

# REVIEW

## Suicide in Adolescents: A Worldwide Preventable Tragedy

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### Abstract

The tragedy of suicide in adolescents is experienced by all countries of the world with as many as 200,000 youth and young adults ending their life in the prime of their life because of self-murder each year. Such a tragedy should be unacceptable to clinicians of the world and this article examines factors leading to such death in our youth with recommendations on how to prevent such a worldwide carnage. A major issue in suicide prevention is to screen all children and adolescents for depression and other factors that may trigger suicide in adolescence. (Keio J Med 58 (2) : 95–102, June 2009)

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### Introduction

The tragedy of suicide in adolescents is experienced by all countries of the world with as many as 200,000 youth and young adults ending their life in the prime of their life because of self-murder each year.<sup>1</sup> Such a tragedy should be unacceptable to clinicians of the world and this article examines factors leading to such death in our youth with recommendations on how to prevent such a worldwide carnage. A major issue in suicide prevention is to screen all children and adolescents for depression and other factors that may trigger suicide in adolescence.

### Adolescent Suicide

#### Japan

The National Plan for Maternal and Child Health for 2001 to 2010 in Japan has listed suicide prevention as a major priority for health care providers in Japan.<sup>2</sup> Other national priorities include reduction in rates of abortion, sexually transmitted diseases, unhealthy body weights

(i.e., thinness or obesity), and drug abuses (i.e., smoking and alcohol consumption). Suicide rates for male Japanese youth 15 to 19 years of age increased from 5 per 100,000 in 1990 to 9 per 100,000 in 2003 while the rate for females increased from 3 to 5 in the same time period.<sup>3</sup> Suicide rates for young adults, 20 to 24 years of age, are double or more that noted for the adolescent population.

#### United States

Suicide rates in adolescents and young adults in the United States have varied in the 20<sup>th</sup> century and were reflective of greater societal forces. For example, rates were highest in the 1930s in partial response to major economic crises in the adult population; these rates dropped in the 1940s and 1950s only to double from 1960 to the early 1990s.<sup>4,5</sup> Suicide rates in youth dropped somewhat from the 1990s to 2001, then increasing in 2005. Proposed reasons for the drop from 1990 to 2003 was the increased use of selective serotonin reuptake inhibitors (SSRIs) to combat depression. A United

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States government warning was issued in 2003 about the potential worsening of suicidal ideations of those taking antidepressants, leading to a drop in SSRI prescriptions by primary care clinicians, possibly leading to an increase in suicide rates.<sup>1</sup>

Reports from the Centers for Disease Control and Prevention (CDC, Atlanta, Georgia, USA) noted that approximately 20 to 25% of American high school students (ages 13 to 18) seriously consider suicide, 15% have an overt suicide plan, 8 to 10% have attempted suicide, and only 3% actually received medical care for the attempt.<sup>6-8</sup> Suicide represents 12% of deaths each year in the American 15 to 19 year age cohort (**Table 1**). It is the third leading cause of mortality in 15 to 19 year old youth and the fifth in the 10 to 14 year old group.

**Table 1 Causes of death in 15-24 year olds in 2000**<sup>1,8,15</sup>

Unintentional Injuries	14,113
Homicide	4,939
Suicide	3,994
Malignant Neoplasms	1,713
Cardiac Disorders	1,031
All Causes	31,307

A review of published data reveals that in 2002, 31,655 15 to 24 year olds died in the United States from various causes that included approximately 2000 deaths from suicide in the 15 to 19 year age cohort and approximately 2000 from suicide in the 20 to 24 year age cohort.<sup>9</sup> The overall prevalence of suicide was 11 per 100,000 in the American adolescent population in 2002, nearly 15 in males and 3 in females.<sup>8</sup> Careful review of this data notes that more American adolescents and youth die from suicide each year than from the combined death causes of cancer, HIV/AIDS, chronic lung disease, pneumonia, influenza, birth defects, strokes, birth defects, and heart disease.<sup>1</sup>

It is difficult to estimate the ratio of suicide attempts to overt suicide in youth because the methods of attempted suicide vary from country to country and even within different regions in the same country. There is no national suicide registry in the U.S. and no registry in the world. One key study noted 6,200 suicide attempts resulting in 13 deaths in American adolescent males with a ratio of 1:470; in females, there were 3 deaths in 11,200 suicide attempts resulting in a ratio of 1:3,700.<sup>11</sup> In the U.S., there is a 3 to 1 ratio of suicide attempts to death in females to males while three to five times more males complete suicide than females in 15 to 19 year olds.<sup>12,13</sup> Deaths from suicide attempts are higher in females in other countries, such as India or China, because of more lethal means of suicide attempts, such as jumping into deep wells.<sup>14</sup>

### *Methods of Suicide in the United States*

Common suicide methods for adolescent males include firearms (guns), hanging, and a motor vehicle accident, while adolescent females typically use a drug overdose or self-cutting.<sup>13,15</sup> However, comparing the mid-90s to current times, adolescent females now tend to use more deadly methods, such as firearms.<sup>15</sup> Methods of suicide for adolescents ages 10 to 19 years of age are noted in **Table 2**. Hanging is more common than firearms in 10 to 14 year old adolescents and data notes a reduction in gun suicides of 0.9 in 1992 to 0.4/100,000 from 1992 to 2001; during this same time, there was an increase in suicide by hanging from 0.5 to 0.8.<sup>6,16</sup> Data on 15 to 19 year olds noted a decrease in suicide by guns from 7.3 in 1992 to 4.1 in 2001 while hanging suicide increased from 1.9 to 2.7.

**Table 2 Methods of suicide in 10-19 year olds**<sup>1,27</sup>

Firearms	49%
Suffocation (mostly hanging)	38%
Poisoning	7%
Miscellaneous*	6%

\*Running into traffic, motor vehicle accidents, burning, others

### *Adolescent Suicide in Europe*

In the United Kingdom, suicide is one of the leading causes of death and in France, it is the second cause of mortality, among 15 to 24 year-olds.<sup>17,18</sup> Greece has one of the lowest suicide rates in Europe. Protective country sociological characteristics that contribute to low suicide rates in Greece are associated with low isolation, low alienation, and increased cohesion reflective in families, tight family relationships, fairly short distances between communities, a long country history, and a stable national identity.<sup>19</sup>

### *Global Statistics*

Approximately 2 million human beings die annually because of suicide or homicide and in 2002, it was estimated that nearly 900,000 suicides occurred in the world.<sup>20-22</sup> Data from the World Health Organization (WHO) suggests that 90,000 or more adolescents (10-19 years of age) are victims of suicide annually out of over 4 million suicide attempts.<sup>14,23</sup> Suicide is among the top three causes of death in adolescents around the world and rates have increased the fastest in adolescents than in other age cohorts.<sup>24,25</sup> If one looks at both the adolescent and young adult cohorts (to age 24 years), then WHO suggests that up to 200,000 annual suicides occur in this group.<sup>9,26-30</sup>

In developed or industrialized countries, males kill

themselves via suicide at a rate that is 4 times that of females. Though suicide was more common in adolescent males of European heritage in New Zealand, Australia, and the United States, this ratio has changed. Suicide is now at least the same and sometimes more common, in those of minority or indigenous status in the United States (African-American and Native American), New Zealand (Pacific Islanders), and Australia (Torres Strait Islanders and Aboriginal peoples).<sup>1</sup>

A wide range of adolescent suicide rates are reported in different countries, ranging from under 6.5 per 100,000 in Middle East countries and Latin America to over 30 in the Russian Federation, Slovenia, New Zealand, Lithuania, Finland, and Latvia.<sup>9</sup> **Table 3** presents various rates as reported to WHO. Underreporting of suicide rates occurs in some countries because they may be categorized as accidents or not listed at all. The willingness of countries to accept and deal with self-murder of their adolescents and young adults varies and is dependent on numerous local ethnic, religious, and socioeconomic influences.<sup>14,26,27</sup>

**Table 3 1996 Global suicide rates (per 100,000) 15 to 24 year olds\***

Country	Males	Females
Greece	3.8	0.8
Portugal	4.3	2.0
Italy	5.7	1.6
Spain	7.1	2.2
Netherlands	9.1	3.8
Sweden	10.0	6.7
<b>Japan</b>	<b>10.1</b>	<b>4.4</b>
Israel	11.7	2.5
United Kingdom	12.2	2.3
Germany	12.7	3.4
Denmark	13.4	2.3
France	14.0	4.3
Bulgaria	15.4	5.6
Czech Republic	16.4	4.3
Poland	16.6	2.5
Ukraine	17.2	5.3
Hungary	19.1	5.5
Austria	21.1	6.5
Ireland	21.5	2.0
United States	21.9	3.8
Belarus	24.2	5.2
Canada	24.7	6.0
Switzerland	25.0	4.8
Australia	27.3	5.6
Norway	28.2	5.2
Estonia	29.7	10.6
Finland	33.0	3.2
Latvia	35.0	9.3
Slovenia	37.0	8.4
New Zealand	39.9	6.2
Russian Federation	41.7	7.9
Lithuania	44.9	6.7

\* World Health Organization: <http://www.unicef.org/pon96/insuicid.htm>

## Repeat Suicide

In a survey of over 13,000 adolescents in high school (ages 13 to 18) by the Centers for Disease Control and Prevention (CDC), it was noted that one suicide attempt lead to a 15 times increase in another attempt; 30% had 2 or 3 suicide attempts a year and 17% had 4 or more attempts in a year.<sup>15</sup> In another survey, 5% of adolescents noted more than one suicide attempt in a year and further probing revealed that factors inducing repeat suicide attempts include depression (13 fold rise), sexual assault (7 fold rise), violent behavior in males, weight gain in females, and substance abuse disorder in both sexes.<sup>31</sup>

The practitioner should inquire about all these risk factors in order to establish if there is a continuing risk of suicide. High suicidal intent is suggested by the following: planning in advance, precautions to avoid discovery, dangerous methods and a “final act” such as a suicide note. The adolescent should always be asked whether they still intend to die. It is important that the suicide risk is reassessed regularly, as it is not static, but changes over time.<sup>32</sup>

## Pathophysiology

Depression is a major factor in the etiology of suicide, and other precipitants to suicide are listed in **Tables 4 and 5**.<sup>13,14,33–38</sup> As many as 33% of adolescent disability is due to mental disorders, of which depression is a major component.<sup>39</sup> Major or severe depression is noted in 9 of 1,000 preschool children, 20 of every 1,000 school age children (ages 6 to 11), and almost 50 of 1,000 in adolescents (ages 12 to 18); the latter rate is similar to severe depression in adults.<sup>7,40,41</sup> In adolescents and adults, there is a 1 to 2 male to female ratio with regard to depression. Depression can have many adverse results, including academic dysfunction, increased arguments with family members, and suicide (**Table 6**). The status of adolescent mental health around the world has worsened over the past generation with increase in severe depression, school drop-out, refusal to leave home (*hikikomori*), substance abuse, violence, and suicide.<sup>42–44</sup>

**Table 4 Biological factors of suicide**

Low cerebrospinal fluid levels of 5-hydroxy-indolacetic acid (5-HIAA)
Low platelet imipramine binding sites
Non-suppressed plasma cortisol after the Dexamethasone Challenge Test
Abnormal hypothalamic-pituitary-adrenal (HPA) axis
Abnormal sleep EEG with decreased REM (rapid eye movement)

**Table 5 Risk factors for suicide and suicide attempts**

Depression
Bullying in School
Homosexuality in Males
History of completed suicide in the family
History of violence in males (as conduct disorder with aggression)
Psychosis with suicidality
Severe agitation or irritability
History of a previous attempt (s)
Severe personality disorder (borderline or antisocial)
Academic dysfunction or failure
History of sexual or physical abuse
Substance abuse disorder
Easy access to lethal methods (as firearms, knives or hanging)
Ethical or moral acceptance of suicide as an option for overwhelming distress
Severe chaos in one's local community or country
Failure to comply with mental health management recommendations
Living on the streets
Chronic illness
Exposure to war situations

**Table 6 Possible consequences of depression <sup>1</sup>**

Suicide
Social isolation ( <i>hikikomori</i> )
Academic failure
Loss of girl or boyfriend
Substance abuse experimentation and disorders
Abuse (sexual and/or physical)
Sexual promiscuity (with high risk for sexually transmitted diseases and unwanted pregnancy)
Others

Research reveals that as many as half of depressed adolescents eventually attempt suicide and up to 10% of teenagers with major depressive disorder are dead from suicide within 15 years of their psychiatric diagnosis.<sup>45</sup> One study looked at 2,012 adolescent males admitted to a hospital because of a suicide attempt, revealing that 1.3% were dead from suicide at an average of 3.6 years follow-up.<sup>46</sup>

One review considered several studies that involved 1,265 depressed adolescents in which 60% revealed a positive history for suicidal ideation and an attempted suicide occurred in 30%; in a review of 466 adolescents who were treated for depression, 24% were identified who had attempted suicide.<sup>47</sup> In another study of 112 teenage suicides, a history of one or more suicide attempt was identified in 50% of the females and 28% of the males.<sup>48</sup> Various psychiatric diagnoses were identified in a study of 121 youth hospitalized after a suicide attempt, as listed in **Table 7**.<sup>47</sup>

**Table 7 Diagnoses in 31 adolescent males, 90 females with suicide attempt <sup>47</sup>**

Disorder	Males (%)	Females (%)
Major depression/dysthymia	71	64.5
Disruptive behavior disorder	32.3	12.2
Drug abuse/dependence	29	13.3
Alcohol abuse/dependence	19.4	14.4
Anxiety disorder	9.7	18.9
Adjustment disorder	6.5	10
Eating disorder	0	3.3
Some type of psychiatric disorder	87.1	77.8

One method of seeking causes for adolescent suicide is to obtain a careful review of issues related to a specific suicide; this review is identified as a Psychological Autopsy. In this method, various people in the deceased youth's life are thoroughly reviewed in an attempt to uncover the reason (s) that lead to the individual's completed suicide. One well-known study, the New York Psychological Autopsy Study, analyzed 173 teen suicides revealing that a previous attempt was the most critical factor in males; other important precipitants in males were a history of severe depression and substance use disorder.<sup>49,50</sup> Major precipitants in females who completed suicide include severe depression and drug abuse.<sup>49,50</sup> Though a positive family history for depression is a non-specific finding, family history of completed suicide is a major factor, in which this leads to a 5 times higher suicide risk in males and 3 times in females.<sup>49,50</sup>

**Suicide in Absence of Psychiatric Co-Morbidity**

Suicide ideation, attempt, and completions may occur in the absence of underlying overt psychiatric disorders. A state of hopelessness (which includes difficulty in believing that there are non-suicidal alternatives to life problems) has been reported to be more predictive of suicide than is depression. Everyone has a pain threshold beyond which they cannot function. Just before a suicidal act, the individual's adaptive threshold is breached and they may resolve their pain by committing suicide.<sup>13</sup>

When youth find themselves in the midst of a major life crisis without any way out that is known to them, suicide may become an option as a solution to their overwhelming problems. Adolescents are undergoing intense central nervous system changes and may have the understanding that their problems are manageable. They may not have the experience or encouragement from others that their issues can be resolved one way or another. For example, their life may become overwhelmed by school failures (complicated by parental pressure to succeed), bullying, concerns with thoughts or feelings of homosexuality, personality conflicts, severe traits of narcissism, easy access to firearms, and others.<sup>51</sup> Some youth,

when overwhelmed by their society, may withdraw from society by staying in their homes (i.e., *hikimori*) while others runaway from home or commit suicide.

Research in the United States notes that being bisexual or homosexual in a climate that is extremely hostile to such sexual orientations leads to a high suicide risk; for example, as many as 42% of homosexual males attempt suicide in the United States, especially between 15 and 17 years of age.<sup>26,52</sup> Chronic illness can increase risks for suicide attempts by precipitating depression or inducing central nervous system injury because of complications of infection, chemotherapy, epilepsy, or trauma. In the U.S., as many as 50% of deaths in teenagers from suicide and motor vehicle accidents are complicated by use of alcohol or other drugs.<sup>53–55</sup>

There are many extremely stressful situations that confront the youth of the world that may lead to suicide attempts and completions. For example, there are 3 million annual cases of abuse that are reported in the United States, with many more that go unreported; approximately 15% are sexual abuse, 26% are physical abuse, 53% are neglect, and 5% are categorized as emotional abuse.<sup>56–58</sup> There are over 800,000 youth in some type of incarceration in the United States, whether in detention centers, jails, or other facilities.<sup>59–61</sup>

As many as 140 million adolescents are affected by war in the world, whether as refugees, civilians, or soldiers.<sup>14</sup> Many children and youth are sexually abused by soldiers in these war situations. The World Health Organization estimates that as many as 170 million children and adolescents live on the street away from their families, including 40 million in Latin America, 30 million in Asia, 10 million in Africa, and several hundred thousand in the United States.<sup>9,62–68</sup> Untold numbers of children and adolescents are sold into prostitution in the world. For example, approximately 40% of prostitutes in India are under 18 years of age while the average age of female beginning prostitution in Moscow (Russian Federation) is 16 years of age. The mental and physical effects on these children and youth is staggering and suicide is a major consequence.<sup>68–71</sup>

### Risk of Suicide and Use of Medications

The Food and Drug Administration (FDA) in the U.S. released a statement on March 22, 2004 that children, adolescents, and adults who are placed on anti-depressant medication may develop an increased risk for “suicidality”—suicide thinking or ideation; the warning was that patients placed on these medications should be closely observed for increased depression and suicidal thinking. It was stimulated by one pharmaceutical company (GlaxoSmithKline) giving the FDA evidence of their research on 1,385 7 to 18 year olds who were taking the SSRI paroxetine; there was double the number

who developed crying, mood changes, and suicidality — 3.4% vs 1.2% for the placebo group.<sup>72</sup> The warning has included all antidepressants, including selective serotonin reuptake inhibitors and now other medications, such as anticonvulsants, the anti-acne medication Accutane, and others. Though the use of antidepressants have rarely, if ever, led to a actual suicide, the effect of such an FDA warning has been a reduction in SSRI prescriptions in the United States and an increase in suicide as well. The reduction in suicide from 1990 to 2003 has been linked to an increase in SSRI prescription during that time.<sup>73</sup>

A recent meta-analysis<sup>74</sup> concluded that antidepressants may cause a small short-term risk of suicidal events in adolescents with major depression. However, according to the results of the Treatment for Adolescents with Depression Study (TADS),<sup>75</sup> the benefits of the SSRI fluoxetine in adolescent moderate to severe depression still outweigh the risks, which could be minimized by additional provision of cognitive behavior therapy.

### Prevention of Suicide

Primary prevention is the ideal method of protection and involves preventing members of a population from becoming suicidal. It is important to reduce suicide risk factors, such as depression, substance abuse, violence in families, availability of firearms, social isolation, and poverty; also, clinicians can promote protective factors such as physical health, proper exercise, proper diet, and adequate sleep.<sup>13</sup>

The main step in dealing with suicide in adolescents is to prevent them from reaching a point in their life where suicide seems to be the only option to overwhelming problems. The key to this prevention is regular evaluations of the adolescent where the youth can be asked about various issues in their lives, including depression, suicidal thoughts, conflicts at school (such as bullying), problems at home, girlfriend or boyfriend conflicts, and other issues.<sup>76–78</sup>

Interventions should be directed toward increasing coping skills in adolescents, increasing community and parent awareness of adolescent suicide, and restricting access to suicidal means. Because of barriers to adolescents receiving specialty mental health services, primary care settings have become the *de facto* mental health clinics for this population. Guidelines for adolescent depression management in primary care have been developed by researchers from the United States, Canada, and the United Kingdom and work has already begun to implement them in pediatric practices.<sup>79</sup> It is recommended that residents in pediatric training be provided with education in interview skills to learn how to communicate with teenagers.

Secondary prevention refers to the early detection and

treatment of suicidal individuals. Most suicidal youth are relieved to be able to communicate with a professional about their suicidality and learn about help that will prevent them from self-murder. Providing help to the youth and helping them learn that there are options for them besides suicide is a major step in lowering suicide rates in any country. The role of medical practitioners is underlined by the finding that half of young people under 25 years of age who committed suicide had contacted a general practitioner in the 3 months before death.<sup>80</sup>

For suicidal youth, the provision of open access to professional help has produced positive, but not statistically significant results.<sup>81</sup> Though there are indications for hospitalizing a suicidal youth (**Table 8**), hospitalization per se does not actually prevent overt suicide unless the underlying problems are resolved.<sup>49,50</sup> Suicidality itself is not a diagnosis but is reflective of underlying conflicts that must be corrected to remove the youth's suicidal ideation and eventual suicidal attempt. The clinician should never be concerned that asking youth about possible suicidal thoughts precipitates suicide, but is a preventive step in this regard.<sup>82</sup>

**Table 8 Reasons to hospitalize a youth with suicidal ideation**

Psychosis
Severe agitation
Manic state
Intoxicated state (as with a drug overdose)
Patient is a male (10-fold increase in risk of suicide)
Family history for completed suicide (2-fold increase)
Failure of intense outpatient management
History of previous suicide attempts (15-fold increase)
History of severe aggression
Severe substance abuse disorder
Limited care or supervision in the home
Method of providing the family with education about helping the adolescent
Miscellaneous Medical-legal issues

Also, medication (as antidepressants) does not prevent acute suicide but may be useful over time in managing some cases of depression in youth. Youth who are psychotic and suicidal may benefit from the use of antipsychotic medication to improve the psychosis. Adolescent's suicidal behavior can also be influenced by the wider social context, i.e., societal taboos, role models in the community, and media coverage.<sup>32</sup> Media portrayal of deliberate self-harm has been associated with an increased risk of hospital attendance following deliberate self-poisoning.<sup>83</sup> Careful follow-up of any suicidal youth is important and research suggests that the majority of such youth may not receive adequate follow-up management that then increases the risk of eventual suicide.<sup>1,50,84-88</sup>

## Summary

Suicides are among the three leading causes of death for adolescents in the world and rates are rising faster in teens than in other age groups; at least 90,000 adolescents commit suicide each year in the world in the context of 4 million suicide attempts each year. Suicide rates globally are underreported because they may be classified as accidents or not classified at all. The ratio of suicide attempts to completed suicides is 3 to 1 (female to male) while three times as many males vs. females complete the suicide. Chronic illness, gender orientation concerns, and abuse are other risk factors for suicide. Clinicians caring for adolescents must be aware of the risk of teen death from suicide and must be prepared to screen all their patients for this potentially tragic but preventable phenomenon.

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