HHS Public Access

Author manuscript

Suicide Life Threat Behav. Author manuscript; available in PMC 2020 February 01.

Published in final edited form as:

Suicide Life Threat Behav. 2019 February ; 49(1): 253–263. doi:10.1111/sltb.12428.

Hopelessness as a Predictor of Suicidal Ideation in Depressed Male and Female Adolescent Youth

Kristin L. Wolfe, MRC, **Paul A. Nakonezny, PhD**, **Victoria J. Owen, BA**, **Katherine V. Rial, MRC**, **Alexandra P. Moorehead, BS**, **Beth D. Kennard, PsyD**, and **Graham J. Emslie, MD**

University of Texas Southwestern Medical Center and Children's Health

Abstract

This paper examined hopelessness as a predictor of suicidal ideation in depressed youth after acute medication treatment. 158 depressed adolescents were administered the CDRS-R and C-SSRS as part of a larger battery at baseline and at weekly visits across six weeks of acute fluoxetine treatment. The BHS was administered at baseline and week six. A negative binomial regression model via a Generalized Estimating Equation (GEE) analysis of repeated measures was used to estimate suicidal ideation over the six weeks of acute treatment from baseline measure of hopelessness. Depression severity and gender were included as covariates in the model. The negative binomial analysis was also conducted separately for the sample of males and females (in a gender-stratified analysis). Mean CDRS-R total scores were 60.30±8.93 at baseline and 34.65±10.41 at week six. Mean baseline and week six BHS scores were 9.57±5.51 and 5.59±5.38, respectively. Per the C-SSRS, 43.04% and 83.54% reported having no suicidal ideation at baseline and at week six, respectively. The analyses revealed that baseline hopelessness was positively related to suicidal ideation over treatment (p=.0027), independent of changes in depression severity. This significant finding persisted only for females (p=.0024). These results indicate the importance of early identification of hopelessness.

Keywords

Suicidality; Youth; Hopelessness

Introduction

According to the Center for Disease Control and Prevention, suicide-related deaths accounted for 1,825 deaths in youth aged 12 to 18 years in 2015, putting suicide as the second leading cause of death among youth in this age group ("WISQARS Leading Causes of Death Reports, 2015). Not only are these rates of completed youth suicide concerning, but research also suggests that those who attempt suicide at a young age are more likely to continue to struggle with mental health difficulties such as depression and additional suicide attempts throughout their lifetime (Goldman-Mellor et al., 2014). In order to best address the

Corresponding Author: Kristin L. Wolfe, University of Texas Southwestern Medical Center, 75390-8589, USA. kristin.wolfe@utsouthwestern.edu.

suicidal ideation in this population, a thorough understanding of predictors and risk factors is warranted.

While numerous predictors and risk factors have been found [e.g., interpersonal stressors (Johnson et al., 2002), history of physical or sexual abuse (Cash & Bridge, 2009), family or peer-related conflict (Kodish et al., 2016), mental illness (Cash & Bridge, 2009), comorbid presentation of these factors (Vander Stoep et al., 2011), etc.], a substantive body of literature has surrounded the theory that cognitive variables (e.g., rumination, thinking errors, poor self-efficacy, etc.) may have strong ties with suicidality (Burke et al., 2016; Stewart et al., 2005). Early literature examining suicidality from this cognitive framework has suggested that hopelessness, in particular, may be a key variable in understanding suicidal behavior (Beck, Kovacs, & Weissman, 1975). More recent literature has continued to explore the role of hopelessness as a cognitive risk factor and has consistently found that hopelessness plays a significant role in suicidal behaviors among adults (McCullumsmith et al., 2014; Kuo, Gallo, & Eaton, 2004; Brown, Beck, Steer, & Grisham, 2000), and has been linked with suicidal ideation (Smith, Alloy, & Abramson, 2006), suicidal intent (Dyer & Kreitman, 1984; Wang, Jiang, Cheung, Sun, & Chan, 2015) and subsequent suicide attempts (Beck, Brown, Berchick, Stewart, & Steer, 1990). Research has also suggested that hopelessness may serve as a mediator between depressive symptoms and suicidality (Rosellini & Bagge, 2014; Woosley, Lichstein, Taylor, Riedel, & Bush, 2014), indicating that hopelessness may be able to explain the relationship between depressive symptoms and suicidality. Importantly, Beck and colleagues (1974) identified hopelessness as the key variable that links depression and suicidality in adults, and later suggested that hopelessness may be more informative than the presence of depressive symptoms in examining suicidal ideation (Steer et al., 1993). Current research has also examined hopelessness as a predictor of suicidality (Beck, Brown, Steer, Dahlsgaard, & Grisham, 1999), with Labelle and colleagues (2013) finding that hopelessness is predictive of suicidal ideation, even after controlling for depressive symptoms.

Despite the findings in the adult literature, historically there has been a paucity of such research among youth (Steer, Kumar, & Beck, 1993). However, given the findings of previous research that highlight the importance of the role of hopelessness in suicidality, researchers have recently begun to more thoroughly examine the role of hopelessness on suicidality in adolescents. There now exists a growing evidence base to support the role of hopelessness in adolescent suicidal behavior (Groholt, Ekeberg, & Haldorsen, 2006; DeCamp & Bakken, 2016; Horwitz, Berona, Czyz, Yeguez, & King, 2017). For instance, DeCamp and Bakken (2016) report that adolescents who feel a greater sense of hopelessness are at an increased risk for suicide. Further, Bergen and colleagues (2003) discovered a significant association between hopelessness and risk for suicide, including ideation. In a study by Horwitz and colleagues (2017) exploring the influence of hopelessness on suicidal behavior, the findings indicate that a lack of positive expectations for one's future, as opposed to the presence of negative expectations, is indicative of future suicidal behavior among adolescents. Indeed, Stewart and colleagues (2005) found hopelessness to be the strongest contributor to concurrent suicidal ideation in adolescents. These findings hold true even when controlling for depression (Nock & Kazdin, 2002; Labelle et al., 2013).

In addition to the strong ties between hopelessness and suicidality, demographic variables, such as gender, have also been identified as risk factors of suicidal behaviors in adolescents (Cash & Bridge, 2009). Importantly, studies have observed a greater lifetime prevalence of suicidal ideation in females (Nock et al., 2013). More specifically, findings from a recent study suggested that female adolescents were 2.16 times more likely to experience suicidal ideation than their male counterparts (Rew, Young, Brown, & Rancour, 2016). Similarly, Labelle and colleagues (2013) also found that hopeless females were twice as likely to report suicidal ideation as hopeless males, even when controlling for depression. Female youth with suicidal ideation are also more likely to make an attempt (American Association of Suicidology, 2016; Nock et al., 2013), but adolescent males are more likely to go on to complete suicide ("WISQARS Leading Causes of Death Reports," 2015). However, these prior studies did not examine the relationship between hopelessness and suicidal ideation in depressed male and female youth. Thus, in this study, we examined hopelessness as a predictor of suicidal ideation in depressed male and female youth after six weeks of acute treatment with fluoxetine.

Method

The current study is based on an extant National Institute of Mental Health (NIMH) funded, single-site study, which examined a sequential treatment strategy to improve remission and prevent relapse in depressed youth (see Kennard et al., 2014 for additional details). A detailed description of the full methodology and outcomes has been previously reported (see Kennard et al., 2014). The study was approved by the UT Southwestern Institutional Review Board.

Study Participants

Two-hundred participants aged 8 to 17 years were enrolled from 2008 until 2012 in the abovementioned randomized controlled trial (RCT; see Kennard et al., 2014), which examined the impact of fluoxetine alone compared to medication plus Relapse Prevention CBT. All participants had a primary diagnosis of Major Depressive Disorder (MDD) for at least four weeks, as determined by scores on the Children's Depression Rating Scale-Revised (CDRS-R; Poznanski, Freeman, & Mokros, 1985) and Clinical Global Impression-Severity (CGI-S; Guy, 1976).

Procedures

For the current study, we examined only the 158 adolescents (aged 12 to 17 years) during the first six weeks from the abovementioned RCT, which involved open label treatment with fluoxetine (10–40 mg). Participants completed the self-report Beck Hopelessness Scale for adolescents (BHS; Cronbach's Coefficient $\alpha = .93$; Beck, Weissman, Lester, & Trexier, 1974), and were administered the Children's Depression Rating Scale-Revised (CDRS-R; Cronbach's Coefficient $\alpha = .85$; Poznanski et al., 1985), and the Columbia Suicide Severity Rating Scale (C-SSRS; Cronbach's Coefficient $\alpha = .73$; Posner et al., 2011) by the treating clinician as part of a larger instrument battery. The BHS was evaluated at baseline and at week six (after six weeks of treatment with fluoxetine). The CDRS-R and C-SSRS were

evaluated at baseline and at each weekly visit across the six weeks of acute treatment with fluoxetine.

Outcome Variable

The primary outcome for this *post hoc* analysis was suicidal ideation at each weekly visit over the six week acute treatment period (across weeks 0 thru 6). Suicidal ideation was measured using the C-SSRS, which is a semi-structured clinician-rated interview created to assess severity of suicidal behavior and ideation for those aged 11 years and older in community, clinical, and research settings (Brent et al., 2009). Clinicians rated participants' suicidal ideation using the C-SSRS suicidal ideation score, with ratings that ranged from 1, "wish to be dead," to 5, "active suicidal ideation with specific plan and intent." An overall score of zero (0) indicated no suicidal ideation/no endorsement of any of these five C-SSRS items. Psychometric properties of the C-SSRS have been previously established (Posner et al., 2011; Mundt et al., 2010).

Independent Variable and Covariates

The main predictor (independent) variable for the current study was the baseline measure of hopelessness (BHS total score), which is a 20-item self-report scale intended to assess aspects of hopelessness such as pessimism about the future and diminished motivation (Beck et al., 1974). Questions are endorsed as either true or false, and items are summed to provide a total score that can range from 0 to 20. Higher scores are indicative of greater levels of hopelessness: BHS total scores less than 3 are considered within normal limits, scores 4 to 8 are considered mildly hopeless, scores 9 to 14 are considered moderately hopeless, and lastly, scores higher than 14 are considered severely hopeless (Beck, Steer, & Carbin, 1988). Gender and weekly measures of depression severity (CDRS-R Total) were also included as covariates in the model. CDRS-R total score was as a time-varying covariate measured at baseline and then weekly at each visit across the six week acute study period.

Multiple Imputation for Missing Values

Missing values for the C-SSRS (Suicidal Ideation) were imputed for 3, 11, 18, 28, 34, 42, and 22 of the 158 adolescents at baseline, and weeks 1, 2, 3, 4, 5, and 6, respectively. Missing values for the BHS were imputed for 26 of the 158 adolescents at baseline. Missing values for the CDRS-R Total were imputed for 1, 14, 18, 28, 33, 45, and 22 of the 158 adolescents at baseline, and weeks 1, 2, 3, 4, 5, and 6, respectively. Missing values (with an assumed arbitrary missing pattern) for the classification variables of the Beck Hopelessness Scale and the C-SSRS (Suicidal Ideation) and for the continuous variables of the CDRS-R total were imputed via 1,000 burn-in iterations (samples) using Fully Conditional Specification along with the discriminant method (for the classification variables) and the predictive mean matching method (for continuous variables) of the PROC MI procedures in SAS software, version 9.4 (van Buuren, 2007).

Statistical Analysis

Demographic and clinical characteristics of the 158 adolescents in the current study were described using the sample mean (SD) for continuous variables and frequency (percentage)

for categorical variables. A negative binomial regression model via a Generalized Estimating Equation (GEE) analysis of repeated measures was used to estimate suicidal ideation over the 6 weeks of acute fluoxetine treatment from baseline measure of hopelessness. Depression severity (CDRS-R total score as a time-varying covariate) and gender were included as covariates in the model. The model also contained a fixed effects term for time. Maximum likelihood estimation and robust standard errors (Sandwich/Empirical Estimator) along with Type 3 tests of fixed effects were used with the Wald Chi-Square statistic. The sandwich (robust covariance matrix) estimator was applied to the compound symmetry covariance structure. Because the primary outcome was a discrete random variable (i.e., suicidal ideation in a specific time period), negative binomial regression (which is a generalization of the Poisson model) was used to produce efficient parameter estimates while accounting for possible over-dispersion (Hilbe, 2007; Nelder & Wedderburn, 1972). The GEE parameter estimates (regression coefficients) were interpreted from the solution for fixed effects in the GEE negative binomial analysis. The GEE negative binomial analysis was also conducted separately for the sample of males and females (via a gender-stratified analysis). The GEE procedures of PROC GENMOD in SAS software, version 9.4 (SAS Institute, Inc., Cary, NC) was used to conduct the GEE negative binomial analysis. The level of significance was set at $\alpha = .05$ (two-tailed) and to address multiple testing, where applicable, p-values were adjusted using the False Discovery Rate (FDR) procedure (Benjamini & Hochberg, 1995).

Results

Participant Characteristics

Demographic and clinical characteristics of the 158 adolescents in the current study (overall and by gender) are shown in Table 1. Of the 158 youth, 59.49% were females and 76.58% were non-Hispanic white. The mean age was 14.86±1.62 years (age range=12–17 years). Mean CDRS-R total scores were 60.30±8.93 at baseline and 34.65±10.41 at week 6. Mean baseline and week 6 BHS were 9.57±5.51 and 5.59±5.38, respectively. According to the C-SSRS, 43.04%, 80.38%, 82.28%, 89.24%, 81.65%, 86.08%, and 83.54% reported having no suicidal ideation at baseline and at weeks 1, 2, 3, 4, 5, and 6, respectively. Of the 158 youth, however, 11.39% reported a lifetime history of at least one suicide attempt.

Suicidal Ideation and Hopelessness

The overall-sample negative binomial regression analysis, while controlling for depression severity (CDRS-R total score as a time-varying covariate) and gender, revealed that baseline hopelessness was positively related to suicidal ideation over the six week acute treatment period ($\hat{b}$ =0.0611, SE=0.0204, 95% CI=0.0211 to 0.1011, raw p=.0027, FDR-adjusted p=.0054; Table 2). We estimated that a one-scale unit increase in baseline hopelessness total score (which ranged from 0 to 20) was related to a 6.3% increase in the predicted or expected suicidal ideation over the 6 weeks of acute treatment, which was calculated as the natural antilogarithm (base $\log_e$) of the parameter estimate [$((e^{0.0611}) - 1) \times 100 = 6.3\%$]. In other words, for every one-scale unit increase in baseline hopelessness total score (e.g., 0 to 1, 1 to 2, 2 to 3, …, 19 to 20) there was a 6.3% increase in the predicted or expected suicidal ideation. Using this parameter estimate from the overall negative binomial regression model

along with a given unit increase in baseline hopelessness total score, we can calculate the percent change in the expected suicidal ideation over the 6 weeks of acute treatment. For example, an adolescent youth with a 4 point increase in baseline hopelessness total score (e.g., 3 to 7 or 4 to 8 or 9 to 13) would have a 27.6% increase, on average, in the predicted or expected suicidal ideation while adjusting (controlling) for depression severity and gender [$((e^{0.0611\times4}) - 1) \times 100 = 27.6\%$]. Similarly, in this overall negative binomial regression model, depression severity (CDRS-R total score as a time-varying covariate) was positively related to suicidal ideation during the six week acute treatment period ($\hat{b}$ =0.0609, SE=0.0104, 95% CI=0.0404 to 0.0813, raw p=.0001, FDR-adjusted p=.0003; Table 2). We estimated that a one-scale unit increase in the CDRS-R total scale was related to a 6.2% increase in the predicted or expected suicidal ideation during the 6 weeks of acute fluoxetine treatment. Gender and time effect were not significant in the overall negative binomial model (p's > .2284; Table 2).

In the gender-stratified analysis, among females, the negative binomial regression model revealed that baseline hopelessness ($\hat{b}$ =0.0796, SE=0.0262, 95% CI=0.0282 to 0.1310, raw p=.0024, FDR-adjusted p=.0054) as well as depression severity (CDRS-R total score as a time-varying covariate; $\hat{b}$ =0.0502, SE=0.0126, 95% CI=0.0254 to 0.0750, raw p=.0001, FDR-adjusted p=.0003; Table 2) were each positively related to suicidal ideation over the six week acute fluoxetine treatment period. From this negative binomial regression model for females, we estimated that a one-scale unit increase in baseline hopelessness total score and in CDRS-R total score was related to an 8.3% and 5.1% increase, respectively, in the predicted or expected suicidal ideation across the six week acute treatment period. Similar to that mentioned above, an adolescent female with a 4 point increase in baseline hopelessness total score, for example, would have a 37.5% increase, on average, in the predicted or expected suicidal ideation while adjusting (controlling) for depression severity [$((e^{0.0796\times4}) - 1) \times 100 = 37.5\%$]. Among males, baseline hopelessness was also positively, but not significantly, related to suicidal ideation after 6 weeks of acute treatment with fluoxetine ($\hat{b}$ =0.0230, SE=0.0264, 95% CI= −0.0288 to 0.0747, raw p=.3847, FDR-adjusted p=.5418). However, among males, a one-scale unit increase in depression severity (CDRS-R total score as a time-varying covariate) was positively and significantly related to an 8.5% increase in suicidal ideation during the six week acute treatment period ($\hat{b}$ =0.0820, SE=0.0160, 95% CI=0.0507 to 0.1133, raw p=.0001, FDR-adjusted p=.0003; Table 2). Time effect was not significant in the gender-stratified negative binomial models (p's > .4334).

Discussion

This study reports on the relationship between hopelessness, suicidal ideation, and gender in adolescents with MDD who completed a six week acute trial with fluoxetine. The findings indicate that overall, and independent of changes in depression severity and gender, a one-scale unit increase in baseline hopelessness total score is related to a 6.3% increase in the predicted or expected suicidal ideation during the six weeks of acute treatment. This suggests that as an individual's hopelessness increases, even slightly, the potential for the presence of suicidal ideation is significantly increased over the course of a short period of acute treatment. These findings mirror those from previous studies, which suggest that hopelessness is a key variable in understanding suicidality in youth (e.g. Groholt, Ekeberg,

& Haldorsen, 2006; DeCamp & Bakken, 2016; Horwitz et al., 2017). Specifically, our results support prior research which has suggested that greater levels of hopelessness are related to (DeCamp and Bakken, 2016, Stewart et al., 2005; Nock & Kazdin, 2002; Labelle et al., 2013) an increased risk for suicidal ideation and behaviors.

While prior literature has suggested that there is a difference between suicidality between genders (Nock et al., 2013; Rew, Young, Brown, & Rancour, 2016), there has been a paucity of such research to examine the effect of gender-specific hopelessness on suicidal ideation. Labelle and colleagues (2013) did find that hopeless females were twice as likely to report suicidal ideation as their male counterparts, but this study did not incorporate hopelessness as a predictor of suicidal ideation. Our study found that, when the relationship between hopelessness and suicidal ideation was broken down by gender, the model continued to be significant for females, with a one-scale unit increase in baseline hopelessness total score being related to an 8.3% increase in predicted suicidal ideation, independent of depression severity. While this relationship continued to be positive for males, it was no longer significant, with a one-unit in increase in baseline hopelessness total score predicting only a 2.3% increase in expected suicidal ideation. These findings indicate that the presence and increase of hopelessness in females may be concerning, above and beyond that of males. Nevertheless, hopelessness in males should not be overlooked, as males with ideation are more likely to go on to complete suicide (“WISQARS Leading Causes of Death,” 2015). The current study suggests that examining suicidality and hopelessness without consideration for one’s gender would fail to fully inform the clinician of a salient risk factor.

We acknowledge that this study has some limitations. Primarily, there is the potential for lack of generalizability due to the primarily non-Hispanic, Caucasian sample. In addition, the short time frame of the current study may provide some limitation to understanding the long-term impact of hopelessness on suicidal ideation. Specifically, the six week acute phase performed in this study may not depict the long-term implications of hopelessness. Another potential limitation was the use of self-report measures to determine hopelessness and its comparison to clinician-rated measures of suicidal ideation and depression. Prior literature has suggested that there can be a discrepancy between adolescent and clinician ratings, especially when rating suicidal intent (Lewinsohn, Rohde, & Seeley, 1996). Finally, this paper was written from a cognitive behavioral framework, where hopelessness was viewed as a cognitive distortion. The authors acknowledge that there exist many more recent theories of suicide that may view the role of hopelessness in a different light. Indeed, Horwitz and colleagues (2017) suggested that the various theoretical orientations may conceptualize the role of hopelessness differently and thus influence the relevance, development, and potential intervention to address this important variable.

In conclusion, despite these limitations, this study suggests that hopelessness may play a predictive role in suicidal ideation, independent of changes in depression severity, and thus could be an important treatment target in this youth population. Specifically, more time and attention should be committed to addressing the issue of hopelessness during intervention given its significant relationship with the presence of suicidal ideation. Furthermore, the findings of the current study indicate that it is critical to measure depression and suicidality not only at the beginning of treatment, but also at subsequent visits throughout treatment, as

it was also discovered that an increase in depression severity was related to an increase in suicidality during the six week acute treatment period. Thus, a measurement-based care approach is warranted to predict changes in suicidality over time. Given that suicidal ideation is higher in female adolescents, and that hopelessness is ultimately more predictive in females, there are clinical implications for the importance of hopelessness screenings particularly in adolescent females. Early identification and intervention for adolescents endorsing hopelessness may have the potential to prevent the development of suicidal ideation. Future research should continue to examine this relationship longitudinally, looking specifically at the underlying mechanisms of hopelessness, while accounting for potential gender differences, and its impact on current and future suicidal ideation.

Acknowledgments

The authors are grateful to all of the children and families who participated in this study, and to all of the faculty and staff who worked diligently on this research project. We would especially like to thank the study coordinators and research assistants, without whom we could not have successfully completed this project.

Funding for this study was provided by NIMH, Grant #R01 MH39188 (PI's Graham Emslie and Betsy Kennard). Statistical Expert: Paul A. Nakonezny, PhD.

References

Alavi A, Sharifi B, Ghanizadeh A, Dehbozorgi G. 2013; Effectiveness of Cognitive-Behavioral Therapy in decreasing suicidal ideation and hopelessness of the adolescents with previous suicidal attempts. Iranian Journal of Pediatrics. 23(4):467–472. [PubMed: 24427502]

Beck AT, Brown G, Berchick RJ, Stewart BL, Steer RA. 1990; Relationship between hopelessness and ultimate suicide: A replication with psychiatric outpatients. The American Journal of Psychiatry. 142(2):190–195.

Beck AT, Brown GK, Steer RA, Dahlsgaard KK, Grisham JR. 1999; Suicide ideation at its worst point: A predictor of eventual suicide in psychiatric outpatients. Suicide and Life-Threatening Behavior. 29(1):1–9. [PubMed: 10322616]

Beck AT, Kovacs M, Weissman A. 1975; Hopelessness and suicidal behavior: An overview. JAMA Psychiatry. 234(11):1146–9.

Beck AT, Steer RA, Carbin MG. 1988; Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. Clinical Psychology Review. 8(1):77–100.

Beck AT, Weissman A, Lester D, Trexier L. 1974; The measurement of pessimism: The Hopelessness Scale. Journal of Consulting and Clinical Psychology. 42(6):861–865. [PubMed: 4436473]

Benjamini Y, Hochberg Y. 1995; Controlling the false discovery rate: A practical and powerful approach to multiple testing. Journal of the Royal Statistical Society. 57:289–300.

Bergen HA, Martin G, Richardson AS, Allison S, Roeger L. 2003; Sexual abuse and suicidal behavior: A model constructed from a large community sample of adolescents. Journal of the American Academy of Child and Adolescent Psychiatry. 42(11):1301–1309. [PubMed: 14566167]

Brent DA, Emslie GJ, Clarke GN, Asarnow J, Spirito A, Ritz L, … Keller MB. 2009; Predictors of spontaneous and systematically assessed suicidal adverse events in the Treatment of SSRI-Resistant Depression in Adolescents (TORDIA) study. The American Journal of Psychiatry. 166(4):418–426. [PubMed: 19223438]

Brown GK, Beck AT, Steer RA, Grisham JR. 2000; Risk factors for suicide in psychiatric outpatients: A 20-year prospective study. Journal of Consulting and Clinical Psychology. 68(3):371–377. [PubMed: 10883553]

Burke TA, Connolly SL, Hamilton JL, Stange JP, Abramson LY, Alloy LB. 2016; Cognitive risk and protective factors for suicidal ideation: A two year longitudinal study in adolescence. Journal of Abnormal Child Psychology. 44:1145–1160. [PubMed: 26597963]

Cash SJ, Bridge JA. 2009; Epidemiology of youth suicide and suicidal behavior. Current Opinion in Pediatrics. 21(5):613. [PubMed: 19644372]

DeCamp W, Bakken NW. 2016; Self-injury, suicide ideation, and sexual orientation: Differences in causes and correlates among high school students. Journal of Injury and Violence Research. 8(1): 15–24. [PubMed: 26401756]

Dyer JA, Kreitman N. 1984; Hopelessness, depression and suicidal intent in parasuicide. The British Journal of Psychiatry. 144(2):127–133. [PubMed: 6704597]

Goldman-Mellor SJ, Caspi A, Harrington H, Hogan S, Nada-Raja S, Poulton R, Moffitt TE. 2014; Suicide attempt in young people: A signal for long-term health care and social needs. JAMA Psychiatry. 17(2):119–127.

Groholt B, Ekeberg Ø, Haldorsen T. 2006; Adolescent suicide attempters: What predicts future suicidal acts? Suicide and Life-Threatening Behavior. 36(6):638–650. [PubMed: 17250468]

Guy, W. ECDEU Assessment Manual for Psychopharmacology. Washington DC: US Government Printing Office; 1976.

Hilbe, JM. Negative Binomial Regression. New York: Cambridge; 2007.

Horwitz AG, Berona J, Czyz EK, Yeguez CE, King CA. 2017; Positive and negative expectations of hopelessness as longitudinal predictors of depression, suicidal ideation, and suicidal behavior in high-risk adolescents. Suicide and Life-Threatening Behavior. 47(2):168–176. [PubMed: 27371943]

Johnson JG, Cohen P, Gould MS, Kasen S, Brown J, Brook JS. 2002; Childhood adversities, interpersonal difficulties, and risk for suicide attempts during late adolescence and early adulthood. Archives of General Psychiatry. 59(8):741–749. [PubMed: 12150651]

Kennard BD, Emslie GJ, Mayes TL, Nakonezny PA, Jones JM, Foxwell AA, King J. 2014; Sequential treatment with fluoxetine and Relapse-Prevention CBT to improve outcomes in pediatric depression. The American Journal of Psychiatry. 171:1083–90. [PubMed: 24935082]

Kodish T, Herres J, Shearer A, Atte T, Fein J, Diamond G. 2016; Bullying, depression, and suicide risk in a pediatric primary care sample. Crisis. 37(3):241–6. [PubMed: 27040126]

Kuo WH, Gallo JJ, Eaton WW. 2004; Hopelessness, depression, substance disorder, and suicidality—a 13-year community-based study. Social Psychiatry and Psychiatric Epidemiology. 39(6):497–501. DOI: 10.1007/s00127-004-0775-z [PubMed: 15205735]

Labelle R, Breton JJ, Pouliot L, Dufresne MJ, Berthiaume C. 2013; Cognitive correlates of serious suicidal ideation in a community sample of adolescents. Journal of Affective Disorders. 145:370–377. [PubMed: 23102862]

Lewinsohn P, Rohde P, Seeley JR. 1996; Adolescent suicidal ideation and attempts: Prevalence, risk factors, and clinical implications. Clinical Psychology Science and Practice. 3(1):25–46.

McCullumsmith CB, Williamson DJ, May RS, Bruer EH, Sheehan DV, Alphs LD. 2014; Simple measures of hopelessness and impulsivity are associated with acute suicidal ideation and attempts in patients in psychiatric crisis. Innovations in Clinical Neuroscience. 11(9–10):47–53.

Mundt JC, Greist JH, Gelenberg AJ, Katzelnick DJ, Jefferson JW, Modell JG. 2010; Feasibility and validation of a computer-automated Columbia–Suicide Severity Rating Scale using interactive voice response technology. Journal of Psychiatric Research. 44:1224–1228. [PubMed: 20553851]

Nelder JA, Wedderburn RW. 1972; Generalized linear models. Journal of the Royal Statistical Society. Series A (General). 135(Part 3):370–384.

Nock MK, Green J, Hwang I, McLaughlin KA, Sampson NA, Zaslavsky AM, Kessler RC. 2013; Prevalence, correlates, and treatment of lifetime suicidal behavior among adolescents: Results from the national comorbidity survey replication adolescent supplement. JAMA Psychiatry. 70(3): 300–310. DOI: 10.1001/2013.jamapsychiatry.55 [PubMed: 23303463]

Nock MK, Kazdin AE. 2002; Examination of affective, cognitive, and behavioral factors and suicide-related outcomes in children and young adolescents. Journal of Clinical Child and Adolescent Psychology. 31(1):48–58. [PubMed: 11845650]

Posner K, Brown GK, Stanley B, Brent DA, Yershova KV, Oquendo MA, … Man JJ. 2011; The Columbia-Suicide Severity Rating Scale: Initial validity and internal consistency findings from three multisite studies with adolescents and adults. The American Journal of Psychiatry. 168(12): 1266–1277. [PubMed: 22193671]

Poznanski EO, Freeman LN, Mokros HB. 1985; Children's Depression Rating-Scale-Revised (September 1984). Psychopharmacology Bulletin. 21(4):979–989.

Rew L, Young C, Brown A, Rancour S. 2016; Suicide ideation and life events in a sample of rural adolescents. Archives of Psychiatric Nursing. 30:198–203. [PubMed: 26992871]

Rosellini AJ, Bagge CL. 2014; Temperament, hopelessness, and attempted suicide: Direct and indirect effects. Suicide and Life-Threatening Behavior. 44(4):353–361. [PubMed: 24494785]

Smith JM, Alloy LB, Abramson LY. 2006; Cognitive vulnerability to depression, rumination, hopelessness, and suicidal ideation: Multiple pathways to self-injurious thinking. Suicide and Life-Threatening Behavior. 36(4):443–454. [PubMed: 16978098]

Steer RA, Kumar G, Beck AT. 1993; Hopelessness in adolescent psychiatric inpatients. Psychological Reports. 72(2):559–564. DOI: 10.2466/pr0.1993.72.2.559 [PubMed: 8488235]

Stewart SM, Kennard BD, Lee PWH, Mayes T, Hughes C, Emslie G. 2005; Hopelessness and suicidal ideation among adolescents in two cultures. Journal of Child Psychology and Psychiatry. 46(4): 364–372. [PubMed: 15819645]

van Buuren S. 2007; Multiple imputation of discrete and continuous data by fully conditional specification. Statistical Methods in Medical Research. 16:219–242. [PubMed: 17621469]

Vander Stoep A, Adrian M, McCauley E, Crowell SE, Stone A, Flynn C. 2011; Risk for suicidal ideation and suicide attempts associated with co-occurring depression and conduct problems in early adolescence. Suicide and Life-Threatening Behavior. 41(3):316–329. [PubMed: 21463356]

Wang YY, Jiang NZ, Cheung EF, Sun HW, Chan RC. 2015; Role of depression severity and impulsivity in the relationship between hopelessness and suicidal ideation in patients with major depressive disorder. Journal of Affective Disorders. 183:83–89. [PubMed: 26001667]

WISQARS Leading Causes of Death Reports. Centers for Disease Control and Prevention; 2015. Retrieved August 18. 2017, from http://webappa.cdc.gov/sasweb/ncipc/leadcaus10_us.html

Woosley JA, Lichstein KL, Taylor DJ, Riedel BW, Bush AJ. 2014; Hopelessness mediates the relation between insomnia and suicidal ideation. Journal of Clinical Sleep Medicine. 10(11):1223–1230. [PubMed: 25325598]

Youth suicide fact sheet based on 2014 and 2015 data. American Association of Suicidology; 2016. Retrieved from http://www.suicidology.org/Portals/14/Re-Formatted%20youth%20suicide%20fact%20sheet.pdf?ver=2016-11-16-105737-160

Table 1

Demographic and Clinical Characteristics of the Adolescent Sample

Participant Characteristic	Overall Study Sample (N=158)	Sex	
		Male (n=64)	Female (n=94)
Demographics			
Age in Years (Mean±SD)	14.86±1.62	14.68±1.69	14.97±1.57
Female, %	59.49%		
Race, %			
White, Non-Hispanic	76.58%	81.25%	73.41%
Black, Non-Hispanic	15.82%	7.81%	21.28%
Asian	1.27%	1.56%	1.06%
American Indian	0.63%	0.00%	1.06%
Multi-Race	5.70%	9.38%	3.19%
Ethnicity, %			
Hispanic	31.01%	34.38%	28.72%
Non-Hispanic	68.99%	65.62%	71.28%
Clinical Characteristics			
MDD Episode, %			
Single	86.61%	90.63%	87.23%
Recurrent	11.39%	9.37%	12.77%
Duration of MDD Episode in Weeks	44.11±40.24	43.04±38.31	44.84±41.69
Age of MDD Onset in Years	13.74±2.02	13.72±2.23	13.75±1.87
CDRS-R Total at Baseline	60.30±8.93	57.92±8.10	61.92±9.15
CDRS-R Total at Week 6	34.65±10.41	34.14±8.68	35.01±11.47
Beck Hopelessness Scale at Baseline	9.57±5.51	9.51±5.32	9.61±5.67
Beck Hopelessness Scale at Week 6	5.59±5.38	5.93±4.87	5.36±5.72
Suicidal Ideation (C-SSRS) at Baseline, %			
No Suicidal Ideation	43.04%	46.87%	40.43%
Wish to be Dead	22.78%	23.44%	22.34%
Non-Specific Active Suicidal Thoughts	11.39%	12.50%	10.64%
Active Suicidal Ideation with Any Methods (no plan) without Intent to Act	15.19%	15.63%	14.89%
Active Suicidal Ideation with Some Intent to Act, without Specific Plan	1.27%	1.56%	1.06%
Active Suicidal Ideation with Specific Plan and Intent	6.33%	0.00%	10.64%
Suicidal Ideation (C-SSRS) at Week 6, %			
No Suicidal Ideation	83.54%	89.06%	79.78%
Wish to be Dead	5.07%	4.69%	5.32%
Non-Specific Active Suicidal Thoughts	3.16%	1.56%	4.26%
Active Suicidal Ideation with Any Methods (no plan) without Intent to Act	5.07%	4.69%	5.32%
Active Suicidal Ideation with Some Intent to Act, without Specific Plan	0.00%	0.00%	0.00%
Active Suicidal Ideation with Specific Plan and Intent	3.16%	0.00%	5.32%
Lifetime History of Non-Suicidal Self-Injury, %	30.38%	20.31%	37.23%
Lifetime History of at least one Suicide Attempt, %	11.39%	6.25%	14.88%

Participant Characteristic	Overall Study Sample (N=158)	Sex	
		Male (n=64)	Female (n=94)
Lifetime History of Total Suicide Attempts, %			
Zero	88.61%	93.75%	85.12%
One	5.07%	3.13%	6.38%
Two	4.43%	1.56%	6.38%
Three or More	1.89%	1.56%	2.12%

Table 2

Suicidal Ideation across the 6-week acute treatment period

Variables	Parameter Estimate	Std Error	p-value (FDR)	Percent increase in Predicted Suicide Ideation*	95% CI for Parameter Estimate	
Overall Sample (N=158)						
Baseline Hopelessness (BHS)	0.0611	0.0204	0.0027 (0.0054)	6.3001%	0.0211	0.1011
CDRS-R Total Score (time-varying[a])	0.0609	0.0104	0.0001 (0.0003)	6.2792%	0.0404	0.0813
Gender (female vs. male)	0.2514	0.2087	0.2284 (0.3807)	28.5824%	−0.1577	0.6606
Time effect (week)	0.0364	0.0532	0.4941 (0.5490)	3.7070%	−0.0679	0.1406
Female Sample (n=94)						
Baseline Hopelessness (BHS)	0.0796	0.0262	0.0024 (0.0054)	8.2853%	0.0282	0.1310
CDRS-R Total Score (time-varying[a])	0.0502	0.0126	0.0001 (0.0003)	5.1481%	0.0254	0.0750
Time effect (week)	0.0258	0.0679	0.7041 (0.7041)	2.6135%	−0.1072	0.1588
Male Sample (n=64)						
Baseline Hopelessness (BHS)	0.0230	0.0264	0.3847 (0.5418)	2.3266%	−0.0288	0.0747
CDRS-R Total Score (time-varying[a])	0.0820	0.0160	0.0001 (0.0003)	8.5455%	0.0507	0.1133
Time effect (week)	0.0503	0.0642	0.4334 (0.5418)	5.1586%	−0.0755	0.1760

[a]CDRS-R Total Score was a time-varying covariate across the 6-week acute study period (weeks 0–6).

*Percent increase in the predicted or expected suicidal ideation across the 6-week acute treatment period for each scale unit increase in the predictor variable (covariate), while adjusted for the other variables in the model, which was calculated as the natural antilogarithm (base $\log_e$) of the parameter estimate.

Note. Std Error = Robust/empirical standard error estimate; FDR = False Discovery Rate.