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Suicidal behavior in children and adolescents: Epidemiology and risk factors

AUTHORS: Stephanie Kennebeck, MD, Liza Bonin, PhD
SECTION EDITOR: David Brent, MD
DEPUTY EDITOR: David Solomon, MD

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INTRODUCTION

Suicidal behavior includes the spectrum from thoughts or ideas that revolve around suicide or death (suicidal ideation) through fatal completion of suicide [1,2]. Between these extremes are suicide threats and suicide attempts (potentially self-injurious action with a nonfatal outcome for which there is evidence that the individual intended to kill him- or herself) [1]. Children and adolescents who present for medical attention with suicidal behavior require a variable amount of medical, social, and psychiatric intervention depending upon the seriousness of their intent, their underlying risk factors, and their emotional support system.

The epidemiology of and risk factors for childhood and adolescent suicide will be reviewed here. The evaluation and management of children and adolescents with suicidal ideation are discussed separately. (See "Suicidal ideation and behavior in children and adolescents: Evaluation and management".)

EPIDEMIOLOGY

Prevalence — Suicide is an important public health problem for children and adolescents around the world [3-8]. In the United States, suicide rates doubled in the 15- to 19-year age group and tripled in the 10- to 14-year age group between the 1960s and the 1990s [9]. The reasons for this trend are unclear, although it is not simply because of increased reporting [10].

Possible explanations include increased rates of alcohol and drug abuse, depression, family and social disorganization, and access to firearms [10,11].

Suicide is the third leading cause of death among all children and adolescents in the United States, including those aged 10 to 19 years (table 1) [12,13]. Adolescent suicide rates declined somewhat between the late 1980s and 2003, but increased between 2003 and 2004 [14,15], and again between 2008 and 2009 [13]. In 2009, there were 1922 suicides reported for children younger than 19 years [13]. Suicide accounted for 14 percent of deaths in adolescents aged 15 to 19 years, and 8 percent of deaths in children aged 10 to 14 years.

Between 2003 and 2004, suicide rates increased among females aged 10 to 14 years (by 76 percent), females aged 15 to 19 years (by 32 percent), and males aged 15 to 19 years (by 9 percent) (figure 1) [15]. The reasons for this increase are not clear; possible explanations include the misclassification of unintentional asphyxia from adolescents playing "the choking game" (ie, intentionally restricting the supply of oxygenation to the brain, often with a ligature, to induce a brief euphoria) and changes in risk factors for suicide or suicide methods [15-17]. The potential impact of the United States Food and Drug Administration warning regarding the risk of suicidality and antidepressants on the rates of antidepressant prescriptions and suicide is discussed separately. (See "The "choking game" and other strangulation activities in children and adolescents" and "Effect of antidepressants on suicide risk in children and adolescents".)

Suicide attempts are common. Available data indicate that there are as many as 50 to 100 suicide attempts for every completed suicide in adolescents [18-21]. Survey data from the United States in 2001, 2003, 2005, and 2007 found that approximately 7 to 9 percent of all adolescents attempted suicide in the 12 months before the survey [22-25], and cross-sectional data from a self-report questionnaire administered to 15- and 16-year-old students attending 41 schools in England provided similar results [26]. A more recent nationally representative, retrospective survey of adolescents (n = 6483) in the United States found a lifetime prevalence of suicide attempt in 4 percent; among adolescents who attempted suicide, 67 percent had a lifetime history of treatment or some type of services prior to their attempt [27]. The reasons reported for suicide attempt vary by sex and age (table 2).

Suicidal ideation often precedes suicide attempts. A nationally representative survey in the United States found that among adolescents who suffered suicidal ideation, a subsequent attempt occurred in 34 percent [27].

Age — Suicidal ideation occurs in prepubertal children, but suicide attempts and completions are rare [28,29]. Between 2008 and 2012, the incidence rate of suicide among children aged 5 to 11 years in the United States was 1 per 1 million (a total of 155 children committed suicide) [30].

After puberty, the rate of suicide among adolescents increases with increasing age (figure 2) [31]. As an example, data from the United States (both public health surveillance in 16 states from 2005 to 2009, and death certificates from 50 states from 2010) showed that the rate of suicide deaths among children aged 10 to 14 years was 1 per 100,000, and for children aged 15 to 19 years was 7 to 8 per 100,000 [32].

Potential explanations for the increased incidence of suicide attempts and completion with increasing age include increased access to firearms and potentially lethal drugs, increased rates of psychiatric illness, substance abuse, and other comorbidities, as well as changes in cognitive development. As adolescents develop their capacities for abstract and complex thinking, they are more capable of contemplating life circumstances, envisioning a hopeless future, generating suicide as a possible solution, and planning and executing a suicide attempt [33,34]. Younger children who complete suicide are more likely to be of above-average intelligence, possibly exposing them to the developmental level of stress experienced by older children [33].

In addition, puberty may have a negative impact, particularly for girls, when there is a lack of synchrony between the timing of pubertal development and chronologic age. In a large cross-sectional study, girls who matured early were more likely to have a lifetime history of disruptive behavior disorder and suicide attempts than their peers [35]. (See "Normal puberty", section on 'Psychological changes'.)

Sex — The rate of suicidal ideation is greater in high school girls than boys (21 to 31 percent versus 13 to 20 percent) [22,23,36]. Female high school students are more likely than males to have a specific suicide plan (median of 16 versus 11 percent, with a range of 13 to 20 percent and 8 to 15 percent for females versus males, respectively) [23]. In contrast, the rates of having a specific plan are similar between the genders in college students (approximately 8 percent) [37].

Suicide attempts are also more common in adolescent girls than boys. As an example, a nationally representative survey in the United States found that the one-year prevalence of suicide attempt was two times greater in females than males [38], and a second such survey found that the lifetime prevalence of suicide attempt was three times greater in adolescent females (6 versus 2 percent) [27].

However, adolescent boys are more likely to complete suicide than girls. As an example, public health data from the United States showed that the rate of suicide deaths among males aged 10 to 19 years was 7 per 100,000, and for females was 2 per 100,000 [32]. Most studies relate the differences in completion rates to the method chosen. Girls tend to choose less lethal means such as overdose or cutting, whereas boys tend to choose firearms and hanging

(table 3) [39-42]. Another lethal method of suicide that is more common in males (usually older adolescents and adults) is "suicide by cop", in which the suicidal individual engages in conspicuous and threatening behavior with a lethal or apparently lethal weapon in an attempt provoke law enforcement officers to shoot him to protect civilians or in self-defense [43,44]. This method is also known as police-assisted suicide, victim-precipitated homicide, and law-enforcement-assisted suicide.

Differences in the rate of adolescent depression between boys and girls may explain at least some of the difference in the rates of suicide attempts. As puberty progresses, most boys develop a more positive self-image and mood, but girls, particularly White girls, have a diminished sense of self-worth [45]. During adolescence, the prevalence of depression increases and becomes twice as high among girls as boys [46-49]. (See "Pediatric unipolar depression: Epidemiology, clinical features, assessment, and diagnosis".)

Race/ethnicity — The rates of suicide and suicide attempts vary according to race/ethnicity (figure 2). Among adolescents, the suicide rate is highest for White males. However, between 1980 and 1996, the suicide rate increased most rapidly among Black males ages 15 to 19 years (from 3.6 to 8.1 per 100,000) [50]. On the other hand, in the 2007 YRBSS, Hispanic adolescents were more likely than Black or White adolescents to report a suicide attempt in the previous 12 months (10 versus 8 versus 6 percent, respectively) [25].

RISK FACTORS

Much effort in psychiatric medicine has gone into identifying risk factors for suicide. Improved ability to identify individuals who are at risk for suicide attempts and completion may facilitate prevention and enable more appropriate allocation of resources. Unfortunately, factors that reliably differentiate between suicide ideators, attempters, and completers have not yet been identified [51]. Nonetheless, general categories of factors that affect an individual's vulnerability to suicide have been identified [8,52]. These factors can be used to determine the level of intervention necessary for a particular patient [8,53,54]. (See "Suicidal ideation and behavior in children and adolescents: Evaluation and management".)

Risk factors for suicidal behavior in children and adolescents can be categorized as predisposing or precipitating factors. Predisposing factors increase an individual's risk for suicide and include [2,28]:

- Psychiatric disorders
- Previous suicide attempt

- Family history of mood disorder and/or suicidal behavior
- History of physical or sexual abuse
- Exposure to violence
- Biologic factors

Precipitating factors (also called "proximal" or "potentiating" factors) are unlikely to contribute to suicide risk in and of themselves. However, they play a vital role in interaction with predisposing factors. Precipitating factors include:

- Access to means
- Alcohol and drug use
- Exposure to suicide
- Social stress and isolation
- Emotional and cognitive factors

Psychiatric disorder — The majority of adolescents who attempt or commit suicide have a psychiatric disorder, with depressive disorder being the most common [27]. Other predisposing psychiatric disorders include oppositional defiant disorder, conduct disorder, bipolar disorder, anxiety disorder, eating disorder, personality disorder, and substance use disorders [55,56]. (See 'Alcohol and drug use' below.)

Most children and adolescents who commit suicide have a mental illness, and suicide victims are more likely to meet criteria for a psychiatric disorder than matched community control subjects [33,42,57]. In one retrospective "psychiatric autopsy" study of 119 subjects who committed suicide (mean age 17 years), at least one psychiatric diagnosis was present in 91 percent [33]. Depressive syndromes, conduct disorder, and substance use disorders were most common. However, the prevalence of psychiatric illness appears to be greater among older adolescent suicide victims than younger victims. A retrospective study in 140 suicide victims found that a psychiatric disorder was present in more subjects ≥16 years of age, compared to subjects <16 years of age (90 versus 60 percent) [42]. (See "Pediatric unipolar depression: Epidemiology, clinical features, assessment, and diagnosis".)

Adolescents who attempt suicide also have high rates of psychiatric disorders [58-60]. In a case-control study, 129 adolescents and young adults (aged 13 to 24 years) who made serious suicide attempts were compared with 153 randomly selected controls [58]. Adolescents who made suicide attempts had higher rates of affective disorders (70 versus 15 percent), substance use disorders (39 versus 7 percent), anxiety disorders (15 versus 6 percent), eating disorders (9 versus 5 percent), and antisocial disorders (35 versus 7 percent) than did controls.

Psychosis — The risk of suicide is elevated in patients with psychotic symptoms (eg, command auditory hallucinations to commit self-harm) [61,62]:

- In a prospective observational study of adolescents (N >1100) who were followed for up to 12 months [63]:
  - Suicide attempts were more likely in adolescents with psychotic symptoms at baseline (n = 77) than adolescents without psychosis (odds ratio 11, 95% CI 4-29)
  - Among adolescents with psychopathology (eg, depressive, anxiety, or conduct disorder; n = 193) at baseline, the probability of suicide attempts was greater in adolescents who were also psychotic (n = 47), compared with adolescents who were not psychotic (odds ratio 33, 95% CI 10-102)
- A community based study found that among adolescents aged 11 to 13 years (n = 78), suicidal ideation or behavior were more common in adolescents with psychiatric disorders (eg, depressive disorder, anxiety disorder, or attention deficit hyperactivity disorder) plus psychotic symptoms, compared to adolescents with psychiatric disorders but no psychotic symptoms (OR 5.1, 95% CI 1.2-22.8) [64]. Similar results were found in adolescents aged 13 to 15 years (n = 72).

Comorbidity — Among patients with a psychiatric disorder, comorbid psychiatric diagnoses further increase the risk of suicidality [56,65-69], although the degree of increased risk depends in part upon the specific disorders that are present [70]. Among depressed youth, particularly among males, suicide risk increases with comorbid conduct disorder and substance use disorders [69,71]. In one case control study, the odds of a serious suicide attempt in subjects with two or more psychiatric disorders were 90 times greater than the odds in subjects with no disorder [66].

Hospitalization — Multiple hospitalizations for suicidality within a short period of time appears to predict subsequent suicide attempts. A one-year observational study prospectively followed adolescents (n = 373) who were hospitalized for acute suicidal ideation or recent suicide attempt [72]. Youth who were rehospitalized within the first three months of the index hospitalization, compared with youth not rehospitalized, were three times more likely to attempt suicide during the subsequent nine months.

Antidepressants — The association between antidepressants and suicide risk in children and adolescents is discussed separately. (See "Effect of antidepressants on suicide risk in children and adolescents".)

Previous attempts — Individuals who have attempted suicide in the past are at greater risk for subsequent attempts and/or completion [68,73]. This is particularly true if they have a history of multiple attempts [74-77]. Between one-quarter and two-thirds of children and adolescents who have attempted suicide make a subsequent attempt [78-80]. The risk of completed suicide in previous attempters appears to be greatest in the first year following the previous attempt [73], and remains elevated even a decade after the attempt [77].

In a study of adolescents who attempted suicide (n >3700), 40 percent reported a previous attempt; previous attempts were more common among those who indicated their reason for suicide was physical, sexual, or substance abuse [78]. In baseline and follow-up surveys of high school students, individuals with multiple suicide attempts more frequently reported wishing to die at the time of the attempt, regretting recovery, and timing the attempt to avoid intervention than did those with a single attempt [74].

Suicide attempts in adolescents substantially increase the risk of subsequent completed suicide for many years [81]. A registry study identified patients who survived a first self-poisoning episode (n >20,000) and controls with no such history (n >1 million); up to 12 years of follow-up data were available [77]. Among adolescents with a first self-poisoning episode, the risk of suicide within one year was more than 30 times greater than the risk in controls, and after ten years of follow-up, the risk was 10 times greater. The median time to suicide for adolescents with a first self-poisoning episode was three years; risk factors for suicide included recurrent episodes of self-poisoning and male sex, as well as prior psychiatric treatment, which may have been a proxy for more severe psychiatric illness. Depression and substance abuse contributed indirectly to risk for completed suicide by increasing the likelihood for multiple episodes of self-poisoning. In addition, youth who survived a first self-poisoning episode were not only at increased risk for completed suicide, but also more likely to die by accidents. (See 'Psychiatric disorder' above.)

Childhood adversity — Childhood adversity in various forms is associated with subsequent death by suicide in adolescence and young adulthood. A national registry study identified a cohort of nearly 550,000 adolescents and young adults (age 15 to 24 years), including 431 who committed suicide, and examined the association between childhood adversity from birth to 14 years and the risk of suicide [82]. Indicators of childhood adversity included death of a parent or sibling, parental psychiatric disorder, substantial parental criminality, single parent household, household receiving public assistance, and residential instability. After controlling for potential confounding factors (eg, childhood school performance and psychopathology, foreign born parent, and parental education and income), the analyses found that each indicator of adversity was associated with an increased risk of suicide during adolescence and young adulthood. The

relative risks ranged from 1.4 (single parent household) to 2.3 (parental criminality). In addition, the results suggested that there may be a dose-response relationship, such that exposure to multiple childhood adversities was associated with a greater risk of suicide, compared with exposure to one adversity.

History of abuse — Physical and/or sexual abuse increases the likelihood of depression and suicide:

- In a cohort of 776 randomly selected children who were studied retrospectively for 17 years, adolescents who were physically maltreated were three times more likely to become depressed or suicidal than those who were not [83]. The risk of repeated suicide attempts was eight times greater among those who had been sexually abused than those who had not.

- A prospective study interviewed a nationally representative sample of youth aged 10 to 17 years (n = 1186) and reassessed them approximately two years later [84]. Controlling for suicidal ideation and other characteristics at baseline, suicidal ideation occurred in more children and adolescents who were sexually assaulted in the past year, compared to youth who were not (odds ratio 3.4).

Exposure to violence or victimization — Children and adolescents who are witnesses to or victims of violence are at increased risk for depression and suicidal behavior [85-87]. One study found that suicide attempts were twice as likely to occur in high school students who were exposed to higher levels of violence or victimization (eg, had been injured or threatened with a weapon, or had sexual contact against their will) than those who were not [88]. (See "Peer violence and violence prevention" and "Intimate partner violence: Childhood exposure", section on 'Effects'.)

Another risk factor for suicide is peer victimization (bullying), which involves repeated harassment, the intent to cause harm, and an imbalance in power; bullying can be exercised physically, verbally, or by excluding the victim [89]. A meta-analysis of nine studies (n >70,000 children and adolescents) found that suicide attempts were two to three times more likely to occur in children who were victimized than children who were not. In addition, suicidal ideation was more strongly related to cyberbullying than traditional bullying [89].

Family history — The risk of suicide is increased in adolescents who have a family history of mood disorders and/or suicidal behavior [90-95]. As an example:

- One prospective observational study of the offspring (n >700) of mood disordered parents found that the rate of suicide attempts was nearly five times greater in the offspring of

parents who attempted suicide, compared with offspring whose parents did not attempt suicide [96].

- A national registry study identified a cohort of nearly 550,000 adolescents and young adults (age 15 to 24 years), including more than 3000 who were children (age 0 to 14 years) when a parent or sibling committed suicide [82]. The analyses found that after controlling for potential confounding factors (eg, childhood school performance and psychopathology, foreign born parent, and parental education and income), the risk of suicide was three time greater in adolescents and young adults who were exposed to suicide in the family during childhood (relative risk 2.9, 95% CI 1.4-5.9).

Twin studies suggest that the association of parental mood disorders and suicidal behavior with suicidality in the offspring involves both environmental and genetic factors [97,98]. However, it is not clear whether the genetic component is primarily responsible for the underlying psychiatric disorder or for the suicide itself. In one study, both a family history of completed suicide and psychiatric illness were risk factors for suicide, and the effect of family suicide history was independent of the family history of psychiatric illness [90].

The risk of suicide attempt may be greater for children who suffer parental suicide than adolescents who experience the same loss. A national registry study compared time to hospitalization for suicide attempt in three groups who lost a parent to suicide: children 0 to 12 years of age (n >10,000), adolescents 13 to 17 years of age (n >6000), and young adults 18 to 24 years of age (n >9000) [99]. Although the absolute risk of suicide attempt was small, the risk in children was greater than that for young adults, and for offspring who lost a parent during early childhood (ages 0 to 5 years), the risk continued to rise for two decades. By contrast, the risk of suicide attempt in adolescents was comparable to the risk for young adults.

In addition, the risk of suicide attempt may be greater for youth who lose their mother to suicide rather than their father. A retrospective study of national registries examined time to hospitalization for suicide attempt, comparing children and adolescents who lost a mother to suicide (n >5000) with youth who lost a mother to an accident (n >2000); the study also compared time to hospitalization for suicide attempt in youth who lost a father to suicide (n >17,000) or to an accident (n >12,000) [93]. Propensity scoring was used to match suicide decedents with fatal accident decedents with regard to observed potential confounders. Hospitalization for suicide attempt was greater for youth who lost a mother to suicide compared with youth who lost a mother to an accident (adjusted hazard ratio = 1.8). By contrast, the risk for hospitalization in offspring of paternal suicide and paternal accidental death was comparable.

Biologic factors — Biologic factors, particularly those that influence brain serotonin, may play a role in suicidal ideation and behavior in individuals with depression [100-107].

Most studies comparing suicide attempters and nonattempters have found lower levels of 5-hydroxyindoleacetic acid (5-HIAA), the major serotonin metabolite, in the CSF or brainstems of suicide attempters than nonattempters [108,109], with the extent of metabolite reduction directly related to the lethality of the suicide attempt [106]. In some genetic studies, suicidal acts and low CSF 5HIAA concentrations are related to a polymorphism in the TPH gene, which codes for tryptophan hydroxylase, the rate-limiting enzyme in the synthesis of serotonin [102,110], but this is an inconsistent finding [111,112].

Individuals who commit suicide have fewer serotonin transporter sites, more postsynaptic serotonin receptors, smaller serotonin neurons, and more numerous, less functional neurons than controls [106,109]. Such individuals also have increased concentrations of norepinephrine, tyrosine hydroxylase, and alpha-2-adrenergic receptors, and reduced numbers of postsynaptic beta receptors, locus coeruleus neurons, and norepinephrine transporters [109].

Access to means — Access to means to attempt suicide is a potent precipitating factor [10,11]. This is true even after controlling for other risk factors such as depression or substance use. Firearms are the most common means for suicide completion. Other means include medications, illicit drugs, toxic chemicals, carbon monoxide, hanging, and cutting. Almost anything can be used as a means to attempt suicide, but access to the most lethal means often is preventable. (See "Firearm injuries in children: Prevention", section on 'Framework for prevention'.)

Firearms — Access to firearms increases the risk of completed suicide [11,113-115]. Firearms are used in almost two-thirds of fatal suicides in the United States [78], where the rate of firearm-related suicide is nearly 11 times greater than the pooled rate from other industrialized countries (0.32 versus 0.03) [116]. In a case-control study of adolescent suicide, guns were twice as likely to be present in the homes of suicide victims as attempters or psychiatric controls (adjusted odds ratio 2.1, 95% CI 1.2-3.7 and 2.2, 95% CI 1.4-3.5 for attempters and controls, respectively) [11]. In another study comparing suicide rates among adolescents (14 to 20 years) from states with and without various types of firearm legislation, a modest decrease (8.3 percent) in suicide rates among 14- to 17-year old children was found in the states with child access prevention laws (5.97 per 100,000 population versus the projected 6.51 per 100,000 population) [117]. Prevention of firearm injuries is discussed in detail separately. (See "Firearm injuries in children: Prevention", section on 'Framework for prevention'.)

Alcohol and drug use — Alcohol and drug use are known risk factors for suicide [71,118-121], largely because of their disinhibiting effects. Between 25 and 46 percent of adolescents who complete suicide and approximately 20 percent of those who attempt suicide have alcohol or another drug in their bodies at the time of suicide or suicide attempt [10,40]. Increased rates of alcohol and substance use among adolescents since the 1960s, particularly among White males, may be related to the increased suicide rate in this population [10]. Adolescent intoxication, in combination with psychiatric disorder and a firearm in the home, is a particularly high risk and lethal combination [11].

Exposure to suicide — Children who are exposed to the suicide of a family member or friend are at risk for internalizing symptoms, depression, anxiety, and/or posttraumatic stress [122,123]. Teenagers who are exposed to relatives who commit suicide may be at particular risk because of exposure to violence, exposure to suicide, and possible genetic predisposition to suicide [98,124,125]. The individual contribution of each of these factors to the overall risk of suicide is not known. (See 'Family history' above and 'Exposure to violence or victimization' above.)

Suicide contagion — Suicidal contagion refers to the phenomenon of suicide clusters or "outbreaks" of suicides in a community [126-128]. Clusters of suicide account for approximately 5 percent of youth suicide in the United States [129]. These clusters may occur when a vulnerable adolescent reads or hears an account of another suicide [130]. However, most studies show that friends of suicide victims are not at risk for imitation. Adolescents who imitate the suicide of another peer are usually not close friends of the victim and may have deficits in coping skills and lack models for healthy coping strategies. Adolescents and young adults between the ages of 12 and 24 appear to be the group at greatest risk for imitation [129,131-134]. It is controversial whether exposure to the suicide of a friend is a risk factor for suicide independent of depression, anxiety, withdrawal, somatic complaints, and posttraumatic stress [26,123].

Data that suggest exposure to a suicide is a risk factor for imitation includes a two year prospective, observational study of a nationally representative sample of Canadian youth that controlled for age, sex, socioeconomic status, prior depression and anxiety, and substance use [134]. Both a schoolmate's suicide and personally knowing someone who died by suicide were each associated with an increased rate of suicide attempts. As an example, the adjusted risk of suicide attempt was greater among 14 and 15 year olds (n >7800) who were exposed in the past year to suicide by someone personally known, compared to 14 and 15 year olds with no exposure (odds ratio 4, 95% CI 2-6).

Social stress — Stressful life events typically increase the risk of suicide only in the context of preexisting vulnerability. Nonetheless, adolescents who attempt or complete suicide are more likely to have suffered major stress in their lives than those who do not [79,85,135-139]. Common stressful events for adolescents include:

- Interpersonal loss or conflict
- Economic problems
- School-related difficulties
- Workplace problems
- Legal or disciplinary problems

Interpersonal problems, such as a relationship breakdown and/or argument with partner, family, or friend(s), are the most commonly cited reason for suicide attempts provided by both previous attempters and their significant others (table 1). Legal difficulties or charges and being in trouble with the police are another important category of stressful life events that are associated with increased risk of adolescent suicide attempt [140].

Medical or physical concerns also can be stressful issues for adolescents. These may include the physical changes related to puberty and/or chronic illness, teenage pregnancy, and the threat of sexually transmitted infections (STIs), including human immunodeficiency virus (HIV) [141-145]. Although the overall risk of suicide during pregnancy is low [146], teenagers may have a variety of emotional responses to a newly diagnosed pregnancy; those with a previous suicide attempt may be at increased risk [147]. (See 'Previous attempts' above and "Pregnancy in adolescents", section on 'History'.)

Adopted adolescents also may be at increased risk for suicide. Univariate analysis of data from a subset of adolescents in the National Longitudinal Study of Adolescent Health indicated that adopted adolescents were more likely to have attempted suicide (7.6 versus 3.1 percent) in the past year than had their nonadopted peers [148]. (See "Adoption", section on 'Other mental health issues'.)

Other life events that are not typically thought of as negative also can be precipitating stressors for adolescents (eg, birth of sibling, high school graduation, etc). Whether or not an event is potentially stressful depends upon the adolescent's perceptions and interpretations of the event as well as the adolescent's coping repertoire.

Social isolation — Social isolation and alienation are often associated with adolescent suicide. Adolescents who attempt suicide are more likely to isolate themselves than those who only think about committing suicide [149]. Suicidal adolescents who keep thoughts to themselves

appear to be at greater risk for suicide attempt than those who discuss their suicidal ideation with others.

Adoption — The risk of attempting suicide may be increased among teens who were adopted. A prospective study enrolled adoptees (n = 657) and nonadoptees (n = 508) with a mean age of 15 years and followed them for approximately three years [150]. After controlling for suicide risk factors (eg, psychiatric disorders), the investigators found that the probability of suicide attempts was nearly four times greater in the adoptees (odds ratio 3.7, 95% CI 1.7-8.0).

Sexual orientation — Suicidality is greater in sexual minority youth (eg, self-identification as gay, lesbian, or bisexual) than heterosexual youth. The increased risk for suicidal ideation and behavior in sexual minority youth may be attributable to their higher rates of substance abuse, depression, family conflict, peer victimization, and childhood sexual victimization [151,152]. (See "Lesbian, gay, bisexual, and other sexual minoritized youth: Epidemiology and health concerns", section on 'Mental health and self-harm'.)

Emotional and cognitive factors — Emotional and cognitive factors that may precipitate suicidal behavior include:

- Hopelessness and helplessness
- Despair and/or agitation
- Impaired problem-solving

Before suicide, adolescents often perceive their future to be fundamentally negative and hopeless. They perceive themselves and others as powerless to change their dire circumstances. Suicide is a desperate attempt at a solution for such adolescents whose hopelessness renders them unable to generate or even imagine helpful options.

Other risk factors — Other risk factors for suicide attempts include poor self-esteem, impulsivity and risk-taking behavior, aggressiveness, delinquent behavior, family dysfunction, parenting style characterized by little warmth and little control (rejecting and neglectful), nonintact family, and having run away from home [153-158].

CONSEQUENCES

Adolescents who attempt suicide are at increased risk of poor outcomes as young adults. As an example, a prospective community study of adolescents age 16 years (n = 4799) found that self-harm at any age up to 16 years was associated with multiple adverse outcomes in early adulthood (ages 18 to 21 years) [159]. Compared to adolescents with no self-harm by age 16

years, adolescents with suicide attempts by age 16 years were at increased risk of a subsequent anxiety disorder (odds ratio 3), self-harm incident (odds ratio 15), cannabis abuse (odds ratio 4), substance use disorder other than cannabis (odds ratio 3), and poor educational and occupational outcomes (odds ratio 2).

In addition, nonfatal episodes of self-harm in pediatric patients are associated with an increased risk of death at a young age, especially from unnatural causes such as suicide and alcohol poisoning. A study of primary care health records from 2001 to 2014 identified patients aged 10 to 19 years with an episode of self-harm (n >8000), and control patients with no record of self-harm (n >170,000) [160]. Self-harm included nonsuicidal self-injury and suicide attempts, and the analyses were adjusted for socioeconomic status. Compared with the control group, children and adolescents who harmed themselves were 3 to 34 times more likely to eventually die from:

- All natural causes – hazard ratio 3
- All unnatural causes – hazard ratio 9
    - Suicide – hazard ratio 17
    - Acute alcohol or drug poisoning – hazard ratio 34

INFORMATION FOR PATIENTS

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- Beyond the Basics topics (see "Patient education: Depression in children and adolescents (Beyond the Basics)" and "Patient education: Depression treatment options for children and adolescents (Beyond the Basics)")

SUMMARY

- Suicide is the fourth leading cause of death among all children in the United States; in 2004 there were 1985 suicides reported for children younger than 19 years (table 1). There are as many as 50 to 100 suicide attempts for every completed suicide in adolescents. Surveys estimate that the 12-month prevalence of suicide attempts in adolescents is 7 to 9 percent. The reasons reported for suicide attempt vary by sex and age (table 2). (See 'Epidemiology' above.)

- Suicidal ideation occurs in prepubertal children, but suicide attempts and completions are rare. After puberty, the rate of suicide among adolescents increases with age (figure 2). (See 'Age' above.)

- Suicidal ideation is more common among high school girls than boys, and females are more likely to have a specific suicide plan. In addition, suicide attempts are more likely in adolescent girls than boys; however, suicide deaths are more common in boys (table 4 and figure 2). One explanation is that girls tend to choose less lethal means such as overdose or cutting, whereas boys tend to choose firearms and hanging (table 3). (See 'Sex' above.)

- Factors that increase the risk of suicidal behavior in children and adolescents include:

  - Psychiatric disorders – especially major depression, but also including bipolar disorder, substance abuse, oppositional defiant disorder, conduct disorder, anxiety disorder, eating disorder, personality disorder, and comorbidity of mood with behavioral or anxiety disorders

  - Previous suicide attempt – especially a history of multiple attempts

  - Family history of mood disorder and/or suicidal behavior

  - History of physical or sexual abuse

  - Exposure to violence or peer victimization

  - Antidepressant medications may increase the risk of suicidal ideation and behavior in children and adolescents. (See "Effect of antidepressants on suicide risk in children and adolescents".)

- The increased risk posed by these factors can be amplified by additional factors, including access to means (especially firearms), alcohol and drug use, exposure to suicide (eg, family

member or friend), social stress and isolation, and emotional and cognitive factors (despair, hopelessness, and impaired problem-solving skills). (See 'Risk factors' above.)

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