95% CI= .99–1.13). When examined with respect to suicide attempts, conduct disorder symptoms made a significant contribution to the prediction of suicide attempts (Wald=6.60, $p = .01$, OR=1.06, 95% CI=1.02–1.11).

Next, depression and conduct disorder symptoms scores were entered simultaneously in a logistic regression model. Depression symptoms made a strong contribution to the prediction of *recurrent suicidal ideation* (Wald =10.79, $p = .01$, OR= 1.10, 95% CI= 1.04–1.17), whereas conduct disorder symptoms did not make a significant contribution (Wald=.14, $p = .71$, OR=.98, 95% CI=.87–1.10). The interaction term was not significant ($p = .68$), indicating there were not synergistic effects for depression symptoms and conduct disorder symptoms in predicting recurrent ideation. About one fifth of the total variance in recurrent suicidal ideation status predicted by the model with depression symptoms, conduct disorder symptoms and their interaction (McFadden's D=.21). Similarly, depression symptoms made a strong independent contribution to the prediction of *suicide attempts* (for elevated depressive symptoms (Wald = 5.70, $p = .02$, OR= 1.05; 95% CI= 1.01–1.10). Once depressive symptoms were accounted for, the contribution of conduct disorder symptoms was not significant ($p = .38$); nor was the interaction term significant ($p = .19$). Depression, conduct disorder symptoms, and their interaction accounted for just over 10% of the variance in the risk of a suicide attempt (McFadden's D=.11).

Discussion

This study is among the few to use a community-based cohort to prospectively assess the association between the co-occurring depression and conduct disorder symptoms in early adolescence and adolescent suicide-risk behaviors. Participants underwent several, semi-

annual follow-up assessments, which is the most systematic assessment of suicide risk with community participants to date. Consistent with our hypothesis, young adolescents with comorbid depression and conduct disorder symptoms experienced elevated risk for suicidal ideation, recurrent suicidal ideation, and suicide attempts. Specifically, regarding suicidal ideation, comorbid adolescents were more likely to ever endorse suicidal ideation. Examining each timepoint, in two or more assessments adolescents with comorbid symptoms demonstrated increased risk of experiencing suicidal ideation compared to adolescents with low psychopathology, depression symptoms only, and conduct disorder symptoms only. Comorbid psychiatric status demonstrated the best prediction of suicidal ideation within the first year of the assessment of these symptoms. Being classified as either comorbid or depressed signified increased risk for recurrent suicidal ideation. Examination of the association between depression symptoms and conduct disorder symptoms suggests that symptoms in the depression domain exerted direct effects on risk of suicide attempts. The interaction between depression and conduct problems did not indicate significant synergistic effects. That is, the impact of depression symptoms on risk of recurrent ideation or suicide attempts was not dependent on a young adolescent's conduct disorder symptom status.

Recurrent ideation mediated the association between comorbid symptoms and attempted suicide. This is consistent with the extensive literature linking cognitive processes (i.e., suicide ideation, planning, hopelessness) with suicide attempts (Brown, Beck, Steer, & Grisham, 2000; Fawcett et al., 1990; Kessler, Borges, & Walters, 1999). Moreover, it extends our understanding of the role of comorbid symptoms, suicidal ideation, and suicide attempts in a community sample of adolescents. Recurrent suicidal ideation over this period of young adolescence was uncommon, but was strongly associated with risk for suicide attempts suggesting that recurrent ideation indicates specific risk. This finding supports the notion that psychopathology is associated with suicidality, but suicidal thoughts themselves may be an important mechanism serving to maintain or escalate suicide risk over time (Joiner, 2005; Kerr, Owen, & Capaldi, 2008). Consequently, recurrent ideation in young adolescents may mark significant risk onto suicide attempts, and modifying suicide-specific cognitions would be important in reducing that risk.

The serious consequences related to having both depression and conduct disorder symptoms suggest that young adolescents with comorbid symptoms suffer from more severe psychopathology relative to those with elevations in depression or conduct problem symptoms only. Although there have been many substantive explanations regarding the meaning of co-occurrence of symptoms, these results support theories that comorbidity is a marker of severity of psychopathology and emotional dysregulation (Angold, Costello, & Erkanli 1999; Vander Stoep, Adrian, McCauley, Rhew, Herting, Kraemer, submitted). Indeed, we found in a post-hoc investigation that adolescents with comorbid problems had significantly higher depression scores compared to the adolescents with depressed only in four of five assessments. Consistent with this finding, in prior studies, comorbidity has been associated with increased symptom levels within each of the contributing types of psychopathology (Foley et al., 2001; Vander Stoep et al., 2006), greater functional impairment (Newman et al., 1996; Rockhill et al, 2009), and greater psychosocial adversity (Kuhne, Schachar, & Tannock, 1997). Our findings are also consistent with recent work demonstrating that risk for suicide increases significantly with each additional concurrent diagnosis (Goldston et al., 2009). Finally, a growing literature suggests that the overlap between depressed mood and externalizing behaviors may increase risk for a number of negative developmental outcomes (Crowell et al., 2009), including completed suicide (Brent et al., 1994).

The results of the current study have implications for clinical and public health efforts. Whereas this study substantiates a well-established finding that depression is a risk factor for suicidal ideation and behavior, it suggests that knowledge of an adolescent's status with regard to both depressive *and* conduct problems could help to identify a particularly high-risk subgroup. Thus, administering a brief, well-validated screening questionnaire to determine the presence of conduct symptoms in combination with depression symptoms could enhance the utility of current mental health screening efforts in clinical, school, or other community settings (Vander Stoep et al., 2005; McCormick et al., 2010). Furthermore, our findings suggest that once adolescents with comorbid depression and conduct disorder problems have been identified, clinicians working with youth should conduct systematic, periodic assessments of suicidal ideation.

Our findings are limited by a number of factors. In particular, the low base rate of suicidal behaviors among young adolescents limits the power of the study. A number of the associations that were investigated were strong, but not statistically significant. Low power was partially due to the fairly brief follow-up window and the timing of the follow-up occurring in a developmental period of low risk. Had the study period been longer, most likely other youth would have made a suicide attempt. Additionally, even though the study can be considered "naturalistic," we cannot rule out the possibility that participation in a longitudinal study served as a source of protection against self-injurious behaviors for some participants. Moreover, not all of the participants were retained through follow-up. Although we addressed problems with missing data statistically, it is possible that those who did not continue with the study were different in ways we did not assess. Lastly, the reporting of suicidal behaviors, as well as of psychopathology symptoms, relied upon adolescent self-report. While use of self-report for measurement of these constructs is appropriate due to how difficult they are for others to detect, it is not possible to rule out response distortions and shared method variance.

In sum, the current findings build upon the literature implicating comorbid depression and conduct problems in the etiology of suicidal behavior and extend this research to young adolescents. Our results suggest that the early manifestation of depression and conduct disorder symptoms confers significant later risk for suicidal behaviors and that screening for both types of symptoms in early adolescence may be warranted. This study underscores the need for longitudinal studies such as the recently launched National Children's Study (National Children's Study, 2010) that will assess mental health status of a large sample of children over development at intervals frequent enough to detect subtle shifts in risk and protective factors. Studies that can identify developmental stage-specific warning signs will aid efforts to prevent psychopathology, suicidal behaviors and, ultimately, completed suicide.

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Figure 1.
Developmental Pathways Project Sampling Frame

Figure 2.

Test of Mediation by Recurrent Ideation of Association between Suicide Attempts and Depressive Symptoms, Conduct Problems

*RECURRENT IDEATION is binary and defined by endorsing suicidal ideation in 2 or more assessments.

Table 1
Odds of Endorsing Suicidal Ideation by Psychopathology Group across Five Assessments

	CM	NE	CD		DP		
	Ref	OR	95% CI	OR	95% CI	OR	95% CI
Early 6 th grade (Interview 1)	1.00	.13 ^{**}	(.04–.41)	.37	(.11–1.17)	.33 [*]	(.11–.95)
Percentage Endorsing	13.46%	2%		5.41%		4.85%	
5.61%							
Late 6 th grade (Interview 2)	1.00	.09 ^{***}	(.03–.31)	.18 [*]	(.04 –.80)	.06 ^{****}	(.01–.46)
Percentage Endorsing	15.46%	1.57%		3.13%		1.07%	
4.72%							
Early 7 th grade (Interview 3)	1.00	.08 [*]	(.01 –.69)	.73	(.18 –3.03)	.33	(.07–1.68)
Percentage Endorsing	6.32%	.55%		14.06%		6.52%	
2.77%							
Late 7 th grade (Interview 4)	1.00	.13	(.01– 1.14)	.00	(-)	.81	(.18–3.73)
Percentage Endorsing	4.12%	.54%		0%		3.37%	
1.83%							
Early 8 th grade (Interview 5)	1.00	.00	(-)	.00	(-)	.84	(.18–3.87)
Percentage Endorsing	3.88%	0%		0%		3.30%	
1.58%							
Ever endorsed SI	1.00	.10 ^{***}	(.04–.22)	.35 ^{**}	(.16–.77)	.32 ^{**}	(.15–.66)
Percentage Endorsing	26.6%	3.34%	11.11%	10.28%			
11.5%							

Note:

*
p .05,

**
p .01,

p .001.

Abbreviations. CM= Comorbid, NE= Neither, CD= Conduct Disorder Symptoms, DP=Depression Symptoms, SI= Suicidal Ideation.

Table 2

Patterns of Recurrent Suicidal Ideation by Psychopathology Group

Number of assessments in which adolescent endorsed suicidal ideation	Neither (NE)		Conduct Disorder Symptoms (CD)		Depression Symptoms (DP)		Comorbid (CM)	
	N	%	N	%	N	%	N	%
0	202	96.66%	72	88.89%	96	89.72%	91	73.39%
1	5	2.39%	9	11.11%	8	7.48%	26	20.97%
Recurrent	2	.96%	0	0%	3	2.80%	7	5.65%
2	2	.96%	0	0%	3	2.80%	5	4.03%
3	0	0.00%	0	0.00%	0	0.00%	1	.81%
4	0	0.00%	0	0.00%	0	0.00%	1	.81%
Total	209	100.00%	81	100.00%	107	100.00%	124	100.00%

Table 3

Descriptive Findings about Suicidal Ideation, Suicide Attempts and Psychopathology Group Membership

Number of assessments in which youth endorsed suicidal ideation	Number and % of young adolescents in recurrence categories	Number and % who attempted suicide	Percent of attempters in each psychopathology group
0	461 (88.48%)	16 (3.47%)	5 (31.25%)=NE, 1 (6.25%)=CD, 3 (18.75%)=DP, 7 (43.75%)=CM
Any SI	60 (11.52)	8 (13.33%)	0 (0%)=NE, 1 (12.5%)=CD, 2 (25%)=DP, 5 (62.5%)=CM
1	48 (9.21%)	3 (6.25%)	1 (33%)=CD, 2 (66%)=CM
2	10 (1.92%)	4 (40%)	2 (50%)=DP, 2 (50%)=CM
3	1 (0.194%)	1 (100%)	1 (100%)=CM
4	1 (0.19%)	0 (0%)	0 (0%)
Total	521 (100.0%)	24 (4.61%)	5 (20.83%)=NE, 2 (8.33%)=CD, 5 (20.83%)=DP, 12 (50%)=CM