

# Suicidal Behaviour in Children and Adolescents. Part 1: Etiology and Risk Factors

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## **ABSTRACT**

**Objective:** This is Part 1 of a 2-part review of suicidal behaviour in children and adolescents. Part 1 explores the phenomenology and epidemiology of suicide in children and adolescents.

**Method:** Systematic review of the literature since 1966. Behaviours included within this spectrum are discussed and differentiated. The literature regarding the impact of demographic, social, and psychological risk factors is summarized.

**Results and Conclusions:** Suicide rates in youth are declining, but the reasons are speculative. Suicidal behaviour comprises a spectrum with differing frequencies and risk factors. While some risk factors are fixed, such as age and family history, others, such as psychiatric illness and stressors, may be amenable to intervention.

## **RÉSUMÉ**

**Objectif :** Il s'agit de la première partie d'une étude en 2 parties du comportement suicidaire chez les enfants et les adolescents. La première partie explore la phénoménologie et l'épidémiologie du suicide chez les enfants et les adolescents.

**Méthode :** Une revue systématique de la documentation depuis 1966. Les comportements qui font partie de ce spectre sont examinés et différenciés. La documentation concernant l'effet des facteurs de risque démographiques, sociaux et psychologiques est résumée.

**Résultats et Conclusions :** Les taux de suicide chez les jeunes sont en baisse, mais les raisons relèvent de la spéculation.

Le comportement suicidaire comprend un spectre à différentes fréquences et différents facteurs de risque. Même si certains facteurs de risque sont fixes, comme l'âge et les antécédents familiaux, d'autres comme la maladie psychiatrique et les stressors peuvent faire l'objet d'une intervention.

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**Key Words:** *child, adolescent, suicide, etiology, risk factors*

This paper is Part 1 of a 2-part review of the literature on suicide in children and adolescents, covering epidemiology and risk factors. Established principles of conducting a systematic review were followed. The databases searched included the Cochrane Central Register of Controlled Trials (CCTR) and Cochrane Database of Systematic Reviews (with Ovid as the search engine and the truncated key words "suic\$ AND treat\$ OR interven\$"). The time period extended from 1966, prior to which the CCTR recorded no controlled trials for suic\$. We searched MEDLINE, EMBASE, and personal databases of colleagues (SUICDATA, YouthSuicRandom2004, and Youth2) of systematically accumulated articles (more than 56 000), mainly from MEDLINE and Web of Science weekly updates, using "suic\* or attempt\* suic\* or self harm or self-harm" as keywords. The resulting yields were assembled in a database labelled SUICDATAACPG, from which a subset was selected for relevance via the key words "adolescen\*," "youth," and "child\*." Subsequently published relevant articles were added to the core database as they appeared.

To establish the context for discussion, Part 1 summarizes known developmental differences in suicidality between children or youth and adults and reviews the epidemiology. The literature on risk and protective factors is also reviewed.

### Developmental Differences Between Adults and Youth

Suicide can occur at any age and is a significant public health concern. Developmental factors modify the clinical presentation of suicidal behaviour in children and youth. Before puberty, the prevalence of suicidal behaviour is rare; it increases steeply with age, peaking between the ages of 19 and 23 years.<sup>1</sup> Suicide is unusual in young children, in part owing to their cognitive immaturity, which prevents them from planning and executing a lethal suicide attempt<sup>2</sup>: the younger the child, the less complex and more immediately available the method. Precipitants of suicidal behaviour vary with age, with discordant family relationships being a common precipitant for prepubertal children and peer conflicts for adolescents. Having certain psychiatric disorders (for example, major depressive disorder) is a risk factor for suicidal behaviour at any age, but the frequency of onset of some of these disorders increases with age, becoming more common in older adolescents<sup>1</sup> and adulthood. While suicidal behaviour may resolve in some, in others, "deliberate self-poisoning in adolescence seems to be part of a complex and continuing network of problems, marked by high rates of psychopathology, comorbidity, with other disorders and high psychosocial adversity."<sup>3</sup>

The roles of caregivers and schools are more salient in the assessment, management, and prevention of suicidal

behaviour in children and youth, compared with adults as a whole, where educational environments are less important, except in college and university students.

### Epidemiology of Suicidality in Children and Adolescents

Suicidal behaviour includes the completed act, suicide attempts, and suicidal statements or thoughts. Data on completed suicides may be more straightforward; diagnostic challenges make estimates of less clearly defined behaviour more problematic. In Canada, the suicide rate for children under 14 years of age in 1997 was 0.9 per 100 000 and for adolescents aged 15 to 19 years 12.9 per 100 000,<sup>4</sup> indicating a precipitous escalation during the middle teens. Suicide is the second leading cause of death in both sexes for youth aged 10 to 19 years in Canada,<sup>5</sup> and in the United States, it is the third leading cause of death among children aged 10 to 14 years,<sup>6</sup> after all accidents and after accidents and homicides, respectively.<sup>7</sup>

In Canada, the methods of suicide used by youth 10 to 19 years old were firearms, drugs, carbon monoxide poisoning, and hanging.<sup>5</sup> The most common method used by persons of all ages to commit suicide in the United States is with a firearm, whereas ingestion of medication is the most common method in suicide attempts.<sup>1</sup> The suicide rates for all ages attributed to firearms were lower in Canada than in the United States. In Canada, the rates of suicide from hanging in youth 10 to 19 years old increased from 2.2 per 100 000 in 1990 to 3.7 per 100 000 in 1996.<sup>5</sup> Less common attempt methods include jumping from a height, stabbing, and drowning. There does not appear to be a specific link between method choice and psychopathology. Method choice appears to be determined by opportunity, but local customs seem to play a role. Choice of method varies between urban and suburban areas, with jumping from a height more prevalent in urban areas and asphyxiation by carbon monoxide exhaust most common in suburban areas, where adolescents have access to cars and garages.<sup>1</sup>

In Western countries suicide rates among male populations are regularly multiples of those among female populations,<sup>7</sup> but rates among young women are rising.<sup>4</sup> In Canada, the 1980 rate for girls 15 to 19 years of age was almost the same as the 1960 rate for boys of the same age group.<sup>7</sup>

Between 1981 and 1997, the suicide rate for children under 14 years old in Canada increased only slightly, from 0.7 to 0.9 per 100 000.<sup>4</sup> Between 1980 and 1994, the suicide rate for those 10 to 14 years old increased by 120% in the United States.<sup>8</sup> In Canada, between 1991 and 1997, suicide rates among 15- to 19-year-old youth decreased overall, from 13.8 to 12.9 per 100 000, but this relatively slight decrease masks the differences between the sexes; the rate in boys decreased whereas that in girls increased slightly.<sup>4</sup> In the mid-1990s in the United States, the 15- to 19-year-old white male suicide rate started to

decline, and after 1995, both adolescent white and African-American male and female rates were declining.<sup>9</sup>

Several reasons have been postulated for the recent decline in the suicide rates among youth, including lower substance and alcohol use rates,<sup>10</sup> decreased availability of firearms,<sup>11</sup> and increased prescribing of antidepressants.<sup>12</sup> With respect to decreased substance abuse, no decline in alcohol or cocaine use was documented in the United States during this time, so this putative reason for the decline is considered unlikely.<sup>10,13-16</sup> An examination of the proportion of suicides committed with firearms over a long period of time (1926 to 1996) has shown that access to firearms is only slightly related to overall changes in the rate of suicide.<sup>17</sup>

The third postulated reason for the decline has been the increased use of antidepressants in adolescents.<sup>9,12</sup> There is reasonable evidence that rates of depression increased in cohorts born after World War II and that the age of onset was earlier, especially in the male population.<sup>18-20</sup> The increase in youth suicide noted from the 1960s to the mid-1990s may be explained by increasing rates of depression, especially in male youth.<sup>21</sup> The youth suicide rate in 15 countries has declined by an average of 33% over the past 15 years, over which time period there have been increases in prescribing selective serotonin reuptake inhibitor (SSRIs) antidepressants.<sup>22</sup> While tricyclic antidepressants were available prior to this time and were used in youth for several indications, including depression, a Cochrane database review by Hazell failed to show efficacy of these agents in depression in prepubertal youths and only marginal effects in adolescents under age 18 years.<sup>23</sup> In New Zealand, the youth suicide rate is slowly declining, and the decline is even more dramatic in Canterbury, the area with the most prominent increase in the prescription of SSRIs.<sup>21</sup> In the United States between 1987 and 1996, the annual rate of antidepressant use in those aged 6 to 19 years increased from about 0.3% to 1.0%.<sup>24</sup> Supporting evidence also comes from a natural experiment in Japan, where the youth suicide rate remained high until 1998, when it started to decline. The year before, the Japanese government had given approval for the manufacture and importation of SSRIs.<sup>22</sup> Another indication that antidepressant treatment may be a factor in the recent decline is the finding that the proportion of suicide victims in Sweden who received antidepressant treatment is lower than in the rest of the depressed population.<sup>25</sup>

Ludwig analyzed the relation between the prescription of SSRIs and the rate of suicide across countries and found that an increase of one pill per capita was associated with a 2.5% decrease in the rate of suicide, with the relation stronger in adults than in children.<sup>26</sup> Gibbons examined the relation between antidepressant use and suicide in children and younger adolescents aged 5 to 14 years.<sup>27</sup> They found that, when they controlled for other risk factors, there was an inverse

relation between the prescription of SSRIs and suicide. While not demonstrating an inverse relation, Jick and colleagues, examining data from the general practice database in the United Kingdom, failed to find a positive relation between SSRI prescription and suicide rates.<sup>28</sup> Despite these encouraging trends, there has been increased concern that SSRIs and other antidepressants can paradoxically increase suicidal ideation in children and adolescents with depression. In 2003, the Expert Working Group of the Committee on Safety of Medicines in the United Kingdom warned doctors against prescribing SSRIs, except fluoxetine, for depressed youth under age 18 years<sup>29</sup>; the US Food and Drug Administration (FDA), after reviewing 24 trials involving more than 4400 patients, showed that there was a 2% increased risk of suicidality during the first few months of treatment and, as a result, issued a black box warning indicating that antidepressants may increase the risk of suicidal thinking and behaviour in children and adolescents with major depressive disorder.<sup>30</sup> Health Canada advises that patients under age 18 years who are currently being treated with an SSRI or other novel antidepressant should consult their treating physician to confirm that the benefits of the drug still outweigh the potential risks, in light of the recent safety concerns.<sup>31</sup>

Other authors independently sounded a note of caution.<sup>32,33</sup> Whittington and colleagues reviewed both published and unpublished data and found that risks outweighed benefits in all SSRIs, except for fluoxetine, in children and adolescents.<sup>34-36</sup> Contradictory findings continue to accumulate regarding paroxetine<sup>37-40</sup> and other antidepressants (citalopram,<sup>41</sup> sertraline,<sup>42</sup> fluoxetine,<sup>43</sup> escitalopram,<sup>44</sup> and venlafaxine<sup>45</sup>; metaanalyses<sup>46-48</sup> and other papers<sup>49-53</sup>).

The impact of this debate spread beyond the specifics of the antidepressant issue. This debate encouraged a more critical look at data, including those that remain unpublished. An appreciation emerged regarding the difficulties of interpreting data retrospectively.<sup>54</sup> Further, emergent suicidal behaviour can occur during any treatment of depression. In a study by Bridge and colleagues,<sup>55</sup> 88 medication-free patients who denied suicidal thoughts at intake were followed for 12 to 16 weeks while they were treated with psychotherapy alone; 12.5% of them reported emergent suicidal behaviours. The endorsement of suicidal thoughts varies with circumstances. In a study on the use of a general health questionnaire administered to 444 patients age 12 to 17 years by their primary care provider, a high percentage of respondents endorsed a question about having suicidal thoughts. Owing to ethical considerations, the authors changed the consent midway through the study to inform subjects that they would be asked to disclose suicidal ideation. Endorsement of the item fell from 8% to 1%.<sup>56</sup> All practitioners, as well as members of the public, were

sensitized to the need to inquire about suicidal thoughts and behaviours.

While data continue to accumulate, the present consensus appears to support both the possibility of the existence of an increased risk of emergent suicidal thoughts or behaviours with antidepressant use, as well as acknowledging the sobering fact that depression is common, can be associated with significant morbidity, including suicide, and is treatable with these medications.

### Behaviours Comprising the Spectrum of Suicidality

As the FDA debated the issue of risk, it became apparent that clarification was required in defining what constituted suicidal behaviour. To deal with this issue, the Columbia project, a committee to define this issue in behavioural terms, was created.

Suicidal thoughts are relatively common in the general population; 11.6% of general emergency department patients of all ages who were surveyed endorsed suicidal thoughts, and 2% had plans.<sup>57</sup> Similarly, they are common in children and adolescents of both sexes.<sup>1</sup> About 12% of children 6 to 12 years of age and 53% of adolescents 13 to 19 years of age have suicidal thoughts in the United States.<sup>58</sup> A community prevalence survey in Canada showed that 5% to 10% of male and 10% to 20% of female youth 12 to 16 years of age reported suicidal behaviour (ideation and attempts) over a 6-month period.<sup>59</sup> The Youth Risk Behaviour Survey (YRBS) found that 19% of high school students considered attempting suicide, about 15% had made a plan to attempt suicide, and about 9% reported a suicide attempt.<sup>16</sup> Among randomly selected US undergraduate and graduate university students who answered an Internet-based survey, 17% had a history of self-harm.<sup>60</sup>

Suicidal behaviour (that is, ideation and attempts) in prepubertal children correlated with suicide attempts in adolescence.<sup>61</sup> In children under 15 years old, deliberate self-harm is 4 or 5 times more common in girls than in boys, who rarely self-harm deliberately at this age.<sup>62-64</sup> The act of deliberate self-harm in children and adolescents is frequently impulsive,<sup>65,66</sup> and in many cases, they do not intend to die. Youth frequently explain their actions in terms of wanting to stop unbearable feelings or escape from a painful situation.<sup>67</sup>

Repeat suicide attempts are more frequent in adolescents than in adults and are concentrated closer in time to the first episode.<sup>7</sup> In contrast to other adolescents with suicidal ideas, those who attempt suicide have more severe feelings of hopelessness, isolation, and suicidal ideation and are reluctant to discuss their suicidal thoughts.<sup>1</sup> About 10% of youth repeat a suicide attempt within 1 year,<sup>62,68</sup> and the repetition rate

increases to 20% over 7 years.<sup>68</sup> Less than 1 in 4 suicide attempts are medically treated.<sup>69</sup> It has been estimated that as many as 10% to 14% of adolescents who engage in deliberate self-harm may die by suicide.<sup>70</sup> A review shows the need for evidence-based therapy to prevent recurrence.<sup>71</sup>

Adolescent suicide attempters who are at greater risk for suicide are older (16 to 19 years old) male adolescents and adolescents (of either sex, regardless of age) with a current mental disorder, especially when complicated by comorbid substance abuse, irritability, agitation, or psychosis. Those who have made previous suicide attempts and persist in wanting to die are at higher risk.<sup>1</sup> It has been postulated that previous suicidal experience sensitizes suicide-related thoughts and behaviours, such that these later become more accessible and active.<sup>72</sup> Attempts by unusual methods and medically serious attempts are predictive of further suicide attempt behaviour and seem to be predictive of completed suicide.<sup>73</sup>

**Key Point:** The frequency of suicidal behaviour escalates steeply from childhood through middle to late adolescence and into adulthood, with suicide rates peaking in the 19- to 23-year-old population; rates have decreasing slightly in recent years. Family, school, and peer conflicts play a major role during childhood and early teens, and the effect of major mental illness comes on later. Although the recent fall in suicide rates in adolescents is attributed by many to SSRIs and the other new antidepressants, there has been concern over the possible provocation of suicidal behaviour by these drugs in those under 18 years of age. Suicidality in young people encompasses a full range of behaviours, including ideation, deliberate self-harm, attempts, and completed suicide.

### Risk Factors in Children and Adults

#### Age

Both completed suicide<sup>74</sup> and attempted suicide<sup>75,76</sup> before puberty are rare and increase during adolescence.<sup>75,76</sup> Rates of completed suicide increase markedly in late adolescence and continue to rise until the early 20s,<sup>6</sup> perhaps in part because of the increases in comorbid mood and substance use disorders.<sup>77,78</sup> In contradistinction, suicide attempts peak in the 16- to 18-year-old population, after which there is a marked decline in frequency,<sup>79</sup> particularly for young women.<sup>80</sup>

#### Sex

There are sex differences in completed suicide rates, but the same pattern of sex differences does not exist in all countries.<sup>74</sup> In Canada, the ratio of male-to-female completed suicide in children and adolescents is about 4 to 1, similar across

all age groups.<sup>4</sup> In comparison with Canada, completed suicide is more common in the male population in the United States, western Europe, Australia, and New Zealand, but suicide rates are equal between the sexes in some countries in Asia (for example, Singapore) and more common in the female population in China and India.<sup>9,81</sup> Beautrais<sup>82</sup> compared youths under 25 years of age who completed suicide with those who made serious suicide attempts and with nonsuicidal community comparison subjects. She found that sex differences between completed suicides and suicide attempts were explained by sex differences in methods, with 61.3% of all male fatal and nonfatal suicide attempts involving highly lethal methods (for example, firearms), whereas 92.4% of all female fatal and nonfatal serious suicide attempts involved less lethal methods, particularly self-poisoning. The implication is that, if young women were to use more lethal methods, the female suicide rate could approach or even exceed the male rate.<sup>82</sup> In New Zealand, the rate of suicide among female youth more than doubled from 1977 to 1996, with the increase mainly accounted for by the growing use of more lethal methods by women.<sup>83</sup> In China, the higher female suicide rate is most likely explained by the readier access that rural Chinese women have to agricultural pesticides, which are used in self-poisoning attempts and have high lethality,<sup>84</sup> whereas over-the-counter analgesics and psychotropic drugs used in Western countries are less available.

With respect to suicide attempts, studies showed that girls were significantly more likely than boys to have seriously considered attempting suicide, made a specific plan, and attempted suicide.<sup>16,69</sup>

### **Ethnicity**

In Canada, the suicide rate of Aboriginal youth is about 5 to 6 times greater than that for non-Aboriginal youth.<sup>85</sup> In the United States, the youth suicide rate is highest among Native Americans, followed by whites and then African Americans, and lowest among those of Asian-Pacific ethnicity.<sup>6,85-88</sup> The higher suicide rate among Native Americans may be related to other factors, including low social integration, access to firearms, and alcohol or drug use.<sup>9,86,89</sup> The lower suicide rate among African Americans has been attributed to greater religiosity and differences in expression of aggression.<sup>9,90,91</sup> However, between 1986 and 1994, there was a marked increase in the suicide rate among male African-American youth that resulted in a decrease in the difference in suicide rates between whites and African Americans.<sup>9</sup> Ethnic differences may reflect contagion in isolated groups rather than cultural differences.<sup>1</sup>

### **Psychiatric Disorders**

In adolescents who completed suicide, more than 90% suffered from an associated psychiatric disorder at the time of

their death, with more than 50% having had a psychiatric disorder for at least 2 years.<sup>1</sup> However, among younger adolescent suicides, lower rates of psychopathology are found, averaging around 60%.<sup>78,92-94</sup>

Depressive disorders occur in 49% to 64% of adolescent suicide victims, making them the most prevalent conditions.<sup>78,95</sup> In female adolescents, the presence of major depression is the most significant risk factor,<sup>1,78,93</sup> followed by a previous suicide attempt.<sup>1</sup> In contrast, a previous suicide attempt is the most important predictor in male adolescents,<sup>1,93,96</sup> followed by depression, substance abuse, and disruptive behaviour.<sup>78,97</sup> Dysthymia is associated with suicide attempts in female, but not in male, adolescents,<sup>69</sup> but the lack of association in boys may be owing to study limitations.<sup>98</sup> Recurrent brief depressive disorder is associated with major depressive disorder, substance abuse, and suicide attempts and is more common in patients under 25 years of age.<sup>99</sup> Adult patients with the anxious subtype of depression are more likely to have suicidal ideation.<sup>100</sup> The association between bipolar disorder and completed suicide is less clear. One study found completers more likely than attempters to be bipolar,<sup>101</sup> and another study also reported high rates of suicide in those with bipolar disorder.<sup>77</sup> Other studies have reported no or few bipolar cases.<sup>91,95,102,103</sup> Comorbid anxiety disorders in bipolar adults were associated with a greater likelihood of suicidal attempts in the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD).<sup>104</sup>

All youth with psychiatric disorders, including mood disorders, are chronically underserved, which may contribute to rates of suicidal behaviour. A Depression and Bipolar Support Alliance consensus statement reviewed evidence documenting a high rate of unmet needs for the treatment of mood disorders in children and adolescents.<sup>105</sup>

Substance abuse is another significant risk factor for completed suicide.<sup>78,95</sup> A high prevalence of comorbidity with mood, anxiety, and substance abuse disorders has been found in adolescent suicide victims.<sup>1,9,77,78</sup> Hawton and colleagues reviewed 8 studies, of which 7 showed a significant association between cigarette smoking and suicidal phenomena,<sup>98</sup> which is important as cigarette smoking is often the gateway to drug use in youth. Rey and colleagues, in a paper reviewing the connection between marijuana use and psychiatric disorders, included evidence of a link between marijuana use and suicidal behaviour.<sup>106</sup> Suicidal statements in youth with alcohol abuse or dependence should be taken seriously.<sup>107</sup>

Early emotional deprivation and other childhood experiences predispose to both depression and behaviour problems, as does a temperamental predisposition to violent or impulsive behaviour. The secondary consequences of the numerous stresses that often occur in the lives of young people with

disruptive disorder may also contribute to the association between disruptive disorder and other comorbid disorders.<sup>1</sup>

Although patients with schizophrenia have rates of suicide much higher than those in the general population, schizophrenia is unusual in youth suicide.<sup>1,77,78</sup> The fact that schizophrenia is rare prepubertally and that its incidence gradually increases with age may contribute to this observation. Attempts to mitigate this risk have included forms of cognitively based therapies within the context of a first episode of psychosis program, showing some reduction in indirect measures of suicidality.<sup>108</sup>

Four studies examining the relation between sleep difficulties and related problems (for example, nightmares) and suicidal behaviour were reviewed, and it was found that sleep difficulties were significantly associated with suicidal behaviour.<sup>98</sup>

With respect to suicide attempts, Kotila and Lonnqvist found that 10% of boys and 5% of girls met criteria for psychiatric disorders.<sup>109</sup> Mood disorders (particularly early-onset major depressive disorder), anxiety disorders, and substance abuse increase the risk in both sexes.<sup>1,69,110-116</sup> However, when comorbid psychiatric problems were adjusted for posttraumatic stress disorder (PTSD) was not associated with an increased risk.<sup>113</sup> An association between suicide attempts in the past year and eating disorders was found for older female adolescents but not for male or younger female adolescents.<sup>69</sup> In a review of 7 studies, there appeared to be a significant association between unhealthy eating behaviour and symptoms or signs of suicidal behaviour.<sup>98</sup> In another study, a multivariate analysis indicated that after controlling for emotional health, eating behaviours or symptoms did not make a significant additional contribution to the variance in suicide attempts.<sup>117</sup> Andrews and Lewinsohn studied 1710 adolescent high school students at baseline and 1 year later. Those who attempted suicide before baseline, compared with nonattempters, were substantially more likely to attempt again. Psychiatric disorders before baseline also predicted a future attempt.<sup>69</sup>

### **Psychological Factors**

Cognitive variables, including the tendency to think in a rigid fashion, to have poorer problem-solving abilities, to be present- rather than future-oriented, and to have a negative or hopeless outlook,<sup>118-125</sup> have been linked with attempted suicide. Beautrais and colleagues found hopelessness, neuroticism, and external locus of control to be significant risk factors for serious suicide attempts.<sup>126</sup> Hopelessness may not predict attempts independent of depression.<sup>9,127-131</sup>

Reports vary with respect to the effect of impulsivity, with most finding impulsivity to be a risk characteristic of adolescent suicide attempts.<sup>132-140</sup> In one study, frequency of

impulsivity was elevated, but it was not deemed a significant risk factor.<sup>126</sup>

With respect to attachment, Lessard and Moretti found that youth with predominantly fearful or preoccupied attachments (that is, preoccupied with their close relationships) were more likely to endorse suicidal ideation than were predominantly secure or "dismissing" youth. Severity of suicidal ideation was positively correlated with ratings of fearfulness. Greater lethality in methods of contemplated suicide was positively correlated with preoccupied tendencies.<sup>138</sup>

### **Abuse**

Physically and sexually abused children have a high incidence of suicidal behaviour.<sup>139-145</sup> Suicidality is common in runaway youth,<sup>1,143,146-148</sup> who often have a history of previous child abuse.<sup>1</sup> Hawton and colleagues reviewed 3 studies that showed an association between physical abuse and suicidal behaviour.<sup>98</sup> Borowsky and colleagues found that experiencing sexual abuse is a stronger predictor of attempting suicide for male than for female youth,<sup>86</sup> which was also found in a study by Choquet and colleagues, where 52% of male rape victims had attempted suicide, compared with 2% of control subjects.<sup>149</sup>

The manner in which child abuse places children and youth at risk for suicidal behaviour is not completely understood. Child abuse is often associated with various types of psychiatric problems, and it is not clear whether the high prevalence of suicidality is a specific consequence of those problems or whether it is more specifically related to a history of abuse.<sup>1</sup> Children who are physically abused may have difficulty developing the social skills necessary for healthy relationships, which leads to social isolation or conflictual relationships that may put them at increased risk for suicidal behaviour.<sup>142</sup>

### **Family Factors**

A family history of suicide is a key risk factor for youth suicide.<sup>86</sup> Children with family members who have completed suicide are at higher risk of attempting suicide than children who do not have this family history,<sup>150</sup> which was found to be true regardless of the degree of attachment the child had with the suicidal family member.<sup>151</sup> Although youth suicide was found to be more likely in the offspring of parents who completed suicide, the risk is higher for those whose mothers completed suicide.<sup>152</sup> McGuffin and colleagues undertook a metaanalysis of twin data and found that first-degree relatives of suicide victims have more than twice the risk found in the general population,<sup>153</sup> underscoring the importance of genetic risk for the development of suicidal behaviour.

Parental psychopathology has been found to be associated with adolescent suicidal behaviour.<sup>101,115,154-156</sup> Reports

conflict with respect to whether a family history of depression and substance abuse increases the risk of completed suicide after controlling for the adolescent's psychopathology.<sup>115,154</sup>

Adolescent suicide attempters are more likely to come from dysfunctional families than are control adolescents.<sup>157</sup> The risk of suicide and suicide attempts among youth is increased with impaired relationships between parent and child,<sup>115,129,135,154,155,158-161</sup> but there are conflicting reports with respect to whether poor parent-child relationships are associated with increased suicidal behaviour after controlling for the youths' psychopathology.<sup>115,135,154,159,160</sup> Controlled studies<sup>115,162</sup> indicate that a low level of communication between parents and children may act as a significant risk factor.<sup>1</sup> Several studies have found that suicide victims were more likely to come from disrupted families of origin,<sup>77,92,94,115,154,163</sup> but in 2 studies, when parental psychopathology was controlled for, the association between nonintact families and suicide decreased.<sup>115,154</sup>

### *Life Stressors*

Stressful life events are often associated with suicidal behaviour (completed or attempted suicide).<sup>1,92,95,115,164-170</sup> These stresses may arise from the underlying psychiatric disorder itself, may be normative outcomes of uncontrollable events,<sup>1</sup> or may result from the maladaptive actions of the young individual. Individuals with a psychiatric disorder may be faced with a larger number of stressful life events than the average adolescent or may perceive the events as more stressful.<sup>1</sup> In about one-third of cases there is no such precipitant,<sup>66</sup> and Hawton suggests that in such cases depressive disorder is more common.<sup>165</sup>

The prevalence of specific stressors among suicide victims varies by age, psychiatric disorder,<sup>9</sup> and sex. Parent-child conflict is a more common precipitant for children under 16 years of age, who cite arguments with parents as the precipitating factor in more than one-half of cases.<sup>157,171</sup> Romantic difficulties are more common in older adolescents,<sup>1,63,66,93,94,165</sup> especially for young women. Gang involvement was a significant risk factor for boys.<sup>86</sup> Interpersonal losses are more common among suicide victims with substance abuse disorders,<sup>95,115,166,167</sup> and legal or disciplinary crises are more common in victims with disruptive disorder or substance abuse disorders.<sup>115,166</sup>

Obesity may be a significant risk factor: of 81 adolescents referred to a hospital-based clinic for evaluation of obesity, 30.3% had Children's Depression Inventory scores greater than 13, and 27% reported suicidal ideation.<sup>172</sup> Among 15- to 19-year-olds, having a chronic disabling illness may be associated with having a greater risk of a major depressive episode (MDE), and thoughts of death during an MDE were more common in those with a chronic medical illness.<sup>173</sup> Extreme

dieters were more likely to have attempted suicide when compared with moderate dieters and nondieters in a large survey sample investigated by Rafiroiu, where extreme dieters constituted 19.3% of the sample.<sup>174</sup>

Socioeconomic disadvantage has been studied as a potential stressor for those who attempt suicide. However, Gould and colleagues and Hawton and colleagues have found little or no evidence for an association between family socioeconomic status and suicidal thoughts and behaviours in adolescents.<sup>9,98</sup> A chart review by Penn and colleagues showed that incarcerated adolescents have higher rates of previous suicide attempts and use more violent methods than do adolescents in the general population; they also report more severe affective symptoms.<sup>175</sup>

School difficulties may act as a precipitant.<sup>1,66,176</sup> A history of being in a special education class is a significant risk factor for girls.<sup>86</sup> School difficulties, dropping out of school, and not going to college appear to be significant risk factors for completed suicide.<sup>115</sup> Attendance and grade point average in students was predictive of suicidal behaviour, delinquency, and substance abuse.<sup>177</sup> Living off campus was found to be associated with increased serious suicidal ideation in one telephone survey of university students.<sup>178</sup>

Bullying has been shown to increase the risk for suicidal ideation.<sup>179</sup> Bullying is associated with several measures of stress, including severe suicidal ideation.<sup>180,181</sup>

The effect of having known someone who has completed suicide is variable. In some studies, adolescents who reported suicidal behaviour, compared with those who did not, were aware of someone who had attempted suicide.<sup>182,183</sup> Borowsky found that the most powerful risk factor for a past suicide attempt among male and female youth was having a friend who attempted or completed suicide.<sup>86</sup> Some of the possible reasons why adolescents who experienced the suicide of someone close are at highest risk for suicidal behaviour include their weaker attraction to life, stronger attraction to death,<sup>150</sup> lesser fear of death,<sup>184</sup> and greater acceptance of suicidal behaviour<sup>185,186</sup>; they also show a markedly increased incidence of new-onset major depression,<sup>187</sup> suicidal ideation, and PTSD following the suicide.<sup>188,189</sup> Three years after an adolescent suicide, friends who spoke to the victim the day before the suicide and felt they had knowledge of the impending suicide and failed to prevent it were most likely to continue to suffer from major depression and PTSD. Prior psychiatric disorder and a family history of psychiatric disorder, particularly mood disorder or previous exposure to suicidal behaviour, increase vulnerability for adolescents exposed to a peer's suicide.<sup>188</sup> If a peer makes an attempt, this may also increase the risk of suicidal behaviour and psychiatric disorder in friends.<sup>190</sup>

In contrast, in a study that interviewed individuals in the social network of adolescent suicide victims there was no increase in suicidal behaviour among friends of the victims compared with matched control subjects. It was postulated that adolescents who were friends of the suicide victim are at a decreased risk of imitation, primarily because they have witnessed the negative emotional effects of suicide on the survivors.<sup>187</sup>

Exposure to the news of a suicide via the media (for example, a newspaper) may precipitate a suicide.<sup>191-195</sup> Suicide clusters, which are relatively uncommon, occur in vulnerable youth who were aware of another's suicide but who did not know the victim personally.<sup>194,196,197</sup>

### **Sexuality**

The conclusions of studies are mixed about whether homosexual and bisexual youth are at increased risk for suicidal behaviour. Several investigations have found homo- and bisexual youth at increased risk for suicidal behaviour.<sup>117,198-205</sup> Borowsky and colleagues found that homosexual orientation in both sexes and bisexual orientation in female youth were associated with suicide attempts.<sup>117</sup> Hawton and colleagues, however, indicated that multivariate analysis shows that sexual orientation is not directly associated with attempted suicide after controlling for suicidal behaviour in family and friends, alcohol and drug use, physical and sexual abuse, and communication with family and friends.<sup>98</sup>

### **Firearms**

In the United States, suicide rates in the western states tend to be higher than in the eastern and midwestern states, and the higher rates in the western states appear to be largely a result of higher rates of suicide by firearms.<sup>8</sup> Case-control studies have demonstrated an association between firearms in the home and completed suicide.<sup>206,207</sup> If a gun is present in the home, it will likely be the method of choice, whereas if there are no firearms in the home, guns are unlikely to be used.<sup>206</sup> Guns stored loaded convey the highest risk.<sup>97,206,208,209</sup> A case-control study demonstrated lower rates of guns being locked and stored unloaded in homes where gun accidents and suicide occurred, ammunition being locked and stored separately in control homes. Conduct disorder and previous mental health treatment were found to be independent risk factors for adolescent firearm suicide.<sup>207</sup>

Laws restricting access to firearms are associated with inconsistent changes in homicide and suicide rates but are associated with significant reduction of unintentional firearm deaths in youth under 15 years of age.<sup>210,211</sup> In many countries where suicide by firearm is rare, the rate of suicide by firearm has increased more than the rate of suicide by other methods,<sup>212,213</sup> and overall suicide rates have increased markedly in those countries.<sup>1</sup> Lester found an inverse relation between rates of

suicide by firearm in the United States and the degree of restrictiveness of state gun control laws.<sup>214</sup> Sloan and colleagues<sup>211</sup> compared suicide rates in Vancouver (which has restrictive handgun control laws) and Seattle and found no differences in the suicide rate overall. However, the 38% higher rate of suicide noted among 15- to 24-year olds in Seattle was accounted for almost entirely by a tenfold excess of firearm suicides among Seattle youth.<sup>215</sup> Loftin and colleagues documented the impact of a restrictive gun control law in Washington, DC, and compared trends in suicide with those in the surrounding suburbs that had not enacted such a law. In the District of Columbia, a 23% decline in suicide was reported, with no change in rates in the surrounding suburban regions.<sup>211</sup> In a separate report, Rich and colleagues found no effect of gun control laws on suicide rates either in Ontario or in San Diego.<sup>102</sup> However, Rich and colleagues analyzed crude suicide rates only. Carrington and Moyer, using age-standardized Ontario suicide data, found a decrease in level and trend over time of firearms and total suicide rates and no indication of substitution of other methods.<sup>216</sup> There is, therefore, good, albeit somewhat controversial, evidence that restricting firearm availability decreases the suicide rate in youth.

### **Biological Factors**

The role of serotonin (5-HT) metabolism and function in the biological causation of suicide has been studied more extensively in adults.<sup>9</sup> Findings have been inconsistent as to whether there is a relation between attempted suicide and polymorphism on intron 7 of the tryptophan hydroxylase gene (the rate-limiting enzyme for the biosynthesis of 5-HT).<sup>217-220</sup> Significant reductions in the number and binding capacity of 5-HT<sub>1A</sub> in the dorsal raphe nucleus have been found.<sup>221</sup> Low concentrations of homovanillic acid (the metabolite of dopamine) in cerebrospinal fluid may be more predictive in adolescents.<sup>222</sup>

### **Protective Factors**

Very little research has addressed protective factors.<sup>9</sup> Positive family relationships have been found to be protective for suicidal behaviour.<sup>86,135,223-225</sup> In a study of Native American youth, discussing their problems with friends or family, emotional health, and family connectedness were protective against suicide attempts. Having a nurse or clinician in school was protective only for girls.<sup>86</sup> Religious observance may be somewhat protective.<sup>9</sup>

Research on protective factors is definitely needed. In the National American Indian Adolescent survey of Aboriginal youth in the United States, the estimated probability of attempting suicide increased dramatically in proportion to the number of risk factors to which an adolescent was exposed,

but increased protective factors were associated more with reduced probability of suicide attempts than with decreased risk factors.<sup>86</sup>

## Predictors of Outcome

Early onset of suicidal behaviour in prepubertal children predicts suicidal behaviour in adolescents,<sup>61,226</sup> and early onset of major depressive disorders is associated with suicidal behaviour in adolescents and adults.<sup>227–229</sup> We are unable to predict at the time of their first attempt which adolescents are likely to repeat their suicidal behaviour.<sup>228,229</sup> Children and adolescents who attempt suicide are at risk for completed suicide, violent death, or a poor psychosocial outcome 5 to 10 years after the first attempt, with boys having worse outcomes.<sup>230</sup> Some of the poor psychosocial outcomes have included changing schools frequently, motor vehicle accidents, arrests, and (in those who have not yet reached 18 years) living away from the family home for adverse social reasons.<sup>231–234</sup>

Adolescents who had been psychiatrically hospitalized following a suicide attempt had a greater number of suicide reattempts and more frequently engaged in stealing at 1 month after discharge than those hospitalized in a general hospital.<sup>235</sup>

In a study comparing the treatment course of suicidal preadolescent and young adolescent psychiatric inpatients during a 6- to 8-year follow-up period with that of nonsuicidal psychiatric inpatients and nonpatients selected from a community, the treatment course of suicidal patients was significantly longer, earlier, and more intensive than for the nonpatient control population.<sup>236</sup> Adolescents who commit suicide have histories of more frequent mental health service visits than do nonsuicidal adolescents.<sup>237,238</sup> However, adolescents who completed suicide had less psychiatric treatment in their lifetime when compared with adolescent psychiatric inpatient suicide attempters.<sup>101</sup>

**Key Point:** A complex interplay of risk factors facilitates suicidal behaviour among children and youth. These factors include age, sex, ethnicity (much higher risk among Native North Americans), psychiatric disorders, prior attempts, a preexisting cognitive profile (rigidity, poor problem solving, pessimism, impulsivity), abuse during childhood, dysfunctional family backgrounds, firearm availability, and stressful life events. The biological risk factors continue to be elucidated and include serotonergic and dopaminergic dysfunction. Positive, cohesive family relationships may be protective, but in general, protective factors have not been well studied.

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