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Suicidal ideation in early to middle adolescence: sex-specific trajectories and predictors

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Abstract

Background—The present study examined developmental trajectories of suicidal ideation (SI) and predictors of the course of SI across early to middle adolescence in a sample of 521 children utilizing a prospective longitudinal design.

Method—A baseline assessment including structured interviews and parent- and adolescent-reported measures was conducted at age 11–12 years, with follow up assessments occurring 6, 12, 18, and 36 months later.

Results—Group-based trajectory analyses revealed three groups of individuals, one group that remained at low ideation scores throughout the time period examined, another group with moderate ideation scores and a minority of children who had fluctuating SI. Sex differences in SI trajectories were revealed with the highest SI scores at age 12. For boys, high ideation followed by a steady decline in the slope over time. SI in girls demonstrated a quadratic function increasing from age 12 to 13, and decreasing from age 14 to 15. Factors that predicted SI group membership were identified. Depression, externalizing problems, family and friend support discriminated SI trajectories for both boys and girls. History of a suicide attempt was associated with moderate and high-declining ideation groups for boys, and moderate and high ideation group for girls.

Conclusions—Assessment of SI in adolescents should occur in early adolescents, particularly around the time of school transitions.

Keywords

Suicidal ideation; adolescence; suicide risk

Introduction

Suicide is currently the second (ages 15–25) and third (ages 10–14) leading cause of death for young people (McIntosh & Drapeau, 2014). The rates of suicidal thoughts and behaviors increase exponentially at the transition from childhood into adolescence (Nock et al., 2013). The strongest predictor of suicidal behavior, beyond prior suicidal behavior, is suicidal ideation (SI) (Prinstein et al., 2008). Previous research has illuminated pathways in SI over adolescence from low-risk normative thoughts about death and dying to persistent

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consideration of self-injury (Authors, 2009). Age of onset, frequency, and duration of SI predict future suicide attempts among adolescents (Miranda, Ortin, Scott, & Shaffer, 2014; Nock et al., 2013). Thus, a clear understanding factors related to the increase in SI from early to mid-adolescence is an important public health priority.

Developmental progression of suicidal ideation

Although numerous risk factors for SI have been identified (Czyz, Liu, & King, 2012; King & Merchant, 2008; Prinstein et al., 2008), the course of SI and associated age- and sex-related trends have not been adequately examined. Extant research indicates that SI is strongly related to age with the occurrence of ideation increasing during early adolescence with the average age of onset occurring between 10 and 15 years of age (Fergusson, Woodward, & Horwood, 2000; Nock et al., 2013). SI in younger adolescents may be more prevalent than previously assumed. Kerr and colleagues' (2008) examination of SI in boys revealed the highest 1-week prevalence for self-reported SI at age 13. Over one half of those that would report SI in the 20-year course of the study had done so prior to age 14.

Sex differences in suicidal ideation

The prevalence rate of SI varies by sex, whereby more females, compared to males, experience SI during adolescence (Nock et al., 2013). However, it is boys who are most likely to complete suicide (Gould, Greenberg, Velting, & Shaffer, 2003). Despite this knowledge, there is little research examining the nature of these sex differences. Reinherz and colleagues (1995) examined sex differences in risk factors for SI. For both sexes, the early onset of psychiatric diagnosis was a significant risk factor; however the early symptoms associated with later SI differed by sex. For males, the significant risk factors included early behavior problems of dependency and anxiety as rated by teachers and parents. For females, early behavior problems of hyperactivity and aggressiveness were significant predictors. Whereas boys early self-reports at age 9 of their self-concept, popularity, and psychological symptoms did not predict later SI, girls' report of these same self-perceptions were predictive of SI at age 15.

Changes in suicidal ideation during adolescence

A lack of community-based longitudinal studies has limited our understanding of the course of SI. Prinstein and colleagues (2008) reported on the temporal course of SI in a clinical sample of adolescents. Their results indicated that the average course of SI for adolescents discharged from a psychiatric hospitalization reflected a decline in SI during the first 6 months and a re-emergence of SI in the following year.

A more thorough understanding of the development of SI prior to the peak prevalence in mid-adolescence would contribute to our understanding of the developmental course. Psychopathology, particularly depressive and impulsive traits, has been one of the most reliable predictor of SI (Gould et al., 2003; Nock et al., 2013). When researchers examine SI separately for girls and boys, different risk factors emerge. For example, Czyz, Liu, and King (2012) followed 338 recently hospitalized adolescents drawn from the Youth-Nominated-Support Team-II study, a support based intervention study for suicidal youth, over the course of 1 year. They found that greater increases in family connectedness at the 3-

month follow-up predicted less severe SI at the 1-year follow-up, but only for individuals with single suicide attempt histories. Further, post-hospitalization increases in peer connectedness was associated with less severe SI among female, but not male, adolescents at the 3-month follow up period. At the 12-month follow-up, increased social connectedness was associated with more severe SI for females.

Family functioning has also been identified as important to consider when quantifying risk for SI in this age group. Family dysfunction has been consistently correlated with SI in both normative and clinical samples (Au, Lau, & Lee, 2009; King & Merchant, 2008). In general, many findings suggest that young people exposed to adverse, dysfunctional, or abusive home environments are at significantly greater risk of subsequent suicidal behavior, including SI (Fergusson et al., 2000; Wagner, Silverman, & Martin, 2003).

There is substantial evidence that peer relations play an important role in risk for SI (King & Merchant, 2008), though few studies have examined the effect of peers on SI trajectories. Prinstein and colleagues (2000) found direct pathways between low levels of friendship quality and high levels of perceived peer rejection to SI in a sample of adolescent psychiatric inpatients. Giletta et al. (2015) examined trajectories of SI among 565 tenth grade adolescents over the course of two years. Among the three trajectories identified (high, low, and moderate SI severity), adolescents in the high group were differentiated from the low and moderate groups based on friend support and friendlessness. Although this sample was limited to older adolescents, this initial work demonstrates the importance of peer relationships on the course of SI.

The current study

This research aims to extend the literature by examining the trajectories of SI in early adolescence. This is an important, understudied age range where SI frequently onsets. Moreover, sex differences in suicidal behaviors are often cited, but sex-specific predictors are not examined through prospective longitudinal studies. The first goal of the current study was to prospectively examine the developmental trajectories of SI in a community sample of young adolescents. Based on extant literature, we hypothesized that SI would increase from early to mid-adolescence and that the slope of increase would be greater for girls compared to boys. We anticipated that school transitions will heighten SI risk.

The second goal of the study was to identify risk factors that would distinguish different SI trajectories. It was expected that higher levels of depression, externalizing problems, alcohol use and impulsivity, and lower levels of family and friendship support would be significant predictors for boys and girls in the high SI group. To examine the factors that predict changes in the SI over time, psychosocial and demographic variables were examined in relationship to SI trajectory. Finally, we examined the associations between trajectory group and history of a suicide attempt by age 15. We hypothesized that high SI trajectory group would have the strongest association with suicide attempt history.

Method

Participants

The Developmental Pathways Project (DPP) is a community-based prospective cohort study of the antecedents, phenomenology, and outcomes of co-occurring depressive and conduct problems. The cohort was recruited in 4 consecutive years (2001–2005) from universal emotional health screening conducted in 6th grade classrooms. The detailed screening and sampling strategy of the study has been described in previous publications (See Table 1. Authors, 2005; 2009; 2013). Informed consent/assent conferences were conducted with adolescents and their parents at the baseline interview. All procedures were approved by the University of Washington's Human Subjects Division.

Longitudinal study methods

Participants in the Developmental Pathways Project longitudinal study were recruited from the middle school students who were screened for depression and conduct problems. All children who were screened were assigned to one of four groups: high depressive and high conduct problem score (COMORBID), high depressive and low conduct problem score (DEPRESSED), low depressive and high conduct problem score (CONDUCT), and low depressive and low conduct problem score (NEITHER) using a cutoff of .5 SD above the screening sample mean for the MFQ and the YSR externalizing scales. Two additional eligibility criteria included residence in the local geographic area at the time of study recruitment and the ability of both the student and an adult caregiver to undergo lengthy English-language interviews tapping personal information.

Longitudinal study procedures—In-home assessments were conducted with a stratified random sample of children screened along with a parent/guardian. Children were randomly selected from the four cells and recruited in a ratio of approximately 1 COMORBID:1 DEPRESSED:1 CONDUCT:2 NEITHER. Since in the general school population, the ratio is approximately 1COMORBID:1 DEPRESSED:1 CONDUCT:6 NEITHER, this sample selection approach yielded an over-representation of children in psychopathology groups relative to their distribution in the general population.

Data analyzed for the current paper were derived from the first six longitudinal study assessments at baseline (T1), 6-months (T2), 12-months (T3), 18-months (T4), 24-months (T5), and 36-months (T6) after baseline assessment. The final interview was conducted when adolescents were beginning the ninth grade. Of the participants originally enrolled in DPP, 86 to 90% were retained in each follow-up interview.

The demographic characteristics of the sample are described in Table 1. With respect to SI, the longitudinal study sample was a high-risk group. Therefore, to provide general population estimates of the prevalence of suicidal thoughts among young adolescents, each individual in the longitudinal study was assigned a two-component weight to compensate for differences between the screening sample and the longitudinal sample. Weighted scores were used in all analyses so that prevalence estimates derived from the sample reflected

estimates that would have been obtained in an unselected sample of sixth grade public school students.

Measures

Suicidal ideation—A Suicidal Ideation Risk Scale (SIRS) was developed based on 3 items that identified thoughts about death and suicide measured by the Moods and Feelings Questionnaire (MFQ; Angold et al., 1995). The MFQ is widely used instrument that provides self-ratings for 33 questions about depressive symptoms, including SI. Three items that tapped thoughts about death and suicide were selected by a group of child psychologists and psychiatrists for the SIRS: ‘I thought life wasn’t worth living’; ‘I thought about death and dying’; and ‘I thought about killing myself’. Response options for these items were: ‘not true’; ‘sometimes true’; and ‘true’ in the past two weeks and were coded 0, 1, or 2. The occurrence of suicidal thoughts was derived from the MFQ administered at each of the six longitudinal study interviews.

Suicide attempt—Suicide attempt information was obtained from parents and adolescents through the Diagnostic Interview Schedule for Children (DISC; Shaffer, Fisher, Lucas, Dulcan & Schwab-Stone, 2000). Interviewers queried the adolescent and parent, separately, whether the adolescent had tried to kill themselves in their lifetime.

Depressive symptoms—Youth responded to 30 of the 33 items on the MFQ to evaluate depressive symptoms at each of the six time points. The 3-items related to SI were removed so as to not overlap with the SI measurement. Youths rate how true each item is on a three-point scale (*true-not true*) in the past 2 weeks. The MFQ questions are derived from the Diagnostic and Statistical Manual (DSM) criteria for major depression and dysthymia, and have been found to map onto DSM criteria (Angold et al., 1995). Alphas ranged from .87–.90 across time points.

Impulsivity—Impulsivity was assessed using the Antisocial Process Screening Device (APSD)-parent report version, a 20-item scale used to assess the likelihood of antisocial behaviors (Frick & Hare, 2001). Only the impulsivity scale was used for this study. Each item is rated on a Likert-Scale ranging from 0=*not true* to 2=*definitely true*. APSD items has adequate internal consistency (Frick & Hare, 2001), with $\alpha=.65$. Impulsivity was conceptualized as a stable individual characteristic and only measured at the baseline assessment.

Alcohol use—Adolescents reported on the frequency of alcohol use at each of the six assessments using The Customary Drinking and Drug Use Record (CDDR; Brown et al., 1998). The CDDR assessed alcohol use in the past 6 months with responses ranging from 0 (never used) to 7 (used more than once per day). The CDDR was validated in a community sample of adolescents, demonstrating good psychometric qualities (Brown et al., 1998).

Externalizing problems—The Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) is a well-validated parent-report measure with good psychometric properties. Designed to assess children’s psychological symptomatology, the CBCL has 113-items rated

on a 3-point scale (0=*not true*, 2=*very true*) and yields broad- and narrow-band symptomatology categories. For this study, the externalizing scales comprised of aggressive and rule-breaking behavior was used. Parents completed the CBCL at the six assessments, with $\alpha=.86-.90$.

Social support—Peer and family support were assessed using the Multidimensional Scale of Perceived Social Support (MSPSS), a self-report measure designed to assess perceived support from one’s friends, family, and a significant other (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). Participants responded to 12 items that were rated on a 5-point Likert scale (0= Not True, 4= Very True). Participants completed the PSS at each of the six assessments, with friend and family support modeled at each time point. Alphas ranged from .78–.83.

Demographic characteristics—Sex was ascertained from school records. Race, ethnicity, and household income information were obtained from the caregiver in the baseline interview.

Statistical analyses

A semi-parametric group-based trajectory model (Nagin, 2005) was used to describe the course of SI across age, modeled separately for boys and girls. The procedure was designed to examine multiple distinct patterns of change over time and to estimate a regression model for each group within the population. The method is based on finite mixture modeling and is maximum-likelihood based. Similar to other growth curve modeling, the group-based trajectory modeling is based on continuous distribution functions. However, group-based trajectory modeling assumes that there may be subgroups within the population, which show distinctive developmental trajectories and was developed for examining developmental phenomena in which a common growth process is not assumed. The modeling is exploratory and provides a procedure for which to evaluate the number of distinctive groups using Bayesian Information Criterion (BIC). The model produces a probability of membership for each of the trajectories for an individual.

The analyses were run using the STATA Trajectory Procedure (Traj; Jones, Nagin, & Roeder, 2001) on the STATA platform. Missing data was assumed to be missing at random and accommodated in the Traj procedure. First, we identified the best fitting single-variable trajectory models for SI over time. A series of models varied the number of clusters from one to nine and shape of the trajectory to vary from linear, quadratic, or cubic to determine the best fitting model. To account for the numerous zeros associated with absence of SI, developmental trajectories were modeled with the zero-inflated Poisson distribution (ZIP).

Next, the model incorporated the estimation of risk factors that may be associated with the probability of a group trajectory. Impulsivity (only assessed at T1), SES, and ethnicity were assessed at time one and entered as time invariant predictors. Depressive symptoms, externalizing problems, friend support, and family support were assessed at each time point and modeled as time variant factors at each assessment. Finally, the outcome of lifetime suicide attempt was linked to trajectories to determine the association between SI trajectory and suicide attempts.

Results

Descriptives

Table 2 presents the means and standard deviations for all study variables, as well as the result of the t-test examining sex differences. Examination of the study variables for boys and girls reveal a pattern of sex differences consistent with prior research. Boys reported greater impulsivity whereas girls reported higher level of depressive symptoms and mid-adolescent SI severity. Girls also reported significantly more peer support and stressful life events throughout early to mid-adolescence as well as lower levels of family support at the 9th grade assessment.

Empirically identifying suicidal ideation trajectories

Suicidal ideation for girls—Using the trajectory method, the developmental pathways of SI were examined from the age 12 to age 15 assessments. First, using the 3-item SI summary score at each of the six time points as the response variable, the BIC criteria were used to identify the optimal fit. The number of groups identified varied from one to nine. The model fit criteria indicated that the three-class ZIP model fit the data best (Table 3). Another indicator of fit can be determined from the average probability of individuals being classified within each cluster, with probabilities above .70 indicating a good model fit (Nagin, 2005). The average posterior class membership probabilities for the 3-group ranged from .70 to .86 for girls, also indicating a good fit. The first trajectory group (64%) endorsed stably low SI, and the total score on SI remained low throughout the assessment period ('low SI trajectory'; average SI score=.01). The second trajectory group (25.7%) consisted of adolescents who endorsed a modest increase in average SI score, which reached its highest relative points at 12 and 15 years old ('moderate SI trajectory'). This group's average SI score remained around .5 with a curvilinear shape as the best fitting model. The third trajectory was characterized by a curvilinear shape and the highest level of SI throughout the assessment period (average SI score=1.4). SI increased from 12 to 14, and decreased from 14 to 15 years-of-age ('high SI trajectory').

Suicidal ideation for boys—The three-class zero-inflated Poisson model had the best fit to the data for boys (Table 3). The average posterior class membership probabilities for the 3-group model ranged from .73-.90, indicating a good fit. The first trajectory group (68.2%) endorsed stably low SI, and the SI score was near-zero throughout the assessment period ('low SI trajectory'; SI average score=.01). The second ideation group (20%) had moderate ideation that modestly declined across the time period ('moderate SI trajectory'; average SI score=.73). The third trajectory group (11.8%) consisted of adolescent boys who initially had higher SI scores that declined sharply from the 12 to 13-year assessment (SI average score = .45). The trajectory was characterized by highest level of SI at 12-year-old assessment, decreasing steadily until the 13-year-old assessment, where the probability of high ideation membership was low and indistinguishable from the low ideation group ('high-decline SI trajectory').

Predictors of suicidal ideation trajectory

Static (SES, ethnicity, impulsivity at baseline) and time-varying risk factors (depressive symptoms, externalizing symptoms, alcohol use, parent support and peer support) were added to the trajectory models as predictors of class membership.

Risk model for girls—Model estimation of the zero inflated Poisson model with risk factors resulted in improved fit compared to the 3-group ZIP model without covariates, with BIC= -706.44, AIC= -660.92, LL= -634.92. Covariates that predicted trajectory group membership are presented in Table 4. Membership in SI trajectory was significantly predicted by depressive symptom severity. Externalizing problems distinguished the moderate from low trajectory. Alcohol use was inversely related to the low SI trajectory. Self-reported levels of family support discriminated between low SI trajectory and moderate SI trajectory, whereas friendship support discriminated between moderate and high SI trajectories. Impulsivity, ethnicity, and SES did not emerge as significant predictors of SI trajectories for girls.

Risk model for boys—Estimation of the model including risk factors for boys resulted in improved model fit compared to the 3-group ZIP model without covariates, BIC= -674.99, AIC= -628.36, LL= -602.36. Similarly to girls, higher depression symptom severity was predictive of trajectory group. Additionally, levels of family support and alcohol use discriminated high-decline trajectory from the low and moderate trajectories (Table 4).

Association between trajectory group and suicide attempt

We examined the linkages between trajectory group and history of suicide attempt by age 15 by including history of a suicide attempt as an outcome of trajectory groups. Table 4 gives the average number of suicide attempts by age 15 with 95 percent confidence intervals by ideation trajectory groups.

Suicide attempts for girls—The results show that the number of suicide attempts differs significantly by trajectory group. The average number of suicide attempts for low ideation trajectory group was .02, whereas moderate and high ideation group had higher estimated suicide attempts (.12 and .58, respectively).

Suicide attempts for boys—The results for boys also illustrate that the number of suicide attempts differs significantly by trajectory group. The average number of suicide attempts for low ideation trajectory group was .04, whereas moderate and high-declining ideation group had higher estimated suicide attempts (.13 and .15, respectively).

Discussion

In this prospective longitudinal cohort study, group-based trajectory modeling was employed to examine the course and risk factors for SI. The weighted proportion of adolescents who were classified in the low-risk trajectory was 64% for girls, and 68% for boys. These prevalence estimates are consistent with other population based studies (Evans et al., 2005; Nock et al., 2013). As hypothesized, there was heterogeneity in SI over the course of

development, and there were differences between girls and boys. For both girls and boys, the best fitting model had three SI trajectories with the majority of individuals following trajectories characterized by low-risk SI during this time period. The identification of three trajectory group is consistent with the two other studies conducted with adolescents and young adults (Giletta et al., 2015; Rueter, Holm, McGeorge, & Conger, 2008).

Important sex differences were observed in the course of SI between girls and boys. Specifically, for boys, the best fitting trajectory for the highest endorsed ideation group was a curvilinear function wherein ideation decreased rapidly from 12 to 13-years-old, and by age 13 severity of SI was indistinguishable from endorsement among boys in the low SI trajectory. The finding that a substantial number of boys (11.8%) were classified in the high-risk group was contrary to expectations given that past literature suggests that SI is less common in boys during this developmental period. In Evans' and colleagues' (2005) meta-analysis of sex differences in the prevalence of SI, the rates of SI was at least 1.38 times higher for girls than boys. However, most studies have assessed SI starting in high school, when the observable differences in SI risk among boys in this study were mitigated. In a sample of only boys, Kerr, Owen, and Capaldi's research (2008) also indicated a decline in SI with age in a sample of boys followed longitudinally from age 12 to 29. In contrast, girls in the ideation trajectory showed a quadratic function in which SI was at its highest point at age 13 and decreased to its lowest point at age 15. It is possible for boys, the risk of SI decays quickly and is transient during early adolescence when problem solving and skills related to managing distress are being strengthened. Future work is needed to identify how sex and developmental factors affect the trajectory of SI, as well as the transition from SI to suicide attempts.

This study found distinctive patterns of factors from psychological and psychosocial domains that differentiated adolescents in each SI trajectory over the early adolescent period. For girls, the low SI trajectory was characterized by good support and inversely related to alcohol use. Moderate SI trajectories were predicted by depression, externalizing problems and low family support. The high SI trajectory was predicted by depressive symptom severity and low perceived friendship support. For boys, the low SI trajectory was predicted by depression severity and externalizing behaviors. For the moderate SI trajectory depressive symptoms and low family support were predictive. The high-decline SI trajectory was predicted by depressive symptoms, externalizing behaviors, family support and alcohol use. These findings underscore the importance of alcohol use (Pompili et al., 2012) and social relationships (King & Merchant, 2008), especially family relationships, across both sexes in understanding risk for SI. As there are known sex differences in patterns of alcohol use and related problems (Nolen-Hoeksema, 2004) (Nolen-Hoeksema, 2004), it is reasonable to assume that the effects of alcohol use on the developmental course of SI will vary by sex. However, there is a lack of research to elucidate this relationship. The sex differences in alcohol use and SI trajectory observed in this sample are worth further study particularly focusing on the acute effects of alcohol use on suicidal crises. It is likely that alcohol use and unsupportive relationships impact SI by undermining adaptive coping efforts and contributing to further developmental failures (Connor & Goldstein, 2006).

The contributions of this study should be viewed with its limitations in mind. First, the trajectory groups are defined in probabilistic terms and may be misspecified (Nagin, 2005). Given this and the findings of a decrease in overall SI severity over this developmental period, it is important that SI trajectories be replicated with additional samples during this developmental period. The SI score was comprised of self-report items, primarily focused on passive ideation, which may limit its ability to predict suicidal behavior. In addition, there may be important risk factors, like anxiety or panic that were not included in analyses. Given the strengths of this prospective study over retrospective examinations of SI, this study represents an important contribution to the literature in elucidating trajectories of SI during early adolescence and contributors to that risk.

Conclusions

Several conclusions can be drawn regarding SI in young adolescents. First, around 10% of boys and girls were included in high SI trajectory at age 12, shortly after the transition to middle school. Second, the course of SI varied by sex. Whereas the SI trajectories for boys decreased at each time point, the moderate SI trajectory for girls' revealed an increase toward mid-adolescence. Third, consistent with the existing literature, psychopathology, particularly depression, is a clear risk factor for ideation in both boys and girls. The findings suggest that a notable minority of young teens express SI and their trajectories are shaped by sex, psychopathology, and context. Our results underscore the idea that teens at risk for SI experience difficulties across a variety of interpersonal and psychological domains.

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Key points

- The 6th grade time point classified the highest percentage of youth classified, with 15.8% of 12-year-old boys and 11.25% of 12-year-old girls.
- Trajectories of highest SI varied by sex with gradual declines in risk from ages 12 to 14 and increased risk from 14 to 15 for girls and precipitous decline in risk from ages 12 to 15 for boys.
- Depressive symptom severity, externalizing problems, and alcohol use predicted high risk trajectory for both sexes. Family and peer support discriminated low SI from other trajectories.
- Results indicate utility in screening youth in early adolescence for SI.

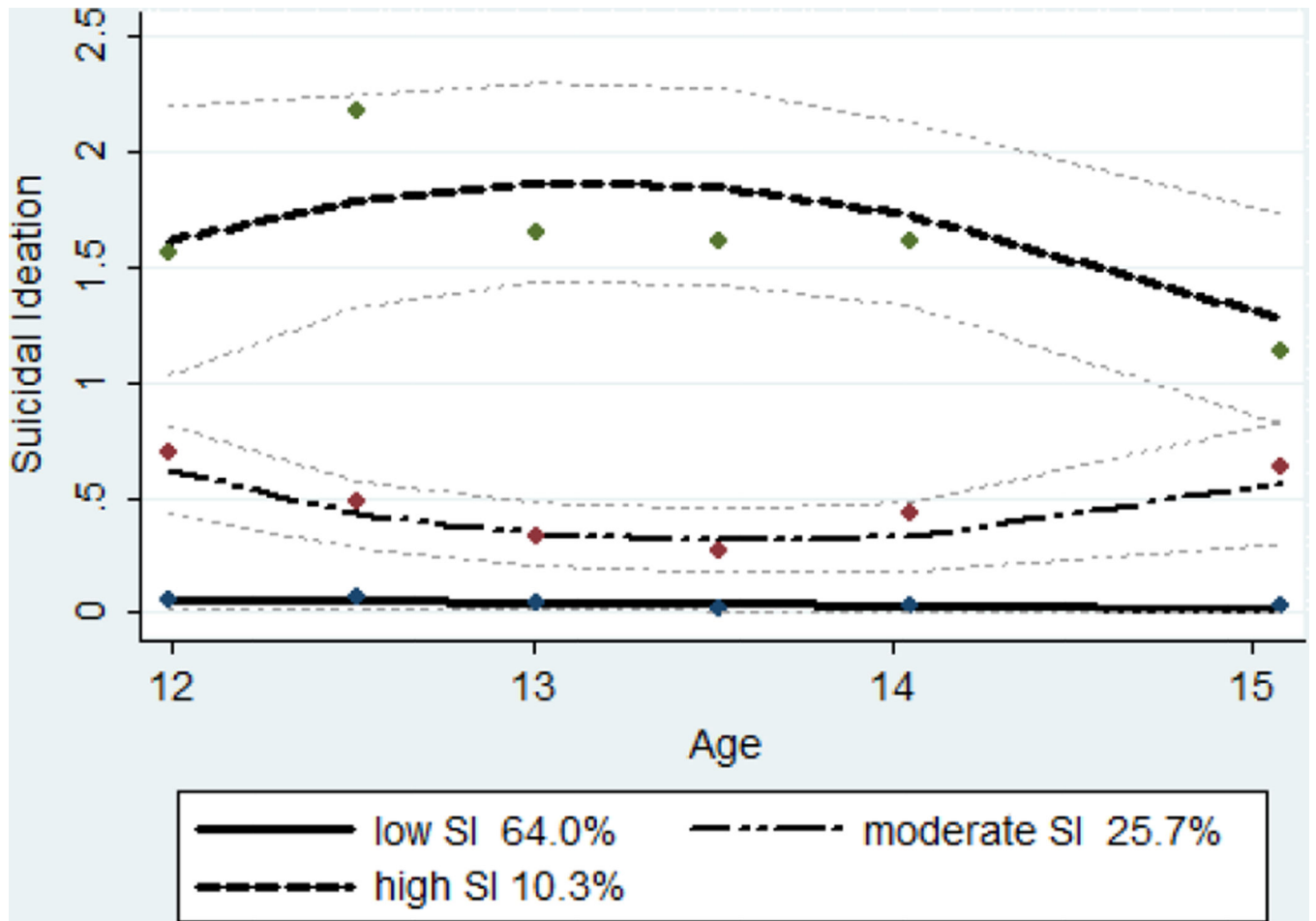


Figure 1.
Trajectories of high suicidal ideation risk from ages 12 to 15 for girls

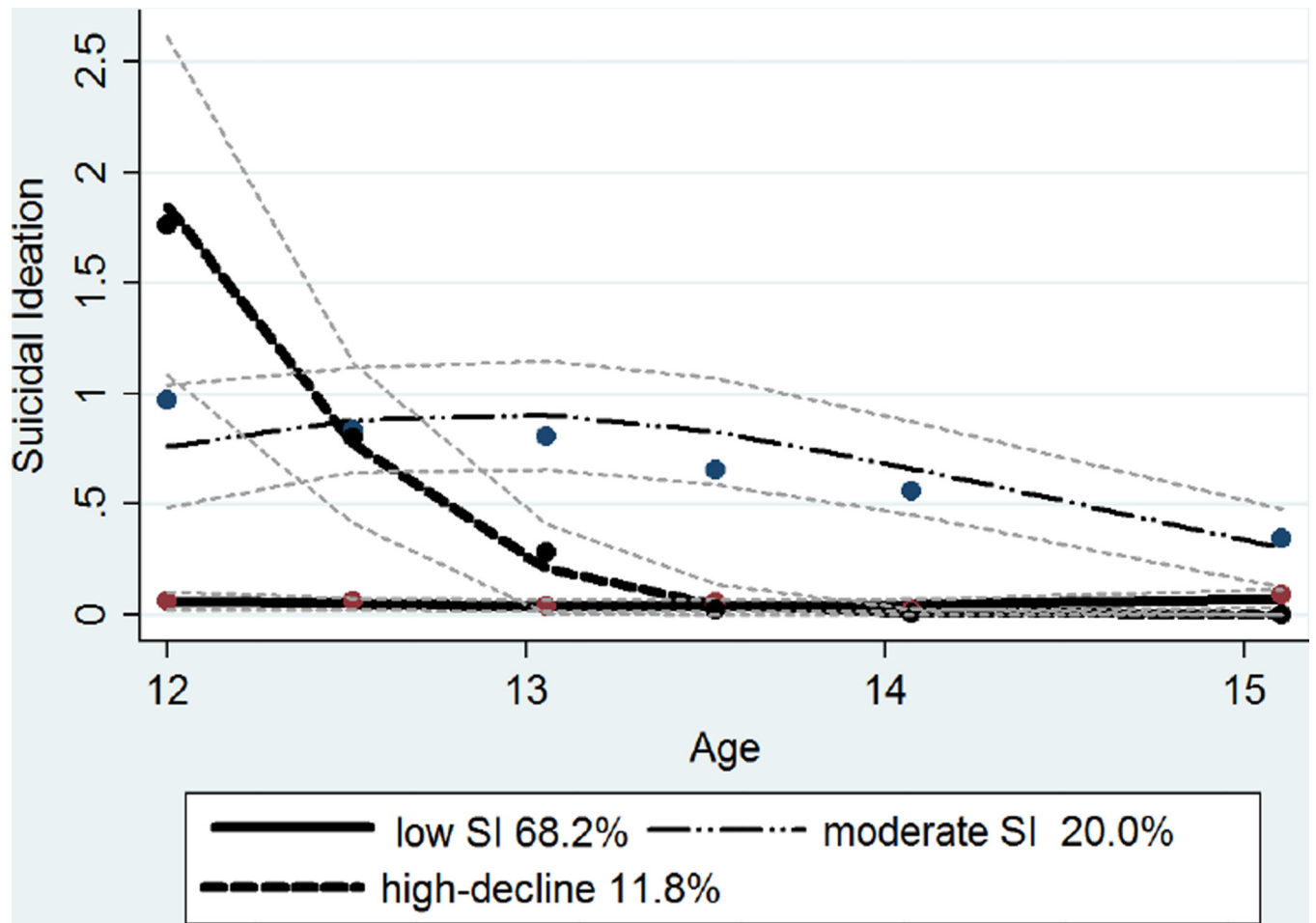


Figure 2.
Trajectories of high suicidal ideation risk from ages 12 to 15 for boys

Table 1

Sample demographics

	N	%	M (SD)
White	255	49	-
Black	148	28	-
Hispanic	53	10	-
Asian	97	19	-
Native American	21	4	-
Female	249	48	-
Male	272	52	-
Age at Baseline	-	-	12.02 (.43)
Income under \$50,000	-	48.1%	-

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Table 2

Means and standard deviations for boys and girls

Variable	Boys (N=272)	Girls (N=249)	<i>t</i> or χ^2
Age at T1	12.03 (.40)	12.00 (.45)	<i>t</i> (519) = .58
SES	61.15 (141.80)	72.90 (180.23)	<i>t</i> (519) = -.83
Impulsivity	0.28 (1.75)	-0.31 (.55)	<i>t</i> (512) = 4.12 **
Family Support			
T1/12 years	18.53 (2.01)	18.54 (2.08)	<i>t</i> (512) = -.11
T2/13 years	18.63 (2.13)	18.63 (2.01)	<i>t</i> (454) = .03
T3/13 years	18.71 (2.12)	18.44 (2.29)	<i>t</i> (440) = 1.25
T4/14 years	18.35 (2.27)	18.25 (2.19)	<i>t</i> (433) = 1.27
T5/14 years	18.47 (2.31)	18.18 (2.71)	<i>t</i> (446) = 1.24
T6/15 years	18.24 (2.57)	17.66 (2.90)	<i>t</i> (405) = 2.18 *
Peer support			
T1	16.82 (2.77)	18.04 (2.11)	<i>t</i> (512) = -5.53 ***
T2	17.15 (2.71)	18.39 (1.88)	<i>t</i> (454) = -5.65 **
T3	17.31 (2.54)	18.63 (1.66)	<i>t</i> (450) = -6.36 **
T4	17.48 (2.40)	18.71 (1.76)	<i>t</i> (433) = -6.04 **
T5	17.47 (2.45)	18.75 (1.72)	<i>t</i> (446) = -6.36 **
T6	17.58 (2.41)	18.40 (1.97)	<i>t</i> (405) = -3.70 **
Depression			
T1	10.86 (8.31)	10.46 (9.17)	<i>t</i> (478) = .80
T2	9.11 (7.04)	11.60 (10.07)	<i>t</i> (472) = -3.13 **
T3	7.81 (7.53)	9.32 (8.62)	<i>t</i> (443) = -1.96 *
T4	6.94 (6.07)	8.92 (8.11)	<i>t</i> (437) = -2.91 **
T5	6.60 (6.08)	9.29 (7.63)	<i>t</i> (446) = -4.14 ***
T6	7.57 (6.08)	11.87 (8.68)	<i>t</i> (406) = -5.81 ***
Externalizing behaviors			
T1	8.50 (7.58)	7.41 (6.58)	<i>t</i> (512) = 1.73
T2	7.44 (6.88)	6.82 (6.83)	<i>t</i> (466) = .98
T3	6.70 (6.08)	6.01 (6.32)	<i>t</i> (442) = 1.17
T4	6.75 (6.54)	5.96 (6.21)	<i>t</i> (436) = 1.30
T5	7.02 (7.61)	6.02 (6.71)	<i>t</i> (445) = 1.47
T6	7.40 (7.77)	6.82 (7.53)	<i>t</i> (445) = 1.28
High risk suicidal ideation class			
T1	43 (15.80%)	28 (11.25%)	$\chi^2 = 2.3$
T2	21 (7.72%)	30 (12.05%)	$\chi^2 = 1.25$
T3	17 (6.25%)	22 (8.84%)	$\chi^2 = 2.76$
T4	11 (4.04%)	19 (7.63%)	$\chi^2 = 3.08$

Variable	Boys (N=272)	Girls (N=249)	<i>t</i> or χ^2
T5	7 (2.57%)	26 (10.44%)	$\chi^2=13.56^{**}$
T6	10 (3.67%)	27 (10.84%)	$\chi^2=10.12^{**}$

Note. T = Time; SES = Socioeconomic Status;

* $p < .05$,

** $p < .01$,

*** $p < .001$

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Table 3

Model fit results of the binary logistic trajectory model for boys and girls

Variable (Classes)	BIC	AIC	2log (B10)
Suicidal ideation for girls			
1 (3)	-999.55	-994.27	-991.27
2 (1 3)	-829.82	-817.51	-810.51
3 (1 2 2)	-815.59	-798.00	-788.00
4 (1 2 2 2)	-827.50	-801.12	-786.12
Suicidal ideation for boys			
1 (2)	-875.62	-870.21	-867.21
2 (2 2)	-781.55	-768.93	-761.93
3 (2 2 2)	-776.67	-756.83	-745.83
4 (2 2 2 2)	-783.25	-756.21	-741.21

Note. BIC = Bayesian Information Criteria; AIC = Akaike Information Criteria

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Table 4
Zero-inflated poisson model including risk factors predicting suicidal ideation group membership

Risk factors	Girls		Boys			
	Low Trajectory y (64%)	Moderate Trajectory y (25.7%)	High Trajectory y (10.3)	Low Trajectory y (68.2%)	Moderate Trajectory y (20%)	High Decline Trajectory (11.8%)
Intercept	-4.43 (2.22)	-36.26 (35.58)	-14.00 (12.3)	.02 (1.72)	-6.10 (33.49)	-7.54 (18.91)
SES	-	.04 (.01)	.03 (.01)	-	-.02 (.01)	-.16 (.18)
Ethnicity	-	-.64 (.31)	-.47 (.31)	-	-	-
Impulsivity	-	-.20 (.19)	-.01 (.20)	-	-.15 (.18)	-.86 (.39)
Depressive Symptoms	.19*** (.03)	.09*** (.01)	.07* (.01)	.06*** (.02)	.17 *** (.01)	.11 *** (.03)
Alcohol Use	-2.70 (1.29)*	.09 (.16)	.14 (.12)	.26 (.22)	-.11 (.37)	.72 (.25)**
Externalizing Problems	-.01 (.03)	.03** (.01)	.01 (.01)	.07 (.01)***	-.01 (.01)	-.22 (.04)**
Family Support	.11 (.08)	-.15*** (.04)	.01 (.03)	.01 (.06)	-.02(.03)*	-.20 (.06)**
Peer Support	.24 (.08)	.01 (.05)	-.08* (.04)	.10 (.04)	-.02 (.05)	.04(.05)
Lifetime Suicide Attempt	.02 (.01-.06)	.12 (.05-.32)	.58 (.32-1.04)	.04 (.02-.08)	.13 (.04-.49)	.15 (.06-.38)