Adolescent Suicide: Epidemiology, Psychological Theories, Risk Factors, and Prevention

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Abstract: Suicide is one of the most common causes of death among young people worldwide. Adolescence is a developmentally important phase of age due to the growing risk for suicide and prevalence of psychiatric disorders, as well as due to growing possibilities for prevention and treatments. Research findings in theoretical considerations, in psychological autopsy studies as well as in selected follow-up studies of clinical populations and suicide attempters analyzing risk factors for youth suicides are reviewed emphasizing the most recent data. As youth suicides are rare, research on risk factors for youth suicidal ideation, deliberate self-harm behavior and attempted suicide are also briefly reviewed. Family-related adversity, precipitating interpersonal problems, and particularly psychiatric disorders constitute risk factors for adolescent suicide. Mood disorders, substance abuse and prior suicide attempts are strongly related with youth suicides. However, recent psychological autopsy studies in China have found substantially lower rates of psychiatric disorders among suicide victims compared with those in the Western countries. Recognition and effective treatment of psychiatric disorders, e.g. depression are essential in preventing adolescent suicides. As only seldom young suicide victims have received psychiatric care, broad prevention strategies are needed in health care and social services. Education of physicians to recognize youth at risk, and restricting access to lethal means are recommended to prevent suicides. For high-risk youth providing continuity of care is important. Recent treatment studies among suicidal adolescents have reported promising results on safety planning and increased therapeutic contact early in treatment.

Keywords: Adolescent, deliberate self-harm behavior, psychiatric disorder, psychiatric treatment, risk factor, suicidal behavior, suicide, theory.

1. INTRODUCTION

Completed suicides are a major health problem among youth worldwide. The latest mean worldwide annual rates of suicide per 100,000 were 0.4 for females and 1.5 for males among 5-14-year olds, and 4.9 for females and 22.0 for males among 15-24-year olds, respectively [1]. There has been a male preponderance in suicide rates. However, there is growing concern also on female suicides, as in some countries, e.g. in rural China [1, 2] recent reports have found even higher suicide rates among adolescent females compared with males. Suicide is a leading cause of death worldwide and the third leading cause of death for adolescents in the USA [1, 3]. In Finland, youth suicide mortality has declined by over 20% from 1990 to 2003, possibly due to better treatment of depression [4], and actions to prevent suicides launched throughout the country [5]. However, completed suicide was a leading cause of death among females and the second common cause among males at age of 15 – 19 years, in 2008, in Finland; 27% of all the deaths in this age group were suicides [6]. The prevalence of suicidal behaviour varies, however, significantly across countries, cultures, and racial/ethnic groups around the world [3].

Despite its high prevalence and known risk factors, suicidal thoughts and behaviour in many adolescents are often undetected by parents, teachers and health care professionals [7]. It has been estimated that as many as two thirds of suicide attempters are not identified as a danger to themselves in primary health care clinics, and only few suicide attempters receive care even after a suicide attempt [7]. In a recent psychological autopsy study Portzky et al. [8] found that suicidal communication was less frequently reported by suicide victims and treatment of psychiatric disorders was significantly less found in adolescent suicide victims compared with suicidal adolescents.

Research on risk factors for youth suicide provides the basis for suicide prevention. Primary prevention of such rare outcomes as youth suicide faces several problems, and the effectiveness of preventive efforts in schools, social services and primary health care has been questioned [7, 9]. Since most young people committing suicide have suffered from psychiatric disorders, particularly from depression [10], early recognition and effective treatment of these disorders are key issues in the prevention of youth suicide [11, 12]. However, recent research findings in China have found lower prevalence of mental disorders in Chinese suicide decedents.
compared with those in respective Western respective studies [13]. If further studies confirm the findings on the more remarkable impact of other risk factors than previously thought (such as familial adversity, precipitating problems, cultural factors), theoretical modeling of suicidal behavior and development of international prevention strategies need to developed by taking into account these new findings.

Suicidal ideation is defined as one’s wish or threat to die, suicide attempt/parasuicide as self-injurious behavior with a non-fatal outcome, deliberate self-harm (DSH) with a history of intentionally injuring one’s body without apparent suicidal intention, and suicide as a cause of death on a death certificate [12, 14]. Completed suicides are rare in children and young adolescents and their prevalence increase with growing age [1]. Adolescence and early adulthood are generally seen as periods in which there is a high risk for first-onset suicidal behaviour [15]. Due to the growing risk for suicide with increasing age, adolescents can be regarded the main target of suicide prevention.

This article first briefly reviews the epidemiology of completed suicide among adolescents during the last decade. The main target is to review recent theoretical considerations and research findings on risk factors and treatment possibilities for adolescent suicide during the last decade. Youth suicide is a rare phenomenon, and research on risk factors for youth suicidal ideation, DSH and attempted suicide are also briefly reviewed. Then, preventive approaches are reviewed. While depressive disorders are among the most important psychiatric disorders associated with youthful suicides and research-based knowledge on adolescent mood disorders rapidly increase, they are still under-recognised and under-treated [16, 17]. This paper therefore briefly reviews controlled treatment studies of child and adolescent depressive disorders. Controlled treatment studies among adolescents with other psychiatric disorders, as important as they are, are not included in this review. However, other than depressive disorders are briefly reviewed in the context of comorbid psychiatric disorders. Finally, since adolescents with suicidal ideation or suicide attempts, are in a particularly high risk for suicide, research on the effects of interventions aiming at reducing further suicidal behavior among suicide ideators and attempters are reviewed.

The main focus is to review findings during the last decade. There are, however, only few recent studies in some topics (e.g. in adolescent suicide studies using psychological autopsy-method), and therefore some older studies are also briefly reviewed.

2. EPIDEMIOLOGY OF ADOLESCENT SUICIDES

According to the WHO statistics [1], the mean worldwide (countries reporting their mortality data) annual rates of suicide per 100,000 in 2000 (or latest available year) were among 15-24 year olds 4.9 for females and 22.0 for males. There has been a male preponderance in suicide rates worldwide, and one of the few exceptions were that more females compared with males committed suicide in rural China [1, 18, 19]. However, recent findings in China show that male-to-female-ratio for suicide seem to became closer to that in the West, although it would still be much lower [2]. The studies from New Zealand, where the rates of female youth suicide more than doubled from 1977 to 1996, showed that the increasing rates were due to the growing use of hanging and vehicle exhaust gas by women [20, 21]. Further evidence of the role of gender-related method choice may be found in China, were the higher female rates of suicide is most likely to be explained be the ready access that Chinese women have to agricultural pesticides, which are used in self-poisoning attempts and have high lethality [22]. On the other hand, the findings from China seem to support a cultural and /or familial explanation (e.g. a lower social status in Chinese women than Chinese men), as previously reported [23].

During the last decade, youth suicide rates have increased in many countries, and most of the increase is due to more young men committing suicide [1]. The suicide rates among young males in Belgium have doubled over the last decade [24]. For example, suicide rates among adolescents have increased in USA [3, 25]. In Finland, a country with particularly high and rising rates of youth suicide until 1991, an approximately 20 % decline has taken place by 2008 [6]. Total rate of suicides was 18.2 per 100,000 at age of 15-24 years in 2007 in Finland [1].

However, there are large variations in the rates of adolescent suicides in countries in different time periods, and between countries. The background of such secular changes in youth suicide rates are largely unknown but it has been suggested that the decline in the rates of youth suicides is due to restriction of the availability of lethal methods, e.g. firearms [9, 26, 27], and better treatment of depression [4, 9]. Disparities in the classification of suicide in listing suicide as the cause of death on death certificates may also contribute to the international variation. The reliability of international suicide data is generally considered to be high; however, the influences of e.g. varying data collection procedures have to be taken into account in interpreting the findings [3, 28].

3. RISK FACTORS FOR SUICIDE

3.1. Age and Youth Suicide

The incidence rates of suicides increase sharply from childhood to adolescence [1, 27]. The reasons to explain this change are largely unknown. The family provides social and emotional support thereby possibly protecting children from suicide. Adolescence is often marked by higher levels of emotional reactivity, increased risk-taking behaviours and increased strivings for autonomy, which may result in conflict or a “pushing away” of previous sources of support, such as parental figures. Therefore, risks for suicidal behaviour may be heightened during adolescence, particularly in the context of psychiatric disorders associated with increased emotionality or decreased inhibitions. Alternatively, the risk for suicidal behaviour during episodes of psychiatric disorders may continue or intensify from adolescence through young adulthood [29]. Not only the prevalence of suicides increase with growing age; the reported onset of suicidal ideation, plans and attempts was highest in the late teens and early 20s, with the median in the mid-20s [15].

The higher risk for suicide in adolescence may be attributed to the higher prevalence of psychopathology with growing age [27, 30]. In general, the frequencies of any
psychiatric disorder, particularly mood disorders, substance abuse and conduct disorder, as well as prior suicide attempts have been more common in the older than younger adolescent suicide victims [18]. Psychopathology may not only be more prevalent but also convey a higher risk for suicide among older adolescents [30], however, the finding is not consistent [31]. Besides studies on suicide victims, one study found that the relationships between suicide attempts and with major depression, generalized anxiety disorder, attention-deficit/hyperactivity disorder, and substance use disorders strengthened as participants came older in a clinical sample (age 12-19 at admission) [32].

There has been a debate if the underlying structure of psychiatric disorders is stable with growing age. A recent study [33] provided evidence of a stable underlying structure of DSM-IV syndromes across the transition to adolescence. Further, a general process of psychopathological differentiation is not likely to be responsible for high rates of comorbidity in this timeframe. Despite the fact that adolescence is accompanied by substantial changes in rates of a range of psychiatric symptoms and disorders, it appears that the structural organization of those symptoms and disorders is highly stable [33].

3.2. Theoretical Considerations in Examining Risk Factors for Suicidal Behaviour

Scientific research in studying risk factors for suicidal behaviour has previously mainly based on psychological autopsy studies of suicide victims and follow-up studies of high-risk adolescents (e.g. suicide attempters, adolescent clinical populations) [18]. In the recent decade, growing number of researchers have used theoretical models in order to examine and understand the relationships between suicidal behaviour and different risk factors. There are no common well-investigated and accepted theories thus far, and the findings may be seen as preliminary. However, they offer important perspectives for understanding and preventing youth suicides. We briefly review some of these studies, which are mostly conducted among non-clinical populations. Unfortunately, many important theories and findings had to be excluded from this review, and more comprehensive reviews on this specific topic are needed.

The development and testing of explanatory models are challenging in the cause of suicidal behaviour [3]. Although suicide is a leading cause of death among young people, suicidal behaviours have a relatively low base rate in the general population. Studies of suicidal behaviour would typically require large sample sizes to test the complex models that will be needed to understand and predict suicidal behaviour. In addition, concerns about failing to adequately monitor or treat suicidal behaviour, or about increasing suicidal behaviour in response to an experimental manipulation, often preclude the use of experimental study designs. Furthermore, the stigma associated with suicidal behaviours can lead to underreporting or avoiding research studies. As a result, although studies of suicidal behaviour have provided valuable information about the nature of the correlates of these outcomes, many questions remain about the nature of these correlations (e.g. what are the mediators and moderators) and about the causal mechanisms through which these relations exist [3]. Current evidence seems, however, to point that there are several different paths to suicidal behaviour indicating that no one single theory could explain all heterogeneous forms of suicidal behaviour.

According to Windle [34] most existing conceptual frameworks of suicidal behaviour, such as “stress model” or “the mental health model” are predominantly non-development. The inclusion of important developmental, age-normative events (e.g. puberty, dating behaviour) and non-normative events (e.g. serious injuries, legal encounters) in conceptual frameworks may facilitate inquiry into the vicissitudes of suicidal behaviours among youths, and provide enhanced understanding of the interrelationship between e.g. alcohol use and suicidal behaviour. Recent research in developmental psychopathology emphasizes that multiple factors influence on disorders and related phenotypes, and that variables from different levels of analysis (e.g. genetic, biochemical, physiologic, cognitive, social, neighbourhood) influence on outcomes. Accordingly, the occurrence, as well as the nature of expression, of disorders and related factors may vary across individuals and across time. According to a multivariate mediation path model, several distant factors (e.g. difficult temperament, coping motives for drinking, lower family support, higher percentage of friends using alcohol) significantly predicted mediators (such as depression, stressful events, binge drinking), that in turn, predicted suicidal behaviours [34]. Binge drinking significantly predicted suicide attempts over and above the influence of depression and stressful events, whereas higher levels of alcohol consumption was a more general risk factor for suicidal behaviours [35].

The stress-diathesis model has been proposed to make causal sense of the wide range of factors contributing to suicidal behaviour in psychiatric patients [9]. Diathesis reflects an increased long-term vulnerability to suicidal behaviour because of, for example, being more impulsive and/or aggressive, and therefore more likely to act on suicidal feelings. Critical levels of early-life stress may create particular vulnerable conditions for enhanced sensitivity of the hypothalamus-pituitary-adrenal axis, both with biological and emotional consequences [36]. In line with this theory, Bruffaerts et al. [37] found in a large nationally representative sample of 55,299 adolescents that childhood adversities, especially sexual and physical abuse were the strongest risk factors for both for the onset and persistence of suicidal behaviour, especially during adolescence.

Psycho-educational models are commonly based on the stress-model [38], and explain suicide as an understandable and normal response to extreme stress and abnormal situations. The implementation of stress-model ignores, however, the much more scientifically supported view of suicidal behaviour as the consequence of a complex interaction between social, psychological, biological and psychiatric characteristics.

Chang et al. [39] tested the mediating and moderating effects of the cognitive triad (the cognitive theory of dysfunctional views on self, the future and the world by Alford and Beck [40]) on the relationship between depressive symptoms and suicidal ideation in a sample of high-school adolescents in Taiwan. Higher levels of depressive symptoms and a negative cognitive triad were related to suicidal ideation. When the cognitive triad was included as a
mediator, the effect of depressive symptoms on suicidal ideation was manifested partially through the cognitive triad.

One study found associations between interpersonal problem solving, hopelessness, autobiographical memory and suicidal behaviour among young inpatients [41]. The importance of extending suicide research to specific individual experiences was demonstrated, when suicidal inpatient female adolescents and those with anorexia nervosa were reported to evidence of less attraction to life and more attraction to death as well as more negative attitudes to their body compared with non-suicidal inpatient females and non-clinical community controls [42]. Research findings on the associations between suicidal behaviours and some individual variables, such as temperament and personality traits, coping skills, perceived social support, as well as gender differences in these variables, have enriched suicide research [e.g. 19, 25], however, could not be included in this review.

Joiner’s theory of interpersonal-psychological theory of suicidal behaviour focuses comprehensively on three necessary, jointly sufficient variables that must be present for an individual to make a lethal suicide attempt: thwarted belongingness, perceived burdensomeness, and the acquired capability to enact lethal self-injury. The rationale behind the concept of acquired capability is that the most direct and potent means of acquiring the capability for suicide is attempted suicide and deliberate self-harm behaviour [43]. Recent studies have supported these comprehensive theoretical considerations [e.g. 44, 45], however, more research among adolescents is needed.

Suicidal behaviour runs in families and exposure to suicidal behaviour may play a role via imitation [46]. However, Burke et al. [47] found that the increase in risk for suicide attempt in offspring of an attempter parent was not related to exposure to suicidal behaviour in the family. It thereby seemed that imitation is unlikely to be sufficient explanation for the familial transmission of suicidal behaviour.

Of the biological mechanisms, hampered impulse control or control of aggression is suggested to be the key underlying dimension in suicidal behaviour across diagnostic categories [48, 49]. There is a reasonable genetic loading and heritability in suicidal behaviour as shown by the twin and adoption studies [49] and it could be that low turn over of 5-hydroxyindoleacetic acid (5HIAA) as measured in the cerebral spinal fluid is the factor passed on to the next generation [48]. Moreover, stressful life events and early adversity increase the risk of suicidal behaviour, possibly via their influence on child brain structures, stress regulation systems and, consequently, serotonin levels not only in childhood but also later in life [50, 51]. These alterations in homeostasis are then related to e.g. depression, anxiety, and suicidal behaviour [50, 51]. In a recent review Brent [52] concluded that familial transmission of suicidal behavior is mediated by familial transmission of abuse and also appears to be mediated by the transmission of impulsive aggression which is suggested to be an endophenotype for suicidal behavior [53].

In their comprehensive review Goldston et al. [11] described how awareness of the interface of culture, adolescent suicidal behaviour, and help-seeking is essential for culturally competent professionals and an important step to the development of effective culturally sensitive interventions to reduce suicidal behaviour. Themes on acculturative stress and protective factors in within cultures, the roles of religion and spirituality and the family in culturally sensitive interventions, different manifestations and definitions of distress in different cultures and community-based interventions are discussed in this review. Such efforts are only recently studied, although academic interest in cultural and social influences on suicidal behaviour dates back at least to Durkheim’s [54] investigations of the associations between suicide rates, religion and social integration.

3.3. Risk Factors for Adolescent Suicide

A widely accepted method in research of risk factors for suicide is studying unselected and representative samples of suicides using the psychological autopsy. It is a procedure for reconstructing the life history, behaviour, social and psychological features of the deceased, as well as the events preceding the suicide retrospectively by interviews of key persons who knew the deceased. Usually also data from different records are collected [55]. The general methodological problems of psychological autopsy include the possibility of incomplete and biased information and difficulties in the assessment of psychopathology of the victims [13]. However, interviewing several informants, using structured interviews to elicit psychiatric symptoms, and using explicit diagnostic criteria have reportedly increased the accuracy of the assessment of psychopathology [55]. Recent psychological autopsy studies of adolescents are few, and we therefore also briefly review previous findings. For more comprehensive and detailed reviews, see e.g. [18, 19, 56].

The prevalence of rare psychiatric disorders, e.g. psychotic disorders, has been low in population-based studies of suicide using psychological autopsy. Follow-up studies of clinical adolescent populations and suicide attempters have provided complementary data of the associations between suicide and risk factors found in psychological autopsy studies [57, 58]. Data collection procedures, characteristics of the samples and the definitions of psychiatric disorders in different chart-based studies may, however, vary and have to be taken into account in interpreting the findings [58]. The following chapters review the most important research on risk factors for suicide in adolescents. However, completed adolescent suicide is a rare phenomenon, therefore also research on risk factors for suicidal ideation, deliberate self-harm and suicide attempts is briefly reviewed.

3.3.1. Findings in Psychological Autopsy Studies

Previous population-based psychological autopsy studies of adolescent suicides and follow-up studies of child and adolescent patients and suicide attempters [18, 19] have reported parental divorce, non-intact family of origin, family history of suicide or suicide attempt, parental mental problems and substance abuse, poor communication with mother and father, weakened parental support, and parental problems with the police to be associated with death by suicide. Individual psychosocial risk factors for young suicides have included recent disciplinary crisis, interpersonal loss and school problems.
On the other hand, psychiatric disorders are closely related to experiencing negative life events in general and also to experiencing multiple events with often additive effects. For example, early adverse events have been found to mediate the link between current stress and risk for depression later in life [59]. Respectively, a recent case-control psychological autopsy study by Portzky et al. [8] investigated psychosocial and psychiatric risk factors of adolescent suicide among 19 suicide victims and 19 suicidal adolescents. Suicide victims had been exposed more frequently to suicidal behaviours by friends and through media and experienced more relational problems in the past year than the controls. Suicidal communication was less frequently reported by suicide victims than in controls and when communication did occur, it was less often directed towards parents. Treatment of psychiatric disorders was significantly less found in suicide victims. Portzky et al. [60] likewise showed that the victims had negative life events and psychosocial problems suggesting difficulties in coping with stressful psychosocial problems.

Fortune et al. [61] used life-charts of psychological autopsy information from multiple informants to identify suicidal process among 27 suicide victims, most of them males. They found three groups, and one of them was characterized by longstanding difficulties which spanned the developmental domains of home, school and peers. The suicidal process was longstanding, and included deliberate-self harm prior to the death and direct communication to friends and family about suicidal ideas and plans. A high level of distress was evident in this group; many families were struggling with distressing life events, criminal behaviour, illnesses and financial problems. The second group was characterized by evidence of established psychiatric disorder, and the third one by the emergence of suicidal process as an acute response to life events among young people who appeared to have previously been functioning well, without apparent mental illness or known self-harm. However, two of five in this group communicated specific suicidal intent in the weeks before their death.

These new findings further confirm the strong evidence that mental disorders constitute the major risk factor for youth suicide. Psychological autopsy studies in Western countries have reported mental disorders in 81% to 95% of youth suicides. Approximately 50% - 75% of youth victims had a mood disorder, most commonly major depression [18]. In a recent psychological autopsy study by Portzky et al. [8], 32 informants of 19 young suicide victims were interviewed, and reportedly all the victims suffered from one or more mental disorders at the time of their death; almost half of them were diagnosed with personality disorders, and adjustment disorders in one fifth of the sample. Only a small minority was receiving treatment for their disorders. The suicidal process of suicide victims with adjustment disorder was short and rapidly evolving without any prior indications of emotional or behavioural problems [60]. It seems that albeit patients with AD suffer from short-term stress-related psychotic disorders, adolescent outpatients with severe psychosocial impairment and suicidal behaviour seemed to be in risk for later suicidal behaviour [62].

Previous findings have further showed that from about one quarter to two thirds of adolescent victims have received a diagnosis of substance abuse or dependence. Also substance misuse not fulfilling the diagnostic criteria of substance use disorders has been reportedly associated with adolescent suicides [18]. In a recent review Giner et al. [56] found that the role of alcohol use in adolescent and young adult suicides was high (from 21.4% to 43.7%). Schizophrenic psychoses and personality disorders have been diagnosed more commonly in young adult than adolescent suicides, while disruptive disorders and adjustment disorders have been more prevalent among younger victims. Also behavior problems and symptom clusters not fulfilling the diagnostic criteria of conduct disorder are common among child and adolescent suicides being reported in 43% - 73% of completers, often in combination with depressive symptoms and/or substance abuse. Problems with the law are also overrepresented among youth suicides (16% - 28%). Psychiatric comorbidity is common among young suicide victims (51% - 81%). The impact of comorbid conditions to suicide risk is complex and thus far little studied. About one third of young suicides have a history of prior attempts and up to two thirds of child and adolescent victims have verbally communicated their suicidal intent. In controlled studies the risk for suicide has been estimated to be about 30-fold among youth with a suicide attempt history compared with those without previous attempts [18].

As reviewed above, the relationship between psychiatric disorders and adolescent suicide is well established. However, recent suicide research in China has prompted important debate on the meaning of the findings concerning the impact of psychiatric disorders for adolescent suicide.

In the case-control psychological autopsy study of 392 young Chinese suicide victims 15-34 years of age, and 416 living comparison subjects, the prevalence of current psychiatric disorders was 48% for suicide victims and 3.8% for comparison subjects [2]. They further reported that mental illness was more prevalent in males than in females (55.1% vs. 39.3%, respectively). Although psychiatric disorders were strong risk factors for suicide, they were less prevalent among rural Chinese young people who committed suicide, particularly females, in comparison with other populations in China and in the West. However, Zang et al. [2] did not include personality disorders and disruptive disorders in their psychiatric interviews, both disorders common among suicide victims in other studies, and this may be one reason for different numbers of psychiatric disorders between studies. Chinese adolescents, especially females, have reportedly lower risk for alcohol use and alcohol related problems, and other possible risk factors need be taken into account (cultural, social and psychological). In a sub-sample of this study [63], a case-control study was conducted with 114 suicide victims (at age of 15-24 years) and with 91 controls who had died of other injuries. Among suicide victims 24% had attempted suicide, as also previously reported in Western studies [18]. Of the suicide victims 45% met a criteria of a psychiatric disorders at the time of death, however, multivariate logistic models revealed that it was a risk factor only for the males. Other risk factors were having experienced severe life events two days before the death, presence of any depressive symptoms within two weeks of the death, low quality of life in the month before death and having an acute stress at the time of death. Prior suicide attempt was related to suicide in univariate
comparisons, but could not be included in multivariate models because no controls had made prior attempts [63].

In discussing the impact of these findings, it has been suggested that regardless of methodological concerns (e.g. to use non-psychiatric interviewers) the findings of the prevalence of psychiatric disorders in the suicide case-control psychological autopsy study seemed to be close to actual rate, albeit somewhat lower compared with an epidemiological study administered by psychiatrists [13]. In addition, a low proportion of individuals ever receive psychiatric treatment in China, and unlike in Western studies, the proxy-based diagnoses cannot be augmented by referring to information in clinical records [13]. Another concern was the dichotomous classification of psychiatric disorders in the suicide studies. Phillips et al. [64] have reported that suicide risk was linearly related to the severity of depressive symptoms in China. Probably sub-syndromal symptoms may be important factors. Manifestations of dysphoric affects may not match diagnostic criteria in China and other cultures compared with those in Western countries. Further, the frequent use of pesticides as a method of self-harm in China may increase the proportion of suicide decedents without psychiatric disorder who carried out impulsive acts with little intention to die [63, 65]. On the other hand, also some previous psychological autopsy studies have identified suicide victims with short-term suicidal process as an acute response to life events among young people who appeared to have previously been functioning well, without apparent mental illness or known self-harm [61, 66].

3.3.2. Follow-Up Studies of Child and Adolescent Psychiatric Patients and Suicide Attempters

Follow-up studies of adolescent psychiatric patients and suicide attempters have provided complementary data e.g. of psychotic disorders, which are rare in non-clinical suicide studies. Recently, Engqvist and Rydelius [57] found significantly higher suicide and other mortality rates among former child and adolescent patients compared with the general population in a 12-33 year follow-up study. Likewise, children and adolescent with psychosis were more likely than non-psychotic patients to have repeat or multiple suicide attempts [58]. On the other hand, a recent follow-up study of a large clinically representative cohort of patients experiencing their first psychosis found lower suicide rates than expected. However, the risk for suicide persisted late into the follow-up (mean 11.5 years), and the risk was highest soon after the first presentation of psychosis, indicating the importance of early assessment and treatment of suicidal behaviour among youth with psychotic disorder [67]. One study on adolescent outpatients [68] found a high male mortality rate among former adolescent outpatients during a 6-year follow-up. Baseline history of suicidal behavior and severe functional impairment were risk factors for late suicidality also in a recent follow-up of referred suicidal adolescents [69].

3.4. Risk Factors for Adolescent Suicidal Ideation, Deliberate Self-Harm and Suicide Attempts

As youth suicides are rare, much of the knowledge on risk factors is based on studies of other suicide-spectrum behaviors, including suicidal ideation or threats, deliberate self-harm behavior (DSH) and suicide attempts/parasuicides [14]. Due to variations in the definitions, sample characteristics, and lack of accurate statistics, the prevalence rates of suicidal ideation and suicide attempts are difficult to be estimated. According to a comprehensive review of 128 population-based studies including 513,188 adolescents, the mean of lifetime prevalence of suicide attempts was 9.7%, with 6.4% reporting suicide attempts in the previous year [70]. The mean of 13.2% reported lifetime DSH and 26% in the previous year. The mean proportion of adolescents reporting lifetime suicidal ideation was 29.9%, with 19.3% in the previous year. There was a considerable within-group variation. The proportion reporting lifetime suicide attempts varied between 2% and 30%, and lifetime suicidal ideation between 8% and 70%. In most studies suicidal phenomena were significantly higher among females compared with males. Suicidal behaviour was more prevalent in studies using anonymous questionnaires [70]. Most previous reports have included Western populations, however, recent findings in rural China have reported respective prevalence numbers of suicidal behaviours [71].

There are large variations in definitions of variables of familial and individual risk factors, in methods used and sample characteristics of suicidal adolescents. In the following, we review selected studies in risk factors for non-lethal suicide-spectrum behavior.

Childhood adversities (especially intrusive or aggressive adversities) were powerful predictors of the onset and persistence of suicidal behaviours in a nationally representative sample (n=552,999) in 21 countries worldwide [37]. Likewise in a large non-clinical population, drug use, victimization, risky sexual behaviour and health problems associated with suicidal behaviour [72]. In a large adolescent non-clinical population in rural China female gender, older age, boarding in school, life stress, depression and external locus of control were significantly associated with increased risk for suicidal ideation; while older age, life stress, external locus of control, poor academic performance, depression and aggression were related to suicide attempts [71].

The meaning of familial risk factors was also studied in some longitudinal studies. Family history of suicidal behaviour and childhood sexual abuse increased the risk for later suicidality [73]. Adolescent suicide attempters in a large 23-year surveillance study among general-hospital treated suicide attempters, aged 13-19 years, reported that dysfunctional family situation was the commonest underlying reason for their suicide attempt (in 43.6%), followed by mental health problems (in 22.8%) [74]. Child and adolescent offsprings of parental suicide decedents were at high risk for suicide in a population-based data from national registers in Sweden [75]. They further found that offspring of suicide decedents had an especially high risk for hospitalization for suicide attempt, depressive, psychotic and personality disorders. Child survivors of parental suicide were at particularly high risk for hospitalization for drug disorders and psychosis [75].

Families of self-injuring adolescents exhibited less positive affect, more negative affect and lower cohesiveness than did control participants [76]. In addition, self-injuring adolescents exhibited more opposition and defiance and less
positive affect than did control participants during conflict discussion. Peripheral serotonin was also inversely correlated with the expression of positive affect within dyads. Furthermore, adolescents’ serotonin levels interacted with negativity and conflict within dyads to explain 64% of the variance in self-injury. However, there were no clinical comparison group, and it is not known if the findings are specific of self-harm or of general psychopathology; more sophisticated measures of 5-HT are needed, such as the fenfluramine challenge tests or in vivo brain imaging techniques.

Depressive disorder is reportedly the strongest risk factor for suicidal behaviours [71, 73, 77]. The long-term psychiatric outcome for adolescents with persistent or recurrent internalizing disorder was poor in a longitudinal study of a large British birth cohort [78]. A longitudinal study of the Isle of White Study found that not only adolescent worry and irritability, but also family and experimental adversities were risk factors for subsequent suicidality [79].

The predictive impact of comorbid psychiatric disorders has been found in several longitudinal studies. Anxiety disorders were risk factors for suicidal ideation and suicide attempts, even after controlling for confounding factors, however, the risk increased with multiple anxiety disorders in 25-year follow-up study of a birth cohort in New Zealand [80]. Further, the Great Smoky Mountains Study, a representative sample of youth aged 9 to 16 years, were followed up by Foley et al. [81]. Risk for subsequent suicidal ideation and/or suicide attempt during the past three months were greatest for those with current depressive disorder and anxiety, or depression and disruptive disorder. Severity of impairment and familial poverty were independent risk factors, irrespective of psychiatric profile. Moreover, a recent Finnish longitudinal population-based study reported that among boys, the strongest predictor of completed suicide or making a severe suicide attempt by age 24 years was comorbid conduct and emotional (mostly anxiety) disorder at age of 8 years [82].

Previous suicidality is one of the most significant risk factors for later suicidal behaviour [18]. In line with these findings Nurgham et al. [83] reported that a history of suicidal acts predicted later suicidality in a follow-up study of a non-clinical sample. Moreover, suicidal ideation at age 15 years predicted increased risk for suicidal behaviour and psychiatric disorders compared with non-suicidal adolescents [84]. Contrary for previous suggestions, symptoms of deliberate self-harm behaviour may not be regarded as transitional and/or non-harmful behaviour [85, 86]. A recent follow-up study among adolescent outpatients with depressive disorders found that alcohol use and Axis I comorbidity predicted later suicidality among both those with DSH and among those with suicidal ideation and/or suicide attempts [87].

Bullying is reportedly a risk factor for depression and suicidal ideation [88] and suicide attempts [89]. However, in a population-based birth cohort [90] longitudinal analyses revealed that bullying at age 8 years increased odds for suicide attempts when examined alone, but the association was not significant after adjusting for conduct disorder and depression. This suggest that bullying was not causally related to suicidal behaviour but instead correlated because both are consequences of conduct disorder, a known risk factor for suicidal behaviour, especially among boys. Results were opposite for girls: victimization, but not bullying was associated with suicide attempts, even after adjusting for conduct disorder and depression. According to a recent review of cross-sectional and longitudinal studies bullying and peer victimization were risk factors for later suicidality particularly with psychiatric comorbidity [91].

Some researches have also pointed the importance to investigate the associations between chronic illness and suicidal behaviour among adolescents. A recent review by Greydanus et al. [92] found that approximately one third of children and adolescents had at least one chronic illness, and they were vulnerable to biopsychosocial risk factors. In a cross-sectional study among 15- to 20 year olds 11.4% of the females and 9.6% of the males had a chronic condition, and 7.7% (3.4% of the controls) of the females versus 4.9% (2% of the controls) of the males had attempted suicide during the previous year [93]. According to Haarasila et al. [94] subjects who had more than three sick days in the past 6 months and who had respiratory allergies were more likely to have major depression episodes, and concluded that young people with chronic illness and symptoms of depression should be assessed for suicidality. In the same study, it was observed that depressed subjects also reported poor self-rated health regardless somatic conditions more frequently than their non-depressed peers. Greydanus et al. [92] concluded that suicide risks are seen in adolescents with chronic illness, and all these young people should be screened for depression and other risk factors for suicide.

4. PREVENTIVE APPROACHES

Adolescent suicide prevention is an important area of public health worldwide [12]. Recent reviews have e.g. assessed suicide prevention strategies [9], suicide screening procedures [7, 95] and the relationship between youth suicide and access to care [96]. Recommendations or guidelines for developing and implementing strategies to decrease the rates of youth suicides are available [1, 26].

Only few preventive efforts for adolescents have been scientifically evaluated thus far. Prevention in general adolescent population includes e.g. programmes in educational settings. In the school setting, universal screening with the current tools available has produced a great number of false positives, which can burden scarce mental health resources. Universal screening is therefore recommended only when the screening is part of a larger suicide prevention program with appropriate access to care [7]. It seems that effective prevention strategies of adolescent suicide should consist of identification and appropriate treatment of those in elevated risk, e.g. those with depression and substance use, and especially of high-risk youth, e.g. suicide attempters [7]. In their comprehensive review of suicide prevention strategies, Mann et al. [9] and Beautrais et al. [26] concluded that education of physicians and restricting access to lethal means were found to prevent suicide. Other methods, such as public education, screening programs and media education need more testing.
4.1. Prevention in General Populations

4.1.1. School-Based Programs

The aim of school-based programs has been to increase suicide awareness of high school students through education and thereby to enhance help-seeking behavior among disturbed adolescents. Findings have, however, been contradictory, and education programs to reduce suicidal behavior have seldom been scientifically evaluated thus far [9]. Ethical and legal concerns about screening instruments have considered high number of screening positives, shortcomings in plans for crisis interventions and problems how the screen positive youth receive timely and adequate care [95]. Previous findings showed that suicide awareness programs had even detrimental effects [97], however, a recent randomized controlled trial in six high schools in USA showed that screening related questions regarding suicidal ideation did not cause iatrogenic effects among non-suicidal adolescents or among suicide attempters [98]. In a subsequent longitudinal study of a suicide screening program, Gould et al. [99] found promisingly, that nearly 70% of at-risk suicide screening adolescents, who were recommended to seek treatment, followed thoroughly these recommendations.

In a large sample of nine high school students were randomly assigned to SOS suicide prevention program intervention and control group. Self-administered questionnaires were completed by students three months after the implementation. Significantly lower rates of suicide attempts and grater knowledge and more adaptive attitudes about depression and suicide were observed among students in the intervention group regardless of race/ethnicity, grade and gender. On the other hand, the intervention was not associated with increased help-seeking among emotionally troubled youth [100].

Due to the limitations of school-based suicide awareness programs, more emphasis has been paid to interventions aiming at skills training, such as enhancing coping skills and self-esteem [18, 19]. However, efficacy of psycho-educational programs is rather conflicting. Portzky and van Heeringen K [101] examined the effectiveness of psycho-educational programs with focus on peer-helping to prevent suicide. 14-18-year-old students were administered structured questionnaires before and two months after the program to assess the effect on knowledge, attitudes, coping and hopelessness. The findings suggested that a positive effect on knowledge about suicide could be found, but the program had no effect on the use of coping mechanisms or levels of hopelessness. This program did not show any adverse effects, however, the authors suggest that psycho-educational programs with peer-helping focus should be implemented as a part of more comprehensive prevention program. On the other hand, there are some peer-support suicide prevention programs aiming at training peers to identify and help adolescents at risk for suicide [102, 103]. The programmes were aimed at increasing the sense of social cohesion and creating the atmosphere that discourages hopelessness and promotes a positive affect overall. However, most of the participants did not complete to the program in these studies. These findings support the view that suicidal adolescents should never be left alone to peer support, but they should always be referred to adult health care professionals.

Some school-based adolescent depression education programmes have been conducted aiming at reduce the risk for suicidal behaviour through reducing symptoms of depression. Swartz et al. [104] conducted a 3 hour-education programme and the results were promising; the knowledge of depression improved after the curriculum. However, without a comparison group the results were preliminary. Sawyer et al. [105] investigated the effectiveness of a universal intervention to reduce depressive symptoms experienced by adolescents at high schools, were the students were randomly assigned either to an intervention or to comparison group. Despite using an extensive, structured programme, based on best evidence to increase protective factors and reduce risk factors at the individual and school levels, the intervention did not reduce levels in depressive symptoms in this large three-year study. It was concluded that implementation of such programmes will require programs which are perceived by teachers and students as relevant to educational and learning goals, which can be effectively delivered in conjunction with other school programs, and where appropriate access to mental health care are provided [105].

4.1.2. Crisis Hotlines

Crisis hotlines are widely available for people with suicidal thoughts. Yet, evidence of their impact in reducing rates of complete suicide is equivocal [9]. They may be helpful, however, it seems that hotlines do not reach those young people, e.g. adolescent males, in greatest need of personal help. There are reports that disturbed adolescents prefer to turn to other adolescents, not adults, parents or professionals when in need of help [18] but those turning to adults receive help more often than those turning only to peers [106]. In Australia, a telephone counselling was conducted between 1997-2000. Changes in suicidality and mental state among adolescents were found during the telephone counselling sessions using a reliable rating scale. Follow-up data were, however, lacking [107]. Recently, Witte et al. [45] investigated the factor structure of a risk assessment tool utilized by suicide hotlines, and determined the predictive validity of the obtained factors. The screening questions regarding suicidal plans had preliminary more predictive impact, as well as suicidal ideation albeit not so significantly. Thereby risk assessment should include both these aspects also in crisis hotline consultations.

4.1.3. Internet

There are worldwide concerns that pro-suicide web sites may trigger suicidal behaviours among vulnerable individuals [9, 49]. In 2006, Australia became the first country to criminalize such sites. Concerns were expressed that the law casts the criminal net too widely, inappropriately interferes with the autonomy of those who wish to die, and has jurisdictional limitations with off-shore web sites remaining largely immune. Conversely, proponents point out that the law may limit access to domestic pro-suicide web sites, raise awareness of internet-related suicide, mobilize community efforts to combat it, and serve a powerful expression of societal norms about the promotion of suicidal behaviour [108]. On the other hand, modern preventive and treatment approaches are increasingly using internet-based approaches with promising preliminary results [109] and, thus, internet
may also be seen as a source of help under appropriate circumstances.

4.1.4. Media Education

Media influences of reports of completed suicides have not been evaluated thus far. Some evidence suggests that an increase in suicides follows after suicide stories in media [19]. However, media may offer public education for prevention [9, 49]. It has been recommended that media should avoid e.g. front page coverage on suicide and describe treatment resources [19]. However, Gould et al. [110] analyzed by a structured content analysis 151 articles from newspaper stories of suicides, and found remarkable difficulties in definitions of complex variables. While the majority of variables (e.g. headline characteristics, pictorial presentations, event and victim characteristics, textual attitude, suicide details, attributions to blame, victims’ problems etc) were very reliable between the raters, in contrast, complex or equivocal constructs achieved relatively low reliabilities (such as sensationalizing, glorifying, romanticizing). These constructs have used in previous media guidelines, and it is suggested that before effective guidelines and responsible suicide reporting can ensue, further explication of suicide story constructs is necessary to ensure the implementation and compliance of responsible reporting on behalf of the media [110].

4.1.5. Restriction of Lethal Methods

Methods used in suicide vary by gender and nation. A large previous international survey of suicides among 15-24 year-olds found that 34% of the suicides were firearm-related [111]. Based on the lethality and common use of firearms in male youthful suicides, it has been suggested that reducing firearm availability would reduce incidence of suicide [9]. Recently, suicides made by highly lethal methods, such firearms and pesticides, have decreased after method restrictions [9]. The critically important meaning of method restriction were pointed in the studies from New Zealand, where the rates of female youth suicide more than doubled from 1977 to 1996, the increasing rates were due to the growing use of hanging and vehicle exhaust gas by women [20, 21]. Likewise in China the higher female rates of suicide is most likely to be explained be the ready access that Chinese women have to agricultural pesticides, which are used in self-poisoning attempts and have high lethality [22]. Gauging the extent which declining overall suicide rates are directly attributable to restriction in access to particular means requires consideration of long-term trends and confounding factors, such as increased antidepressant use. Limitations of this approach are the difficulty to restrict many methods (e.g. hanging, drowning, intake of liquids and solids), and the possibility of method substitution [9]. In Finland, firearm control legislation is under preparation.

4.1.6. Identification of Adolescents at High Risk for Suicide

Although the vast majority of adolescent suicides have had mental problems, and previous suicidal behavior is common, only about 20 % to 50 % of the victims have received psychiatric care, and remarkably few (from 5 % to 20 %) have been in psychiatric care at time of suicide [8, 9, 96]. Hence, in primary care, the recognition of those adolescents most at risk of suicide is a major task. Pediatricians and primary care professionals are in a distinctive position to help prevent suicide in adolescents [112]. It has been recommended that primary care clinicians should be trained in recognizing all known risk factors for suicide. Promising results were found by Pfaff et al. [113] reporting remarkable increase in recognizing and responding to suicidal behavior among adolescents after training primary care physicians.

In addition, children of parents with psychiatric disorders and/or with suicidal behavior should be thoroughly assessed and offered appropriate care, if needed. Collaboration with a psychiatrist and ensuring that adequate and appropriate treatment is given is essential [9, 96].

4.2. Treatment of Depressed Youth

Psychiatric disorders, particularly mood disorders, are among the most important risk factors for adolescent suicides. Recognition and effective treatment of these disorders are cornerstones in clinical prevention of youthful suicides. Opinions vary whether psychosocial or pharmacological interventions, or a combination of them, should be used as first-line treatment for youth with depressive disorders [114, 115]. This chapter briefly reviews research on the treatment of diagnosed unipolar depressive disorders among youth as the most prevalent adolescent psychiatric disorder associating with the risk for various dimensions of suicidality.

4.2.1. Psychosocial Treatment of Youth with Depressive Disorders

In treatment of adolescent depression, no psychotherapy is shown to be superior to another [114, 115]. It seems, however, that the use of systematic and evidence-based approaches by itself is associated with higher efficacy and increases the probability of positive response [116]. In general, youths in treatment groups reach symptomatic recovery faster and more often than in control groups. However, the treatment trials have been relatively short in duration and also intervention studies comprise relatively short follow-up periods. It seems that the good results obtained in the acute phase treatment [117, 118] are not sustained over longer periods of time [114, 115], and suggestions for longer treatments, active treatment approach especially in the early phases of depression, sufficient follow-up and maintenance treatment have been put forward [119-121]. Combining different approaches (e.g. psychotherapy and medication) has been reported to be both more effective [122] and equally effective [123] in the acute phase when compared with monotherapy but very little data exist on its longer term effects [121, 124]. Maintenance treatment has also been little studied [125].

Overall, research on Cognitive-Behavioral Psychotherapy (CBT) shows, that CBT is effective in the acute treatment of adolescent depression with no observed difference between group and individual treatments [114]. In a meta-analysis where four studies on adolescent CBT with a total of 168 patients were analyzed, it was estimated that remission of depressive disorder was three times likely in treatment groups than in comparison groups [126]. The number needed to treat (NNT) was 4 indicating that four depressed adolescents need to be treated for one to reach remission. In other meta-analyses comprising individual and group CBTs the
effect sizes (ES) of 1.27 [127], 1.02 [117], and 0.53 [118] in relation to comparison treatments have been calculated.

The efficacy of Interpersonal Psychotherapy for adolescents (IPT-A) in the treatment of adolescent major depression has been studied in three well-conducted randomized controlled trials. In a study of 24 IPT-A patients a higher recovery rate was reported in comparison with 24 controls (75% vs. 46%) [128]. Improvement in psychosocial functioning has also been reported in a study comprising 34 and 29 adolescents in IPT-A and control treatment groups, respectively [129]. In another trial [130] 71 adolescent outpatients with MDD or dysthymia were randomized to CBT, IPT-A, and to a waiting list. According to self-reports, both IPT-A and CBT significantly reduced depressive symptoms when compared with the waiting list condition. Finally, according to a meta-analysis comprising 27 child and adolescent psychotherapy studies, IPT-A was evaluated to be effective in the treatment of adolescent depression [131]. A group therapy modification as well as preventive intervention using IPT-A methods, has been developed but currently little data exist on their efficacy [132-134].

In cases where family conflict plays a major role in adolescent depression, systematic family therapy has been suggested to be one treatment alternative. However, while there are data on the positive effects of the therapy on family relations [135], data on its efficacy on reducing symptoms of depression or increasing the likelihood of recovery is less encouraging [136]. The role of family-centered approach might be more beneficial in younger adolescents [137] and it should be noted that family conflict has been identified as a significant mediator of treatment effect [138]. The need for research and development of family interventions are further underlined by recent findings from several intervention studies which indicate that parental depression or parent-adolescent conflicts influence the outcome of adolescent depression [121, 134, 139, 140] and that interventions targeted at these interpersonal conflicts may be superior to those not including these aims [134].

Taken the relatively high response rates in adolescents receiving "relatively inactive treatments" in controlled psychotherapy trials, it has been suggested that brief supportive intervention could be used as the first line treatment of mild youthful depressive disorders [127, 141]. Although psychodynamic psychotherapy is widely used in clinical practice, no controlled trials on its efficacy in youthful depressive disorders have been published. A retrospective chart review of child and adolescent outpatients who had received either psychoanalysis or intensive psychoanalytic therapy [142], found that 40% of the depressed patients had no diagnosis and were functioning well, and in 62% reliable improvement in psychosocial functioning was observed at the end of treatment. Moreover, a randomized clinical trial with 72 9-15-year-old patients concluded that short-term (16-30 sessions) focused individual psychodynamic therapy was effective in the treatment of depression [143]. These findings, encouraging research reports among adult patients [144] and clinical experience suggest that also psychodynamic therapy may be of value in treating adolescent depressive disorders. Creative therapies (e.g. music and art therapy) are also applied in the treatment of adolescent depression but no controlled trials are available on their efficacy.

4.2.2. Biological Treatment of Youth with Depressive Disorders

One of the first meta-analyses on antidepressant medication in adolescent depression [145] included five published and seven unpublished trials of serotonin reuptake inhibitors (SSRIs) and venlafaxine. The authors conclude that only fluoxetine had a favourable risk-benefit profile. Other meta-analyses [146 - 148] also have noted that SSRIs as a group are superior to placebo, while of individual drugs, only fluoxetine show a consistent treatment effect over placebo. Furthermore, SSRIs seem to be more efficacious in adolescent than in childhood depression [148]. While the data on the efficacy of fluoxetine is most consistent, some studies [149, 150] have reported also sertraline superior over placebo in adolescent MDD. Age-grouped analyses of RCTs on escitalopram [151], paroxetine [152, 153] and venlafaxine [154] suggest efficacy in treating MDD in adolescents but not in children. Approximately 10 – 20% of adolescent patients may be expected to experience adverse effects when taking SSRIs. A disconcerting finding has been that SSRIs may increase the risk for suicidal behaviour particularly during the first weeks of treatment [155].

The most comprehensive meta-analysis to date included 27 RCTs of SSRIs and other new antidepressants i.e. fluoxetine, paroxetine, sertraline, citalopram, escitalopram, nefazodone, mirtazapine, venlafaxine, fluvoxamine [149]. The authors estimated risk differences for response and for suicidal ideation or attempts in child and adolescent depression (15 studies), obsessive-compulsive disorder (6 studies) and non-OCD anxiety disorders (6 studies) and found pooled risk differences for response in favour for antidepressant compared with placebo in all three indications. In adolescent MDD, NNT 10 and NNH for suicidality 112 were calculated. Careful assessment of response and possible adverse effects are warranted.

Tricyclic antidepressants are not currently recommended due to low efficacy and their side effect profile [156]. In unipolar depression, mood stabilizers can be considered as augmentation treatment. It has been reported, that among adolescents who initially failed to respond to a monotherapy with an SSRI, those who received mood stabilizer augmentation earlier in the course of the treatment had better outcome than those continuing with monotherapy or receiving the augmentation later on [121].

4.2.3. Summary

Current evidence shows that both certain psychosocial and psychopharmacological treatments are efficacious in the acute treatment of adolescent MDD. Of psychotherapies, the evidence is strongest for individual and group CBT and individual IPT-A in the acute phase treatment of adolescent depression. Research on the psychopharmacological treatment of adolescent MDD suggests that SSRIs are useful while TCAs should not be used as first line medication. Of individual compounds, the results generally support the use of fluoxetine as a first choice medication.

In all, good quality data on treatments of adolescent depression are relatively scarce, especially when compared
with data base of depression in adults. Most trials cover only the acute phase, and studies comprising longer follow-ups suggest that relapse and recurrence rates are relatively high, and that initial differences between treatment modalities tend to disappear. In addition, treatment trials often exclude youths with most severe depressions, severe suicidality and comorbid conditions. Other methodological factors possibly affecting the results are heterogeneity of study samples, dose of medication, duration of the trials, instrumentation, concomitant other treatments, and definition of treatment response and recovery. Issues requiring additional research are the efficacy of continuation and maintenance treatment in preventing recurrence of adolescent depressive disorders and the management of treatment resistant depression in adolescents. Finally, effectiveness studies are needed to find out how results of efficacy studies generalize to routine clinical practice.

While a relatively high proportion of subjects respond to psychotherapeutic or antidepressant treatment a markedly lower proportion gain remission. The results of research on combining psychotherapeutic and psychopharmacological treatments seem mixed. There may be some particular patient subgroups for which a combination treatment may be most beneficial. Switching to another treatment in case the first one fails is also beneficial for many [157]. Psychotherapy – when needed - should be as readily available as pharmacological treatment among adolescent psychiatric patients. Obviously, large studies with longer follow-ups are needed. Research on side effects of SSRIs indicate need to weigh the expected gains and harms of antidepressants and for careful and systematic monitoring of treatment response and side effects. The impact of family conflict and/or parental depression on the treatment of adolescent’s mood disorder should be actively taken into account. Finally, efforts in defining as clearly as possible etiologically different subtypes of depression enabling more individualized treatment should continue [158, 159].

4.3. Treatment of Suicidal Youth

4.3.1. Psychosocial Treatment of Suicidal Patients

Treatment of suicidal adolescents is complicated by high rates of treatment refusal and drop-out, and low treatment engagement [160 - 162]. Therefore, one of the areas of interest is to develop methods to increase adherence to treatment and to develop interventions which reach suicidal adolescents as effectively as possible [161]. It has been suggested that effective interventions should focus on specific aspects of psychopathology (e.g. depression, conduct disorders) as well as parental attitudes towards the treatment [160]. Emergency unit interventions involving family members have also been recommended [161]. However, there are few ED interventions for suicidal patient and none have assessed cost-effectiveness [162, 163].

Generally, while some treatments have been shown to be effective in treating the underlying psychiatric disorder or reducing suicidal ideation, it has been more difficult to find an intervention successful in decreasing the actual frequency of attempted suicide [49] or reattempts of suicide [164]. While there is no clear consensus on which of the several risk factors behind suicidal behaviour should be targets for interventions [19], it has been suggested that treatment could be targeted on the development of distress tolerance and emotion regulation, and enhancement of protective elements in family and school [165] and not to be limited to the acute phase only [166]. Interventions taking into account multiple risk and protective factors and the natural ecology of the adolescent, such as multisystemic therapy (MST), seem also promising [166].

Of various psychotherapies, cognitive-behavioral therapy (CBT) approaches have been mostly studied in the treatment of suicidal adolescents [165, 167] as well adolescents deliberately harming themselves [168] although intervention studies in this high risk groups are scarce. A specific, CBT-based and manualized method for adolescents at high risk for repeated suicide attempts has been developed and shown to be feasible among adolescent psychiatric patients in the US [167] but further studies have to be performed on its efficacy on prevention of reattempted suicide as well as feasibility in health care systems outside USA. Moreover, Dialectical Behavior Therapy (DBT), has been shown to be effective in the treatment suicidal behaviour especially in the context of borderline personality disorder [169] while studies in adolescent populations are scarce. In a study of 62 adolescent psychiatric inpatients, it was observed that DBT was feasible to implement and conduct and significantly reduced suicidal behavioural incidents in one-year follow-up [170].

Also other than individual therapies have been developed for suicidal youth. Attachment-based family therapy (ABFT), a manualized family therapy specifically designed to target family processes associated with depression and suicide, emerges from interpersonal theories suggesting that depression and suicide can be precipitated, exacerbated or buffered against by the quality of family relationships [171, 172]. Group therapy was found to be effective in reducing self-injurious behaviour among adolescents [173], however, a recent attempt to replicate this effect by the same group yield the opposite result: those in the group therapy condition were more likely compared with the controls to have engaged in self-injury after the intervention [174].

It may well be that the treatment approach and results achieved also vary by the underlying psychopathology and that in many cases adolescents, and especially those suffering from conduct disorders, could benefit from intensive treatment integrated into their natural ecology. There might also be differences in the underlying mechanisms between amelioration of depressive symptoms or suicidal ideation and the diminishing of actual suicidal behaviour. Interventions that succeed in reducing the rate of suicide attempts could also have beneficial impact on various phenomena often co-occurring or following suicide attempts (e.g. quality of life, mental health costs, psychosocial adversity) [166].

4.3.2. Biological Treatment of Suicidal Youth

Psychopharmacological treatment or ECT is mainly directed by the underlying psychopathology. Suicidal behavior is one of the severity indicators when the adolescent psychiatric diagnostic assessment is performed. Safety measures have to be taken into account when prescribing medication to a suicidal adolescent: careful and frequent follow-up and limitation of the amount of medication prescribed at one time point. Psychopharmacological treatment is always
given in the context of treatment alliance and engagement to treatment is needed for medication to be effective and safe. Of specific preparations lithium possibly reduces suicidal behavior in adult bipolar depression [175] and clozapine in schizophrenia [176].

4.4. Postvention

After a suicide of a child or adolescent, postventive crisis interventions among the survivors, e.g. at school has been commonly recommended [177]. In a qualitative study of the psychosocial consequences for the surviving family, ten families of 88 suicide victims were interviewed [178]. Teenage suicide was found to be a devastating trauma for the surviving family with sustainable explanations for the suicide. A prolonged social and psychological isolation of the families was found. Post-suicide support was reportedly badly timed and insufficient, especially for younger siblings [178]. In a systematic review of interventions for people bereaved through suicide, McDaid et al. [179] found only eight studies, one of which was scientifically sound. There was some evidence of some benefit from interventions for people bereaved by suicide, but further research is needed in order to confirm whether interventions are helpful, and if so, for whom.

CONCLUSIONS

Youth suicide is a major public health concern worldwide. Prevention of suicide in young people is highly important. In order to be successful, youth suicide prevention cannot be restricted to e.g. psychiatric care but action needs to be taken at different levels in the society. Suicide is a complex phenomenon with psychological, social, biological, cultural and environmental factors involved. The consistent finding is that less than half of adolescent suicides have received psychiatric care. Physician education in depression recognition and treatment and restricting access to lethal methods have reportedly reduced suicide rates [9]. All expressions of suicide intent have to be taken seriously and indicate assessment of the adolescent’s development and life circumstances.

The main target of effective prevention of youthful suicides is to reduce suicide risk factors. Psychiatric morbidity, particularly mood disorders, antisocial disorders, and substance abuse are strongly related with youth suicide. In the treatment of child and adolescent depression, both psychosocial treatments and SSRIs have proved to be useful and efficacious. Research on adolescent psychosocial and psychotherapeutic interventions should address suicidal behavior actively. Treatment of parental mood and other psychiatric disorders is of high importance.

Different treatment modalities are useful in the treatment of suicidal youth. For high-risk youth providing continuity of care is important. Recent treatment studies among suicidal adolescents have reported promising results on safety planning and increased therapeutic contact early in treatment.

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