

Adolescent suicide

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Purpose of review

The present review summarizes the updated literature on adolescent suicide.

Recent findings

Reductions in youth suicide rates are probably related to use of selective serotonin reuptake inhibitors since the mid 1990s as well as restrictions in means and enhanced pesticide control. The serotonin theory of suicide has received more empirical support. Familial transmission of suicidal behavior may be mediated by transmission of impulsive aggression from parent to child and early detection of precursors of suicidal behavior can help identify families at high risk of having a suicidal child. A newly investigated social risk factor of bullying adolescents and the novel psychological construct of autobiographical memory all help to advance our understanding and treatment of suicidal youths. Much effort is needed in establishing more solid empirical evidence for suicide prevention programs and treatment, while assessment tools are still in desperate need of further development.

Summary

Suicidal behavior remains an important clinical problem and a major cause of death in youth. There are key issues that need to be solved for better prediction of suicidality, prevention and treatment of youth suicide.

Keywords

adolescent, prevention, risk factors, suicide, treatment

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Introduction

Adolescent suicide is a complex topic, which can be approached from many different angles. In the present article, we have attempted to summarize the following areas: definitions of the different forms of suicidal behaviors and the relationships between them; epidemiology; biological risk factors; psychological risk factors; social risk factors; assessment; treatment and prevention.

Definitions of suicidal behaviors

Suicidal behavior is probably a set of noncontinuous and heterogeneous spectra of behaviors. Thus, suicidal ideation, suicidal threats, gestures, self-cutting, low lethal suicide attempts, interrupted suicide attempts and near fatal suicide attempts and actual suicide may or may not be related to each other, depending on the context in which they are studied [1]. In a recent article, Apter *et al.* [2[•]] showed that in a military context, these behaviors can have very different meanings.

Often authors do not differentiate between different forms of behaviors and especially in the UK, the terms

parasuicide and deliberate self-harm (DSH) have been used as catchall categories. This semantic confusion is troublesome as especially in biological research description of the phenotype can be critical. Moreover, preventive methods may be different for the different subtypes of suicidal behaviors in adolescents.

Epidemiology of suicide in youth: recent changes

The epidemiology of adolescent suicide has shown striking changes over the last 100 years. Since the beginning of the 20th century, there has been a steady rise in the incidence of suicide in young men punctuated by decreases during the 1st and 2nd World Wars. This rise became much more marked in the 1960s and peaked in the middle of the 1990s. Since the 1990s rates of suicide in young men have declined steadily and by 2005 in Britain and 2003 in the USA they were at their lowest level ever for almost 30 years. According to Biddle *et al.* [3^{••}], this decline was partly because of reduction in poisoning from car exhaust gas due to increased number of cars with catalytic converters. Nonetheless, there has been a decline in suicide from all methods, including

hanging, suggesting a more pervasive effect. In England and Wales, there has also been reduction in some of the risk factors for suicide, including reduction in unemployment and divorce [3^{••}]. Another controversial explanation put forward to explain this reduction in suicide rates was the increased use of antidepressants, especially selective serotonin reuptake inhibitors (SSRIs) in the adolescent population. In their analysis, Biddle *et al.* [3^{••}] refute this claim; however, US authors have strongly supported the important role of SSRI use introduced in the 1980s in explaining the reduction in the rate of adolescent suicide [4^{••}]. They point out that similar trends of suicide reduction have been shown in the United States and the Netherlands [4^{••}]. Between 2003 and 2005, the youth suicide in the Netherlands increased by 49% and in the United States by 14% [4^{••}], following the issuing of public health warnings about the possible association between antidepressant use and suicide ideation by both US and European regulators. Following these proclamations, the rate of prescribing SSRI for adolescents was reduced by approximately 22% in the United States and the Netherlands. Thus, Gibbons *et al.* [4^{••}] together with others [5,6] have strongly advocated the theory that it was the reduction in use of SSRIs that led to the increase in youth suicide. In contradistinction, Wheeler *et al.* [7[•]] analyzed the population impact on the incidence of suicide and non-fatal self-harm of regulatory action in 2003 to restrict the use of SSRIs in individuals under the age of 18 and came to the opposite conclusion that in England reductions in antidepressant use have not led to an increase in suicidal behavior.

The controversy continues, though the authors of this article tend to accept the conclusion that restricted use of SSRIs and the black box label warnings in the United States and Europe are problematic.

One other major epidemiological finding in recent years has been the differences in youth suicide in Asian versus Western countries. It appears that in China, southern India and Singapore, the sex differences for suicide are reversed and that young women are more at risk for suicide than men [8]. In these young women, the suicide appears to be related to impulsive attempts using pesticides as the mode of attempt [9,10[•],11[•]]. The high fatality may be related to the lack of emergency medical facilities [9]. Mental illness seems to be less of a factor in these suicides than has been reported in the West [10[•],11[•]]. Undoubtedly, the restriction in the use of pesticides is a very important preventive measure in these areas [12^{••}]. However, these findings may have important theoretical implications. Many clinicians look upon overdoses by female adolescents as being demonstrative, manipulative or a cry for help. In fact, this was in some part the reason for adopting the term parasuicide.

In the Asian context, it seems that these impulsive attempts continue to occur despite the obvious lethal outcome. It is interesting to note that female youth suicide rates have remained fairly constant in the West, while increasing in the Asian countries where there were no pesticide restrictions.

Biological risk factors

Family genetic studies have an important role to play in understanding youth suicide. Suicidal behavior is highly familial and heritable as well. Twin and adoption studies have shown that both completed and attempted suicide form part of a clinical phenotype that is familiarly transmitted. Thus, suicide attempt rates are elevated in the families of suicide completers and suicide rates are elevated in family members of attempters [13]. This is so even after adjusting for the presence of psychiatric disorders in the proband and family, indicating that youth suicide is inherited distinctively from the psychiatric illness [13]. It is possible that impulsive aggression is the basic psychological dimension that is passed on [14[•]]. The biological mechanism that may be involved is probably related to serotonin metabolism and low turn over of 5-hydroxyindoleacetic acid (5HIAA) as measured in the cerebral spinal fluid [15^{••}].

Social risk factors

Brent and Melhem [14[•]] have recently reviewed some of the nongenetic factors contributing to the risk of familial transmission of suicidal behavior. These include also social factors such as parental separation, divorce and family discord as well as child abuse [16[•]] and imitation [17].

Other risk factors for depression and suicidal behavior in adolescents put into focus these last few years include bullying [18] and peer victimization [19[•]], which seem to be a common problem in children and adolescents, with approximately 10–20% of US high school students reporting moderate-to-frequent victimization and 13% reporting bullying others. Findings indicate that both victims and bullies are at high risk for suicide and that the most troubled adolescents are those who are both victims and bullies [18].

The influence of media reporting on suicide in the young has been widely researched over the last few decades, while the impact of the Internet is less well understood [20]. As an increasingly popular source of information, concerns have been raised about the existence of sites that promote suicide [20,21] as well as suicide sites claimed to have facilitated suicide pacts among strangers [22]. However, empirical research is needed to support these notions.

Alcohol and drug use has been reported to be associated with suicidal behavior in adolescents [23[•]]. Two recent studies focused on the problem of binge drinking, a most common pattern of alcohol consumption among high school [24] and college youths [23[•]], found it to be strongly associated with suicidal ideation and behavior.

Psychological risk factors

Some newly investigated psychological risk factors of suicide in adolescents include the assessment of Williams' theory on suicidality and autobiographical memories. Williams [25] suggested that suicidal individuals lack the cognitive ability to retrieve specific autobiographical memories and rather produce more general memories. This means that they will not remember specific events in their lives such as, 'I remember when my dog died and I was very sad', and instead remember having a dog. This leaves them a much smaller repertoire of experience to draw upon and, thus, fewer and less effective available solutions when faced with interpersonal problems [26[•]].

Ariece *et al.* [26[•]] have supported Williams' [25] notion that generalized autobiographical memory is associated with deficits in interpersonal problem solving, negative life events, hopelessness, and suicidal behavior.

Another study showed that deficits in reflection in depressed suicidal individuals is linked to suicidality, probably also through its relation to problem solving deficits [27]. Adding to these, a third study on cognitive characteristics in suicidal adolescents found that poor character-making is present in adolescents who currently self-harm but not in those with previous history. Hence, improvement in decision-making skills may, therefore, be linked to cessation of self-harm [28[•]].

Aggression and impulsivity are traits highly related to suicidal behavior in adolescents. Higher levels of impulsive aggressiveness play a greater role in suicide among younger individuals, with decreasing importance with increasing age [29]. Another finding is that aggression may have a role in worsening other suicide risk factors and potentiating suicide attempt [30[•]]. This finding is consistent with the hypothesis of Brent and Mann [13] that aggression may mark a dispositional tendency to act impulsively in states of negative affect and may in some individuals facilitate acting upon suicidal thoughts. Melhem *et al.* [31^{••}] emphasize that familial transmission of suicidal behavior appears to be mediated by the transmission of impulsive aggression from parent to child. In their prospective study, they found that precursors of early-onset suicidal behavior in offspring of parents with mood disorders include mood disorder and

impulsive aggression as well as parental history of suicide attempt, sexual abuse, and self-reported depression. This first report of precursors of suicidal behavior may help to identify families at very high risk of having a child with suicidal behavior and frames targets for prevention and treatment [31^{••}].

Additional potential contributions to suicidal behavior in depressed adolescents are other early defined traits such as temperament and emotional regulation. One study [32] suggests that suicidal youth are characterized by high maladaptive regulatory responses and low adaptive emotional regulation responses to dysphoria.

Eating disorders are widespread among adolescents and these individuals have high rates of suicidal behavior [33]. This appears to be related primarily to depression and aggression, which are also common in these individuals [34]. A clinical sample of both adolescents and adults with current or lifetime diagnosis of anorexia nervosa showed that suicide attempts are frequent occurrences, are often severe and are associated with the intention to die. After controlling for depression, an association was found with behavioral and effective lack of control, including impulsivity [35[•]].

Hence, impulsivity and aggression seem to play an important role in the pathways to suicidality as precursors of suicidal behavior and as possible mediators between other disorders and suicidality.

Another important risk factor for suicidality is insight (awareness into illness, of the need for treatment and of the consequences of the disorder) [36], which has mostly been investigated in psychotic disorders. One study [37] found that the adolescent patients with better insight and, thus, probably with better prognosis are more likely to be depressed and suicidal. To our knowledge, this subject is in urgent need of further research, as it has not been investigated specifically in adolescents. This is so even though insight into schizophrenia is possibly greater in younger patients [38] and the risk of suicide is three times higher in the young compared with adult schizophrenic patients [39].

Assessment

Although there are self-report instruments assessing the presence of suicidality as well as risk factors, there are still major problems in objective assessment of suicidal adolescents. Even though the principles of clinical assessment are well known and used by clinicians all over the world, an objective orthogonal assessment scale is still problematic. This reflects the difficulties described in the introduction of definitions. For instance, are suicidal gestures more serious than suicidal ideation? Is a low

lethal suicide attempt more serious than a suicidal gesture? As these issues are not clear, a scale of suicidal seriousness from 1 to 10 is not feasible. The only recent publication to deal with this problem is a study by Posner *et al.* [40**], describing the Columbia Classification Algorithm for Suicide Assessment (C-CASA). This is a standardized suicidal rating system providing data for the pediatric suicidal risk analysis of antidepressants conducted by the Food and Drug Administration (FDA). The lack of such a scale has in our opinion severely impeded the progress of research in suicide in adolescents, as most of the scales in use do not take these factors into consideration.

Treatment

There is little research on treatment for suicidal adolescents and as far as we know, there have not been any publications on this topic, which are worthy of mention. At present, there is one National Institute of Mental Health (NIMH) funded study underway that should go far to rectify this lack [see Treatment of Adolescent Suicide Attempters (TASA)]. On the contrary, there has been tremendous advancement in the treatment of adolescent depression and many studies have assessed the use of cognitive behavior therapy (CBT), interpersonal psychotherapy (IPT) and medications, providing many articles of importance [41–44].

DBT (dialectical behavior therapy) is another treatment adopted for suicidal behavior in adolescents specifically [45] but as far as we could determine, there have been no recent articles on this topic. As mentioned earlier, there have been many studies on the use of antidepressant medication either alone or in combination with psychotherapy for depression [41,42,46,47]. None of these studies has addressed suicidality as the main object of therapy, though, as stated above, there has been much discussion about the potentiating effects of these drugs on suicide. Only one medication has been shown to have a potential antisuicide effect, that is, lithium [48,49]. Apart from one report describing the preventive effects of lithium on suicidal thoughts and behaviors in adolescents [50], there have been no studies on the effects of this treatment on adolescent suicidal behavior.

Prevention programs

The suicide prevention and national prevention programs have become increasingly in vogue – for a recent review see Mann *et al.* [51]. The most important programs are those that use public campaigns to promote the detection and treatment of depression such as the European Alliance Against Depression (EAAD) [52]. Unfortunately, these programs have not been directed specifically to adolescents. More specific adolescent

prevention programs have been well described by Gould *et al.* [53] and Shaffer and Pfeffer [54]. The past few years have seen some studies assessing various programs targeting suicidal youths. Although there are many prevention programs used in various settings (community resources, schools, emergency departments, etc.), the overall empirical evidence about effective ways to prevent or treat suicidality in youth is quite low [55]. Current efforts to establish more solid empirical evidence for suicide prevention include the Evidence Based Practices Project (EBPP), a national initiative to develop a registry of effective prevention programs in the United States [55]. Prevention efforts usually include interventions such as screening for depression and suicide risk in schools and clinical settings [56,57], suicide awareness and education programs [58,59], gatekeepers training for school staff [60*,61,62*], hotlines [63], means restriction [51] and as described earlier, pharmacological treatment and CBT/skills training. These strategies and specific programs need further systematic evaluation.

Conclusion

Adolescent suicide remains an important clinical problem and a major cause of death in young people. Nonfatal suicidal behavior is also associated with a great deal of morbidity and suffering. Major problems that remain to be solved are improving of definitions of different subtypes and phenotypes of suicidal behavior; following the dramatic time sequence, geographical and sex differences effecting suicidal behavior; pursuing the important investigation of biological and genetic factors, which interact with environmental factors, putting individuals at high risk of suicide; understanding some of the social and psychological variables that underlie suicidal behavior; and assessing existing suicide prevention programs for youth in different settings.

The identification of more specific risk factors of suicide will help better prediction of suicidality and hence, better assessment process, better treatment and more targeted prevention programs.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 118).

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