



Suicide Risk Factors among Adolescents: A Narrative Review

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Abstract

Introduction: The increasing global rates of adolescent morbidity and mortality highlights problems such as suicide during puberty. Adolescent suicide prevention along with adolescent health in general comprise a priority on the global agenda. Since suicide is associated with several behavioral symptoms, the present study seeks to present a narrative review of suicide risk factors among adolescents.

Methods: The present review study was conducted between January 2000 and November 2017 by navigating the Science Direct, Scopus, Web of Science, Cochrane, PsycINFO, Google Scholar and PubMed databases to find relevant articles containing the keywords “suicide” and “adolescent.” Of the 49,450 articles obtained from this search, 85 relevant articles were selected for review.

Results: According to the findings of the present study, suicide risk factors can be classified into three categories: Social and community risk factors, relationship risk factors and individual risk factors. Some studies examined several risk factors at the same time and all the studies investigated individual risk factors.

Conclusions: A large number of suicides are committed in association with behavioral symptoms and many have intersectionality. Recognizing these factors may contribute to suicide prevention and mediation. Adolescent-friendly services provided in accordance with the distinct culture of each society are considered an effective measure for suicide prevention.

INTRODUCTION

Suicide is defined as any intentional act causing own death [1]. It is reported as the third leading cause of death among adolescents in world. Each year in the world, 71,000 suicides occur among adolescents, and some adolescents attempt suicide 40 or more times before finally succeeding [2]. According to a report by the European Union, the rate of death by suicide was 4.5

per 100,000 adolescents in 2013 [3]. In fact, suicide represents a major health and social concern [4]. Adolescent suicide prevention is a public health priority on the global agenda [5]. Considering the variations in suicide rates in recent years, especially among adolescents between the ages of 10 and 24 in the world, it can be argued that the suicide rate is increasing among adolescents, often due to mental illness [6]. It is

important to note that adolescents often do not seek treatment for their problems and tend to underestimate their intensity [7]. In spite of the suicide-prevention measures adopted around the world, suicide-related morbidity and mortality rates continue to increase among adolescents [8].

Problems like suicide become more prominent around puberty. A majority of the world's adolescents live in developing and poor countries, and many of them are exposed to intentional and unintentional injuries, suicide, depression, high-risk behaviors, substance abuse, addiction, violence and sexual abuse [9]. Recent research suggests that social factors such as childhood, family dynamics, socioeconomic status, individual characteristics and psychological and behavioral issues affect adolescents' suicidal behaviors [10]. Adolescents' poor mental health status is also linked with low educational achievement and risk behaviors induced by drug abuse, violence and sexual activity. Poor mental health leads to violent behaviors, such as suicide [11]. Interpersonal relationships and psychological issues also play a significant role in suicide. Suicide is not a personal act committed by the individual alone; rather, the perceived difficulty of one's environment (family, friends and the society) and the lack of dependence on others help adolescents acquire the ability to reflect on and eventually commit suicide [12]. Individuals who attempt suicide at a younger age are more likely to repeat their attempt in the future than others and the risk of suicide and premature death is high among such individuals [13].

The WHO Adolescent Health Report notes that adolescent health is the subject of one of the top ten interventions in the health sector; this organization recognizes adolescent suicide prevention and adolescent health as priorities on the global health agenda [1, 14]. Research indicates that most suicides are demonstrated by behavioral risk factors whose recognition is effective in preventing adolescent suicide [15, 16]. A thorough understanding of the life circumstances and risks to which adolescents are exposed is required for reaching a proper framework for dealing with suicidal behavior among this group [17]. Since the reviewed studies on adolescent suicide have each considered only some of the factors related to this act, the present narrative review was conducted to detect suicide risk factors (ideations, thoughts and attempts) among adolescents aged 10 to 24 years based on the recent changes in the patterns of suicide.

METHODS

In this review study, all the articles published from January 2000 to December 2017 were searched using the Science Direct, Scopus, PubMed, Web of Science, Cochrane, PsycINFO and Google Scholar websites. Keywords were extracted using the MeSH terms. To find the relevant articles, the keywords 'adolescent', 'suicide', 'risk factor', 'adolescence', 'teenager', 'youth', 'teen' and 'young' were searched. Appropriate operators such as 'and' and 'or' and a combination of search strategies were used to search each database, and all the related articles were then retrieved.

Table 1. Strategy Search PubMed and Scopus

Strategy search (PubMed)	Strategy search (Scopus)
("adolescent"[tiab] OR "adolescence"[tiab] OR "teenager"[tiab] OR "youth"[tiab] OR "teen" [tiab] OR young [tiab]) AND "suicide"[tiab] AND "risk factor" [tiab]	TITLE-ABS("adolescent") OR TITLE-ABS ("adolescence") OR TITLE-ABS ("teenager") OR TITLE-ABS("youth") OR TITLE-ABS ("teen") OR TITLE-ABS("young") AND TITLE-ABS ("suicide") AND TITLE-ABS ("risk factor")

Inclusion and Exclusion Criteria

The following inclusion criteria were adopted: Age group 10-24 years, observational study, access to the full text of the articles, dealing with suicide risk factors (ideation, thoughts and attempts) and English or Persian language.

The exclusion criteria were: (1) Case studies, (2) review studies, (3) Studies on mental syndromes and chronic disease, (4) Studies in languages but English and Persian, (5) No access to original article, and (6) Unrelated reports.

Data Extraction

The two reviewers separately reviewed the titles and abstracts of the concerned articles with regard to the inclusion criteria as such the studies not meeting the concerned criteria were excluded from the study. Then the full text of the articles meeting the inclusion criteria were reviewed, and they, if appropriate, were included in

this study. The required data were extracted by two trained reviewers independently, and the cases of inconsistency and disagreement were resolved by a third reviewer. The required information were the names of the authors, year of publication, place of research, sample size, suicide risk factors and results.

The Quality Evaluation

After deleting duplicates, two independent authors reviewed all studies, starting with the title and abstract screening for inclusion criteria. Finally, selected articles by Checklist designed the research team were reviewed, (In terms of: 1- a clear statement of research question and objective; 2-specified and defined study subject; 3-appropriate methodology and research design used, 4-identified confounding factor, 5-rigorous data analysis, and 6-clear statement of findings), To evaluate each item, the score of zero and one was considered, and if the articles were scored at least three items, they were

included in the study. The coefficient of agreement between the reviewers was ($K = 0.85$).

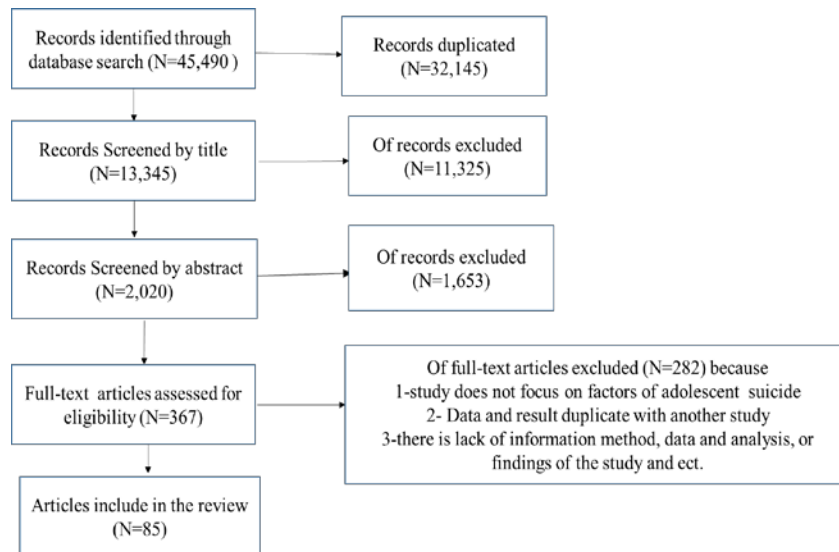


Figure 1. The Flowchart of Article Selection

RESULTS

After reviewing each article's title, inclusion criteria, summary and main text, a total of 85 studies were included (Figure 1). The findings resulted in three categories of suicide risk factors (social and community risk factors, relationship risk factors and individual risk factors). Some studies examined several risk factors at the same time and all the studies investigated individual risk factors. The findings have been summarized in the three following tables.

Social and Community Risk Factors

Of the 85 studies examined in this review, 12 referred to the social and community risk factors of suicide attempts among adolescents (Table 2). The risk factors consisted of access to means (four studies), inappropriate media reporting and use, i.e. social and mass media (four studies), stigma associated with help-seeking behaviors (one study), disaster (one study), food insecurity (one study) and homelessness (one study).

Access to Means

Direct access to suicide tools enhances the risk of suicide. The availability of and preference for specific tools depend on the geography and cultural context of the community in question [16, 18, 19].

Inappropriate Media Reporting and Use

Mass media, computers and the internet play a critical role in adolescents' life and provide them with extensive information. False information, inappropriate suicide reports, uncommon suicide techniques or suicide images are hazardous to adolescents and are considered a suicide risk factor [20, 21].

Stigma Associated with Help-Seeking Behaviors

In many societies, the stigma associated with help-seeking behaviors, physical problems, substance abuse or other emotional stressors acts as an obstacle to problem-solving. Stigma is an important factor in resisting change and preventing suicide attempts [22, 23]. Due to the stigma imposed by the community, adolescents are less likely to seek health care when they feel suicidal, and this propensity is regarded as a major health challenge [24].

Disaster

Disasters affect adolescents' mental health to a great extent and with a wide range of consequences that vary based on the structure of the adolescent's family and the community [25]. Disasters increase the risk of suicide due to their destructive impact on social health, general health, housing, employment and financial security [26].

Food Insecurity and Homelessness

Food insecurity is likely to be associated with suicide attempts and the tendency toward death-related thoughts. Suicide is strongly correlated with food insecurity and depression [27, 28]. Homelessness is another suicide risk factor [29].

Relationship Risk Factors

Reviewing the 85 studies revealed 29 studies on the relationship risk factors associated with suicide among adolescents (Table 3). The two main factors in this category included sense of isolation and the lack of social support (eight studies) and relationship conflict, discord or loss (family, peers and the environment) [26 studies].

Sense of Isolation and Lack of Social Support:

Adolescents may experience feelings of isolation from their family members, peers, friends and others, and such experiences are associated with depression, loneliness and frustration. Such feelings of loneliness often appear in response to a negative life event [30, 31]. Suicidal behaviors often emerge as a personal-psychological response to social contexts that offer poor support. At a higher level, these behaviors reflect the lack of well-being and cohesion in the community. Social cohesion can be represented at several levels (namely, in the individual, family, school, among peers, the local community and social groups). Adolescents who have a better relationship possess a stronger sense of purposefulness and security [32]. Of the eight studies that examined this issue, only one suggested that there is no significant relationship between social support and

suicide [33]. This finding might be explained by the heterogeneity of that study's samples, cultural issues and measurement tools.

Relationship Conflict, Discord or Loss

Relationship conflicts (such as parental divorce, the loss of a parent, discord among the parents and/or peers and conflict in school) lead to feelings of sadness, depression and stress in adolescents, and all of these feelings can increase the risk of suicide. Poor relationships are thus a risk factor for suicide [34, 35]. Of the 26 studies examined on relationship conflicts, discord or loss, only three did not show a significant relationship between this risk factor and suicide [28, 31, 36]. This inconsistency might be caused by the different measurement instruments and/or the samples involved in the studies.

Table 2. The Social and Community Risk Factors of Adolescent Suicide

Suicide Risk Factors / Researchers, Year and Place of Study	Sample Size	Results
Access to means		
(Shilubane et al., 2013), South Africa [37]	(n=10,699 in 2002 and 10,270 in 2008),	Carrying a weapon is a risk factor for suicide.
(Bearman & Moody, 2004), United States [34]	(n=13465)	Owning a gun in the household causes an increased risk of suicide.
(Gilreath et al., 2016), California [38]	(n=390,028)	Military-connected youth are at a higher risk for suicidal ideations, plans and attempts.
(Kukoyi, Shuaib, Campbell-Forrester, Crossman, & Jolly, 2010), Western Jamaica [36]	(n=342)	Ease of access to lethal substances/weapons is positively associated with suicidal ideation.
Inappropriate media reporting and use (social and mass media)		
(K. Kim et al., 2006), Korea [20]	(n=1573)	In the internet-addicted group, depression and suicide ideations are highest in terms of frequency.
(Liu et al., 2017), Taipei [39]	(n=2479)	Internet addiction and internet exposure are related to suicidal thoughts.
(S. Y. Lee et al., 2016), Korea [40]	(n=221,265)	Positive association exists between internet use and suicidal ideation/attempts.
(Zaborskis, Sirvyte, & Zemaitiene, 2016), Lithuania [41]	(n=3572)	Electronic media communication with parents is inversely associated with suicidal behaviors.
Stigma associated with help-seeking behaviors		
(Tormoen et al., 2014), Oslo, Norway. [24]	(n=11,440)	The lack of contact with psychiatric services is associated with suicide.
Disasters		
(Stratta et al., 2014), Lithuania [25]	(n=3043)	The lack of emotional coping after an earthquake is a risk factor for suicidal ideation.
Food insecurity		
(Randall et al., 2014), West African countries (the Republic of Benin) [28]	(n=2,690)	Food insecurity is a risk factor for suicide attempts and ideations.
Homelessness		
(Bhatta et al., 2014), United States [29]	(n=3156)	Homelessness is associated with an increased odds of suicide ideations.

Table3. Relationship Risk Factors for Suicide among Adolescents

Suicide risk factors / Researchers, year and place of study	Sample size	Results
Sense of isolation and lack of social support		
(Perkins & Hartless, 2002), Michigan [35]	(n=14,922)	An unsupportive family is a risk factor for suicide ideations.
(Bearman & Moody, 2004), US [34]	(n=13,465)	Socially-isolated women were more likely to have suicidal thoughts.
(Greening & Stoppelbein, 2002), US [42]	(n=1098)	Low family and peer support correlates significantly with suicide.

(Randall et al., 2014), West African countries (the Republic of Benin) [28]	(n=2690)	Using the multinomial regression analysis showed that loneliness is associated with suicidal ideations and suicide attempts.
(Kelly et al., 2001), Pittsburgh [33] [43]	(n=1082)	The correlation between suicide and social support was not statistically significant.
(Windle, 2004), New York [44]	(n=1216)	Lower family support is a significant mediator (e.g., depression, stressful events, binge drinking) that leads to suicidal behaviors.
(Swahn, Palmier, Kasirye, & Yao, 2012), Kampala [45]	(n=457)	Loneliness was associated significantly with suicidal ideations, according to the multivariate analysis.
(Y. Y. Chan et al., 2016), Malaysia [46]	(n=2789)	The lack of supportive peers was identified as a risk factor for adolescents' suicidal ideations.
Relationship conflict, discord or loss (family, peer and the environment)		
(Brent et al., 2002), Western Pennsylvania counties [47]	(n=7721)	Parent-child discord is a significant risk factor for suicide.
(Perkins & Hartless, 2002), Michigan [35]	(n=14,922)	School discouragement is correlated with suicide
(Bearman & Moody, 2004), United States [34]	(n=13465)	Having friends or family members who have attempted suicide or a single-parent household increase the odds of suicide.
(Prinstein, Boergers, Spirito, Little, & Grapentine, 2000), New England [43]	(n=96)	Less close friendships were associated with suicidal ideations. The indirect pathways to these ideations included substance use and depression symptoms.
(H. S. Kim & Kim, 2008), Korea [48]	(n=2100)	Parent-child relationships, coping strategies and parental childrearing patterns were related significantly to suicide.
(S. Y. Lee et al., 2016), Korea [40]	(n=221,265)	The family structure (having step parents, single parents and being orphaned) acts as an effect-modifier in the relationship between internet addiction and suicidal ideation/attempts.
(S. Y. Kim, Sim, & Choi, 2017), Korea [49]	(n=121,106)	School performance is related significantly to energy drink consumption and suicide.
(Kukoyi et al., 2010), Western Jamaica [36]	(n=342)	School performance is not significantly associated with suicide.
(Kuhlberg, Peña, & Zayas, 2010), New York [50]	(n=226)	Using the path analysis, familism efforts were found to be associated with lower levels of parent-adolescent conflict and low adolescent self-esteem, and internalizing behaviors mediated the relationship between parent-adolescent conflict and suicide attempts.
(Randall et al., 2014), West African countries (the Republic of Benin) [28]	(n=2690)	The number of close friends is not a risk factor for suicide ideations.
(Zaborskis et al., 2016), Lithuania [41]	(n=3572)	A non-intact family structure and weak family functioning are significant risk factors for suicidal ideations and attempts.
(Bernburg, Thorlindsson, & Sigfusdottir, 2009), Iceland [51]	(n=5331)	Parental conflict/fights were correlated with suicide attempts, suicide ideations and suicide suggestion.
(Cerel & Roberts, 2005), US [52]	(n=5918)	Declining parent-child relationships and family connectedness are risk factors for suicide.
(Silviken & Kvernmo, 2007), Arctic Norway [53]	(n=591)	Single-parent homes and paternal overprotection are associated with suicide attempts.
(McMahon, Corcoran, Keeley, Perry, & Arensman, 2013), Ireland [54]	(n=3881)	Problems with peers or friends and problems with or between the parents increase the odds of suicide.
(G. Y. Lee & Choi, 2015), Korea [55]	(n=72,435)	Living apart from the family is correlated with suicidal ideations in boys but not in girls.
(Xing et al., 2010), China [30]	(n=13,512)	Improper parental rearing behaviors, separation from the parents and social problems in the family members are important risk factors for suicide.
(Ahmad et al., 2014), Malaysia [31]	(n=2344)	Parental connectedness, parental supervision, parental bonding, supportive peers and parental respect are not correlated with suicide, but having close friends is correlated with this tendency.
(Young, Sweeting, & Ellaway, 2011), West of Scotland [56]	(n=1698)	Perceptions of the local area (e.g. neighborhood cohesion, safety/civility and facilities) and school connectedness (school engagement and involvement) are correlated with suicide.
(Yao et al., 2014), Anhui Province of China [57]	(n=5249)	Passive coping, lower family satisfaction, lower school satisfaction and lower living environment satisfaction increase the risk of suicide ideation.
(K. Lee, Namkoong, Choi, & Park, 2014), Korea [58]	(n=73238)	Suicidal ideations increase significantly in adolescents with a remarried parent.
(Y. Y. Chan et al., 2016), Malaysia [46]	(n=2789)	The lack of close friends was identified as a risk factor for adolescents' suicidal ideation.
(Sharma, Nam, Kim, & Kim, 2015), Peru [59]	(n=916)	Having parents who understand the adolescents' problems and spend time with them are significant barriers for suicidal ideation and attempt in adolescents.
(Yen et al., 2014), Taiwan [60]	(n=5027)	Low family functioning (adaptability, partnership, growth, affection and resolve) are significantly associated with suicidal ideation.

(Chau, Kabuth, & Chau, 2016), Northeast of France [61]	(n=1559)	The family structure (divorced or separated parents and reconstructed family and single parents and other types) is a factor associated with suicide ideation and attempt.
(Govender et al., 2013), Durban, South Africa [62]	(n=239)	Negative correlations exist between adolescents' perceptions of school connectedness and suicidal ideations.

Individual risk factors

All the 85 studies had examined the individual risk factors of suicide, and some of them had examined multiple risk factors in this category at the same time. As Table 4 shows, the individual risk factors included: Previous suicide attempts (one study), mental disorders (30 studies), alcohol and substance abuse (36 studies), hopelessness (13 studies), chronic pain and illness (three studies), a family and peer history of suicide (three studies), biological factors (one study), sexual orientation (five studies), Body Mass Index (four studies), body image (three studies), sleep disorders (five studies), low socioeconomic status (12 studies), sexual abuse and sexual intercourse (13 studies), violence (eight studies), immigration (three studies), gender (seven studies), inappropriate diet and eating disorders (two studies), race/ethnicity (five studies), low self-esteem (five studies), lack of religious beliefs (three studies) and lack of coping skills (five studies).

Previous suicide attempts

A previous attempt to commit suicide is one of the most important suicide risk factors [63]. According to the framework of the Interpersonal Psychological Theory, a suicide attempt demonstrates the individual's acquired capacity for suicide and reveals an inclination toward death. Such a capacity results in fearlessness and suicide re-commitment [64].

Mental disorders

The incidence of mental disorders among adolescents also increases the risk of suicide, especially when accompanied by other risk factors. A large percentage of mental disorders, such as depression, anxiety, stress, antisocial behaviors, schizophrenia and bipolar disorder, lead some patients to suicide attempts [65, 66]. The risk of suicide is different for different disorders; however, the highest rate is reported for depression [67]. Adolescents suffering from more than one mental disorder are more likely to attempt or commit suicide than those free of mental disorders [68].

Alcohol and substance abuse

Substance abuse enhances the likeliness of suicide among adolescents by as much as two to five times [55]. In fact, substance abuse disorders increase the risk of suicide, and the abuse of alcohol and other substances is observed in 25-50% of all cases of suicide [69]. Of all the studies carried out in this field, only one had reported no significant relationship between drug abuse and suicide rates, likely because of the low rate of drug abuse among the study's participants [36].

Hopelessness

Hopelessness results in poor problem-solving confidence, the use of an approach-avoidance style and the personal control of emotions and acts as a mediator of suicide [70]. People with the highest rates of disappointment in their life have the highest risk for suicide attempt due to their inability to deal with problems. Understanding disappointment is a key to recognizing the psychological aspect of suicide [71-73].

Chronic pain and illness

Pain serves as the mediator of many mental problems, including depression and anxiety. Pain and muscle tension increase the risk of suicide by as much as two times [65, 74]. In adolescents suffering from HIV and AIDS, suicide occurs more often due to the experience of stigmatization, discrimination, isolation, lack of social protection offered by family and friends, the loss of parents or family members, and poor and scarce nutrition [45].

A family and peer history of suicide

When a family member commits suicide, it affects everyone in the family [75, 76]. One family member's suicide can bring out feelings of grief, sadness, stress, sin, shame, anger, anxiety and discomfort among the other family members. The family structure loses its sustainability, some sources of support are diminished and the resultant stigma prevents help-seeking behaviors [77].

Biological factors

Biological changes are also associated with suicide. Serotonin levels are considered an effective biological marker for predicting suicidal behaviors. Low levels of serotonin have been associated with serious suicide attempts in those diagnosed with mood and behavioral disorders [78, 79].

Sexual orientation

The suicide rate is higher among the lesbian, gay and bisexual (LGB) community than among the heterosexual population. Suicide is an urgent health issue, especially among LGB adolescents. Sexual orientation cannot explain suicidal behaviors in and by itself, but the role of family-connectedness, adult caring and school safety is particularly important in the case of those with other orientations [80].

Body Mass Index

Research has demonstrated a correlation between the Body Mass Index (BMI), perceived weight and suicidal thoughts and attempts. BMI affects suicidal behaviors

among adolescents directly and indirectly through perceived weight. Adolescents with a false impression of weight and BMI may force themselves to binge-eat/drink, vomit, take laxatives or diet pills or fast, which can all put them at a higher risk of suicide [81]. Only one of the examined studies did not show a significant relationship between BMI and suicide. This inconsistency can be explained by the fact that the majority of the adolescents in that study had a normal weight [82].

Body image

Misconceptions about body image are a valuable indicator of suicidal behaviors. Body image distortion (also known as the body dysmorphic disorder) is often accompanied by feelings of stress and depression. Depressed adolescents experience lower levels of self-confidence, success and quality of life. Adolescents should be monitored for the negative effects of body image distortion on their mental and physical health [83]. Only one study showed a lack of correlation between body image and suicide attempts, perhaps due to the fact that the majority of the participants had a normal BMI [59].

Sleep disorders

The National Sleep Foundation recommends that adolescents get eight to ten hours of sleep daily to sustain their general, cognitive, emotional and physical health. Sleeping less than six hours per day is considered inadequate [84]. For adolescents, sleeping has a positive impact on the body and leads to feelings of well-being and comfort and mental acuity and puberty-related biological and mental development [49, 85]. A short sleeping time is significantly linked to depression, and inadequate sleep decreases serotonin levels [86, 87].

Low socioeconomic status

The classic assessment of socioeconomic status involves determining the parents' occupation, level of education and income. Adolescents with a lower socioeconomic status face problems such as depression and psychological disorders, and are more likely to commit suicide than those from higher socioeconomic levels [88]. Some of the reviewed studies showed that a low socioeconomic status causes an increase in suicide attempts [53, 88-91]; however, others reached the opposite [37, 92, 93]. This inconsistency might be due to the higher frequency of hospital referrals for individuals with a higher socioeconomic status, the adolescents' lack of awareness about their parents' socioeconomic status and the lack of a precise definition for the term 'socioeconomic status'.

Sexual abuse and sexual intercourse

Sexual abuse is indirectly correlated with suicidal ideation, and sexual abuse among adolescent's results in negative health outcomes. Unprotected sexual contact might also lead to unintended pregnancy, unsafe abortions, HIV and sexually transmitted infections. Sexual abuse causes mental anxiety and can thus provoke suicide. Some of the reviewed articles showed that alcohol abuse, sexual abuse and suicidal ideation form a cluster of high-risk behaviors [35, 82, 94].

Violence

Violence has been linked to income and race [19]. Alcohol, depression, poor serotonin function, personality disorder and individual crises trigger violent behaviors such as careless driving, which may lead to suicidal behavior among adolescents. Violence has a significant role in suicide attempts, and violence and suicide share many of their risk factors [37, 62, 95, 96]. Adolescents who are physically, sexually and emotionally violated are at an increased risk of mental illness and suicide due to the cumulative effects of these factors over time [97, 98].

Immigration

To the researchers' knowledge, few studies have been carried out to date for examining the relationship between suicide and immigration; however, immigration is generally considered a suicide risk factor [51, 99]. Immigration causes stress as a result of the lack of cultural integrity, the necessity to use a different language, the force to comply with new norms and ways of life, the experience of discrimination and changes in the socioeconomic status [100].

Gender

In all the reviewed studies, being female was identified as a risk factor for suicidal ideation and attempts [39, 40]. This finding may be due to women's strong emotions, dependencies, different roles from men, puberty changes and higher levels of vulnerability. Girls attempt suicide more often than boys; however, boys are generally more successful in their suicide attempts [57].

Inappropriate diet and eating disorders

There are some special dietary patterns among adolescents, such as soft drink and sweet food consumption that affect their mental health. In general, a poor mental health is associated with suicide [101]. Eating disorders are associated with psychosocial distress, suicidal ideation and abuse in adolescents [102]. Few studies have been conducted on this topic to date, but given the importance of suicide among adolescents and the high prevalence of eating disorders in this age group, the issue requires further research.

Table 4. The Individual Risk Factors of Suicide in Adolescents

Suicide risk factors / Researchers, year and place of study	Sample size	Results
Previous suicide attempt		
(Ortin et al., 2012), New York [64]	(n=2189)	A previous suicide attempt is an important factor involved in re-attempts.
Mental disorders		
(Wichström & Hegna, 2003), Norway [103]	(n=2924),	Depression is associated with suicide in adolescents.
(Russell & Joyner, 2001), US [75]	(n=6254)	Depression is associated with suicidal ideations.
(Sunhee Park, 2013), Korea [104]	(n=2358)	Depression and stress are important factors involved in suicide in boys and girls aged 12 to 18.
(Taliaferro & Muehlenkamp, 2014), Minnesota, US [105]	(n=70,022)	Depressive symptoms are an important risk factor for distinguishing youth who report suicidal ideations or behaviors from those without a history of suicidality.
(Thompson et al., 2005), US [72]	(n=1287)	Anxiety caused by depression contributes to suicidal behaviors in adolescent girls and boys.
(McMahon et al., 2013), Ireland [54]	(n=3881)	Depression and anxiety increase the chance of suicide
(Gallagher, Prinstein, Simon, & Spirito, 2014), northeastern US [106]	(n=144)	Anxiety has direct and indirect effects through perceived social support on suicide ideations.
(S. Lee & Shin, 2017), Korea [65]	(n=72,435)	Using the logistic regression, high stress is found to be one of the predictors of suicide.
(G. Y. Lee & Choi, 2015), Korea [55]	(n=72,435)	Depression is a risk factor for suicide.
(Bearman & Moody, 2004), US [34]	(n=13,465)	Depression is associated with suicidal ideations.
(S. Y. Kim et al., 2017), Korea [49]	(n=121,106)	Higher stress levels are significantly associated with suicide attempts. Stress is also proportionally related to a higher energy drink intake. Frequent energy drink intake is associated significantly with suicide attempts.
(Windle, 2004), New York [44]	(n=1216)	The findings showed that mediating factors such as depression and anxiety predict suicidal behaviors significantly.
(Liu et al., 2017), Taipei [39]	(n=2479)	Depression is related to suicidal ideations.
(Ahmad et al., 2014), Malaysia [31]	(n=2344)	The analysis revealed that suicidal ideations are positively associated with depression, anxiety and stress.
(Wang, Lai, Hsu, & Hsu, 2011), Taiwan [107]	(n=577)	Stress and depression are the most common causes of suicide in the 15-19 age group.
(Bhatta et al., 2014), United States [29]	(n=3156)	Depression is associated with suicidal ideations.
(Randall et al., 2014), West African countries (the Republic of Benin) [28]	(n=2690)	The multivariable multinomial logistic regression showed that anxiety is associated with suicide attempts.
(S. M. Kim, Baek, Han, Lee, & Yurgelun-Todd, 2015), Korea [108]	(n=73,238)	High perceived stress is related significantly to suicide.
(Y. Y. Chan et al., 2016), Malaysia [46]	(n=2789)	Anxiety or apprehension are considered risk factors for suicidal ideations in adolescents.
(Yen et al., 2014), Taiwan [60]	(n=5027)	Adolescents with anxiety are more likely to have suicidal ideations and attempt suicide compared to adolescents with no symptoms of anxiety.
(Giletta et al., 2015), US [109]	(n=138)	Compared to the girls in the negative control group, the girls in the depression group were at an increased risk of reporting suicidal ideations.
(Langhinrichsen-Rohling, Lamis, & Malone, 2010), US [110]	(n=1533)	Depression mediated the relationship between sexual attraction and suicide proneness.
(Chau et al., 2016), northeastern France [61]	(n=1559)	Depression is a factor associated with suicidal ideations and attempts.
(Gart & Kelly, 2015), US [66]	(n=15,363)	Depression correlates positively with suicidal ideations.
(Strandheim et al., 2014), Norway [74]	(n=2399)	Anxiety and depressive symptoms are associated with reports of suicide attempt.
(Verona & Javdani, 2011), US [111]	(n=223)	Depression and anxiety both have a significant relationship with suicidal ideations and behaviors.
(Chung et al., 2014), Taiwan [112]	(n=607)	Depressive disorder plays an important role in suicidal ideations in adolescents.
(H. S. Kim & Kim, 2008), Korea	(n=2100)	The logistic regression analysis revealed that depression is a predictive risk factor of suicide.
(Subin Park, Lee, & Lee, 2016), Korea [113]	(n=68,043)	Stress and depression increase the use of energy drinks and junk food and the rate of suicide.
(Ahookhosh et al., 2017), Iran [73]	(n=120)	Depression and anxiety have a significant relationship with suicidal ideations.
Alcohol and substance abuse		
(Ziaei et al., 2017), Tabriz, Iran [114]	(n=1517)	Smoking, alcohol consumption and substance abuse are positively associated with suicidal ideations.
(Chau et al., 2016), northeastern France [61]	(n=1559)	Alcohol, tobacco and cannabis consumption are factors associated with suicidal ideations and attempts.

(Govender et al., 2013), Durban, South Africa [62]	(n=239)	Suicidal ideations are positively correlated with substance abuse.
(S. A. Lee et al., 2016), Korea [88]	(n=69,585)	Current smoking and alcohol consumption are risk factors for suicidal ideations and attempts.
(D.-Y. Lee, Kim, Woo, Yoon, & Choi, 2016), Korea [115]	(n=129,900)	Smoking and drug abuse are more common in homosexuals and have an indirect effect on suicide.
(Shilubane et al., 2013), South Africa [37]	(n=10,699 in 2002 and 10,270 in 2008)	Smoking, alcohol consumption and substance and illegal drug abuse are related to suicidal ideations.
(Zarrouq et al., 2015), Morocco [116]	(n=3020)	Tobacco consumption and substance (alcohol and cannabis) abuse are risk factors for suicidal behaviors.
(Randall et al., 2014), West African countries (the Republic of Benin) [28]	(n=2690)	Alcohol, substance and tobacco abuse are associated with suicide attempts according to the multivariable multinomial logistic regression.
(Bae, Ye, Chen, Rivers, & Singh, 2005), US [117]	(n=13,601)	Using hallucinogenic drugs is associated with suicide attempt in adolescents.
(Cerel & Roberts, 2005), US [52]	(n=5918)	Adolescents who have experienced a family member's death by suicide are more likely to report marijuana and alcohol abuse and also suicidal ideations and attempts.
(Chen et al., 2005), Malaysia [95]	(n=4500)	Driving a vehicle after drinking alcohol is an important factor associated with suicidal behaviors.
(Peltzer & Pengpid, 2012), Thailand [81]	(n=2758)	Current alcohol abuse affects suicidal ideations according to the multivariable analysis.
(Kelly, Cornelius, & Lynch, 2002), Pittsburgh [118]	(n=96)	Higher rates of cocaine, hallucinogen and alcohol abuse are risk factors of suicide attempt.
(Le, Behnken, Markham, & Temple, 2011), US [119]	(n=6294)	Alcohol use is a potential mediator of forced sexual intercourse and suicidality.
(Russell & Joyner, 2001), US [75]	(n=6254)	Sexual orientation has a strong impact on suicidal ideations through alcohol abuse.
(Taliaferro & Muehlenkamp, 2014), Minnesota [105]	(n=70,022)	Smoking is a risk factor for suicide attempts.
(Mustanski, Andrews, Herrick, Stall, & Schnarrs, 2014), US [120]	(n=16,977)	Binge drinking and marijuana and cocaine use correlate with suicide attempts.
(L. F. Chan et al., 2013), Malaysia [94]	(n=4581)	Substance abuse increases the risk of suicidal behaviors.
(Silviken & Kvernmo, 2007), Arctic Norway [53]	(n=591)	Smoking is an important risk factor for suicide attempts.
(McMahon et al., 2013), Ireland [54]	(n=3881)	Smoking increases the chance of suicide.
(Bearman & Moody, 2004), US [34]	(n=13,465)	Drunkenness frequency among boys and girls is a risk factor for suicide attempts.
(G. Y. Lee & Choi, 2015), Korea [55]	(n=72,435)	According to the logistic regression analysis, suicidal ideation can be predicted by substance and alcohol abuse and smoking.
(Windle, 2004), New York [44]	(n=1216)	Binge drinking correlates significantly with suicide attempts.
(Swahn et al., 2012), Kampala [45]	(n=457)	Alcohol abuse is associated significantly with suicide attempts as per the multivariate analysis.
(Liu et al., 2017), Taipei [39]	(n=2479)	Alcohol/tobacco abuse is related significantly to an increased risk of suicide attempt.
(Ahmad et al., 2014), Malaysia [31]	(n=2344)	The analysis revealed that suicidal ideations are positively linked to substance abuse.
(S. M. Kim et al., 2015), Korea [108]	(n=73,238)	Drug and heavy alcohol abuse are risk factors of suicide attempt.
(Rossow & Moan, 2012), Norway [121]	(n=32,340)	The results suggest that heavy drinking in the parents is a risk factor for suicidal behaviors in adolescents.
(Sunhee Park & Kim, 2015), Korea [122]	(n=75,643)	This study revealed statistically significant associations between smoking and suicidal behaviors.
(Y. Y. Chan et al., 2016), Malaysia [46]	(n=2789)	Smoking, drinking and illicit drug use are not associated with suicidal ideation.
(Sharma et al., 2015), Peru [59]	(n=916)	Smoking, alcohol and illicit drug abuse are related to suicide attempt.
(Chau et al., 2016), northeastern France [61]	(n=1559)	Alcohol, tobacco, cannabis and drug consumption is associated with suicidal ideations and attempts.
(Gart & Kelly, 2015), US [66]	(n=15,363)	Illegal drug, alcohol and tobacco use affects suicidal ideations in adolescents.
(Strandheim et al., 2014), Norway [74]	(n=2399)	Smoking increases the odds of having suicidal thoughts and correlates strongly with early alcohol intoxication.
(Verona & Javdani, 2011), US [111]	(n=223)	Substance (alcohol and cannabis) abuse is related to suicidal behaviors or threats/attempts.
(Kukoyi et al., 2010), Western Jamaica [36]	(n=342)	Substance abuse is not significantly associated with either suicide attempt or ideation.
Hopelessness		
(J. Lee & Lee, 2015), Korea [82]	(n=20,264)	In people who have a poor body image, hopelessness is a mediator of suicide.
(Perkins & Hartless, 2002), Michigan [35]	(n=14,922)	Hopelessness has a significant correlation with suicide.

(Ahookhosh et al., 2017), Iran [73]	(n=120)	Hopelessness has direct as well as indirect effects on suicide through family cohesion.
(D.-Y. Lee et al., 2016), Korea [115]	(n=129,900)	Hopelessness increases the chance of suicide in homosexual adolescents.
(Shilubane et al., 2013), South Africa [37]	(n=10,699 in 2002 and 10,270 in 2008)	Hopelessness contributes significantly to explaining suicidal ideations and attempts, next to being the victim or the actor of violent acts and illegal substance use.
(Bae et al., 2005), US [117]	(n=13,601)	Hopelessness is linked to suicide attempts.
(Chen et al., 2005), Malaysia [95]	(n=4500)	According to the multiple logistic regression, hopelessness is a factor significantly related to suicidal behaviors.
(Russell & Joyner, 2001), US [75]	(n=6254)	The strong effect of sexual orientation on suicidal thoughts is mediated by hopelessness.
(Taliaferro & Muehlenkamp, 2014), Minnesota, US [105]	(n=70,022)	Hopelessness increases the chance of suicide.
(Thompson et al., 2005), US [72]	(n=1287)	Hopelessness has direct and indirect effects on suicidal behaviors through anxiety.
(Swahn et al., 2012), Kampala [45]	(n=457)	Hopelessness is associated significantly with suicide ideations as per the multivariate analyses.
(Messias, Castro, Saini, Usman, & Peebles, 2011), US [123]	(n=30,451)	Hopelessness is a significant risk for suicidal ideations and suicide planning.
(Langhinrichsen-Rohling et al., 2010), US [110]	(n=1533)	Hopelessness has a positive correlation with suicide.
Chronic pain and illness		
(S. Lee & Shin, 2017), Korea [65]	(n=72,435)	Atopic Dermatitis (AD) is a chronic skin disease. In the multivariate model, the relationships between AD and suicide ideation, suicide planning and suicide attempt are statistically significant.
(Van Tilburg, Spence, Whitehead, Bangdiwala, & Goldston, 2011), US [124]	(n=9970)	Chronic pain in adolescence is a risk factor for suicide ideations.
(Swahn et al., 2012), Kampala	(n=457)	Any STIs or HIV infections are associated significantly with suicide ideations as per the multivariate analysis.
A family and peer history of suicide		
(Bearman & Moody, 2004), US [34]	(n=13465)	The odds of having suicidal thoughts increase for both boys and girls when a family member has attempted suicide.
(Linsell et al., 2010), Korea [125]	(n=2965)	History of suicidal ideation in the parents was significantly higher among adolescents who reported suicidal ideations compared to those who reported none.
(Russell & Joyner, 2001), US [75]	(n=6254)	Suicide attempts by peers and family members have a strong effect on suicidal thoughts in adolescents.
Biological factors		
(Clark, 2003), US [77]	(n=60)	The serum tryptophan concentration is correlated with suicidal behaviors.
Sexual orientation		
(Bearman & Moody, 2004), US [34]	(n=13,465)	Homosexual romantic attraction increases the odds of thinking about suicide for all adolescents.
(Wichström & Hegna, 2003), Norway [103]	(n=2924)	Same-sex sexual contact is associated with an increased odds of suicide attempt among girls but not among boys.
(Russell & Joyner, 2001), US [75]	(n=6254)	There is a strong link between adolescent sexual orientation and suicidal thoughts and behaviors.
(Stone et al., 2014), US [126]	(n=42,343)	Sexual orientation is associated with suicidal ideations, suicide plans and attempts and medically-serious attempts.
(Arnarsson et al., 2015), Iceland [79]	(n=3813)	Lesbian, gay and bisexual (LGB) adolescents are five to six times more likely to have had frequent suicidal ideations.
Body Mass Index		
(Bearman & Moody, 2004), US [34]	(n=13,465)	Having a higher BMI increases the odds of suicidal thoughts in girls but not in boys.
(S. A. Lee et al., 2016), Korea [65]	(n=69,585)	Underweight and normal-weight boys are more likely to think or attempt suicide while only underweight girls are more likely to attempt suicide.
(Peltzer & Pengpid, 2012), Thailand [81]	(n=2758)	BMI is not associated with suicidal ideations.
(Eaton et al., 2005), US [80]	(n=13,601)	Being very underweight or very overweight is associated with a greater odds of suicide attempt.
Body image		
(J. Lee & Lee, 2015), Korea [82]	(n=20,264)	Body image distortion is significantly linked to sadness and suicidal ideations.
(Sharma et al., 2015), Peru [59]	(n=916)	No significant association exists between body weight dissatisfaction and suicide attempts.
(J. S. Kim & Lee, 2010), Korea [127]	(n=74,698)	False weight perceptions and weight control behaviors are risk factors of suicidal behaviors.
Sleep disorders		
(S. Y. Kim et al., 2017), Korea [49]	(n=121,106)	The lack of sleep is associated significantly with suicide attempts.

(Wong et al., 2016), US [86]	(n=10,123)	According to the multivariate analysis, problem falling and staying asleep is associated with suicide variables in the entire life and also with suicidal thoughts and suicide plans in the last 12 months.
(Jang, Lee, & Park, 2013), Korea [128]	(n=75,066)	A negative association exists between sleep duration and suicidal ideations/attempts.
(Linsell et al., 2010), Korea [125]	(n=2965),	Suicidal ideation rates are higher in adolescents with inadequate sleep.
(J.-H. Kim, Park, Lee, & Yoo, 2015), Korea [129]	(n=74,186),	The odds of suicidal thoughts are higher in people with a very short time in bed than those with a long time in bed.
Low socioeconomic status		
(Bearman & Moody, 2004), US [34]	(n=13,465)	A low socioeconomic status caused by the level of education and the occupation status of the parents increases the odds of thinking about suicide.
(S. Y. Lee et al., 2016), Korea [40]	(n=221,265)	The adolescents who described their perceived economic status as either high or low showed higher odds for suicidal ideations and attempts compared to the group with mid-level economic status.
(S. A. Lee et al., 2016), Korea [88]	(n=69,585)	A low household economic status is associated with suicidal ideations and attempts in both boys and girls.
(J. S. Kim & Lee, 2010), Korea [127]	(n=74,698),	A low socioeconomic status is associated with suicidal behaviors in both genders.
(Bernburg et al., 2009), Iceland [51]	(n=5331)	Poverty is a risk factor for suicide.
(Shilubane et al., 2013), South Africa [37]	(n=10,699 in 2002 and 10,270 in 2008)	According to the hierarchical linear regression, the family income is not correlated with suicidal ideations.
(Ko et al., 2014), Korea [87]	(n=74,186)	A low socioeconomic status is related to an elevated likelihood of suicide attempt in both genders.
(Silviken & Kvernmo, 2007), Arctic Norway [53]	(n=591)	A low socioeconomic status is a risk factor for suicide attempts.
(G. Y. Lee & Choi, 2015), China [55]	(n=72,435)	A negative relationship exists between a low socioeconomic status and suicide attempts.
(Nath, Paris, Thombs, & Kirmayer, 2012), India [130]	(n=1817)	Adolescents with a low socioeconomic status who face economic difficulties are at a higher risk of suicidal behaviors.
(S. M. Kim et al., 2015), Korea [108]	(n=73,238)	A low socioeconomic status is a risk factor for suicide attempts.
(Zarrouq et al., 2015), Morocco [116]	(n=3020)	According to the multivariate analyses, a low family income is a risk factor for suicidal behaviors.
Sexual abuse and sexual intercourse		
(Perkins & Hartless, 2002), Michigan, US [35]	(n=14,922)	Sexual intercourse is a risk factor for suicide.
(Ziaei et al., 2017), Tabriz, Iran [114]	(n=1517)	Sexual abuse is a factor that is positively associated with suicidal ideations.
(Chau et al., 2016), northeastern France [61]	(n=1559)	Sexual abuse is associated with suicidal ideations and attempts.
(Kukoyi et al., 2010), western Jamaica [36]	(n=342)	Sexual abuse is positively associated with suicidal ideations and attempts.
(Shilubane et al., 2013), South Africa [37]	(n=10,699 in 2002 and 10,270 in 2008)	Sexual intercourse is a risk factor for suicide attempt.
(Bae et al., 2005), US [117]	(n=13,601)	Sexual intercourse increases the chance of suicide in girls.
(Peltzer & Pengpid, 2012), Thailand [81]	(n=2758)	The bivariate analysis showed that sexual intercourse is associated with suicidal ideations.
(Le et al., 2011), US [119]	(n=6294)	Sexual abuse is associated with suicide in girls.
(Taliaferro & Muehlenkamp, 2014), Minnesota, US [105]	(n=70,022)	Sexual abuse increases the odds of suicide in girls.
(L. F. Chan et al., 2013), Malaysia [94]	(n=4581)	According to the multivariate logistic regression, sexual abuse is a risk factor for suicide plans and ideations.
(Bearman & Moody, 2004), US [34]	(n=13,465)	For girls, sexual intercourse increases the odds of suicidal thoughts.
(Bhatta et al., 2014), US [29]	(n=3156)	According to the multivariable logistic regression analysis, sexual intercourse is associated with increased odds of a suicide attempt.
Sharma et al., 2015 (Sharma et al., 2015), Peru [59]	(n=916)	Sexual intercourse is associated with suicidal ideations.
Violence		
(Shilubane et al., 2013), South Africa [37]	(n=10,699 in 2002 and 10,270 in 2008)	According to the hierarchical linear regression, both victims and actors of violent behaviors have an increased risk of suicidal ideations.
(Kukoyi et al., 2010), Western Jamaica [36]	(n=342)	Self-violence is positively associated with suicide ideations.
(Chen et al., 2005), Malaysia [95]	(n=4500)	Based on the multiple logistic regression, physical fight is a significant risk factor for suicide behavior.

(Russell & Joyner, 2001), US [75]	(n=6254)	Experiences of victimization have a significant correlation with suicidal thoughts.
(Taliaferro & Muehlenkamp, 2014), Minnesota, US [105]	(n=70,022)	Both male and female victims of dating violence have an increased odds of suicide ideation.
(Ahmad et al., 2014), Malaysia [31]	(n=2344)	The analysis revealed that suicidal ideation is positively associated with being abused at home, either physically or verbally.
(Yen et al., 2014), Taiwan [60]	(n=5027)	Bullying victimization has a strong effect on suicidal ideations.
(Govender et al., 2013), Durban, South Africa [62]	(n=239)	Suicidal ideations are positively correlated with violence.
Immigration		
(Plener et al., 2015), Germany [99]	(n=452)	Immigration is a risk factor for suicide attempts.
(Bernburg et al., 2009), Iceland [51]	(n=5331)	Immigration is positively associated with suicide attempts.
(Chau et al., 2016), northeastern France [61]	(n=1559)	Immigrant adolescents have a twice-higher risk of suicidal ideations and attempts than their native counterparts.
Gender		
(Perkins & Hartless, 2002), Michigan, US [35]	(n=14,922)	The rate of suicide attempt is higher in girls than in boys.
(Liu et al., 2017), Taipei [39]	(n=2479)	The rate of suicide attempts and ideations is higher in girls than in boys.
(S. Y. Lee et al., 2016), Korea [40]	(n=221,265)	The rate of suicidal ideations is higher in girls than in boys.
(Shilubane et al., 2013), South Africa [37]	(n=10,699 in 2002 and 10,270 in 2008)	The rate of suicide attempts is higher in girls than in boys.
(Bearman & Moody, 2004), US [34]	(n=13,465)	The rate of suicide attempts and ideations is higher in girls than in boys.
(Govender et al., 2013), Durban, South Africa [62]	(n=239)	The rate of suicidal ideations is higher in girls than in boys.
(Linsell et al., 2010), Korea [125]	(n=2965)	The rate of suicide attempt is higher in girls than in boys.
(Langhinrichsen-Rohling et al., 2010), US [110]	(n=1533)	In all the studies, the rate of suicide attempt is higher in girls than in boys.
Inappropriate diet and eating disorders		
(Zaitsoff & Grilo, 2010), US [102]	(n=492)	An eating disorder psychopathology is a suicide risk factor that is associated significantly with anxiety, low self-esteem and current distress over childhood abuse.
(Pan et al., 2011), China [101]	(n=23,976)	There is a positive association between the consumption of soft drinks (e.g. Cola, Sprite) and sweet foods and suicidal behaviors.
Race/ethnicity		
(Shilubane et al., 2013), South Africa [37]	(n=10,699 in 2002 and 10,270 in 2008)	The rate of suicide is higher in Black people.
(Bae et al., 2005), US [117]	(n=13,601),	The Asian race/ethnicity is a significant risk factor for suicide attempts.
(Taliaferro & Muehlenkamp, 2014), Minnesota, US [105]	(n=70,022)	The rate of suicide is higher in the non-White people.
(Bearman & Moody, 2004), US [34]	(n=13,465)	The chance of suicide is higher in the non-Black people.
(Perkins & Hartless, 2002), Michigan, US [35]	(n=14,922)	No significant differences exist between African-American and European-American men or women in terms of suicide attempts.
Low self-esteem		
(Bearman & Moody, 2004), US [34]	(n=13,465)	For both boys and girls, having a high self-esteem lowers the likelihood of suicidal ideations.
(Kuhlberg et al., 2010), New York [50]	(n=226)	A low self-esteem correlates significantly with suicide attempts.
(Kelly et al., 2001), Pittsburgh [33]	(n=1082)	A low self-esteem correlates with suicidal ideations.
(Yao et al., 2014), Anhui Province of China [57]	(n=5249)	A higher self-esteem is associated significantly with an increased risk of suicidal ideations.
(Yen et al., 2014), Taiwan [60]	(n=5027)	The relationship between suicidal ideations and low self-esteem is statistically significant.
Lack of religious beliefs		
(Bearman & Moody, 2004), US [34]	(n=13,465)	Church attendance is associated with a reduction in the chance of suicide attempt.
(Greening & Stoppelbein, 2002), US [42]	(n=1098)	Orthodoxy, i.e. commitment to core beliefs, is a declining factor of suicide attempt.
(Kukoyi et al., 2010), Western Jamaica [36]	(n=342)	Religious affiliation is not correlated with suicide attempts and ideations.
Lack of coping skills		
(H. S. Kim & Kim, 2008), Korea	(n=2100)	The lack of coping strategies is positively associated with suicide.

(Stratta et al., 2014), Lithuania [25]	(n=3043)	The lack of emotional coping after an earthquake is a risk factor for suicidal ideation.
(Yao et al., 2014), Anhui Province of China [57]	(n=5249)	A high score in passive coping is associated with an increased risk of suicidal ideations.
(Bhatta et al., 2014), US [29]	(n=3156)	There is a statistically significant link between suicidal behaviors and anger management issues.
(Abdollahi et al., 2016), Malaysia [70]	(n=500)	Poor problem-solving confidence is associated with suicidal ideations.

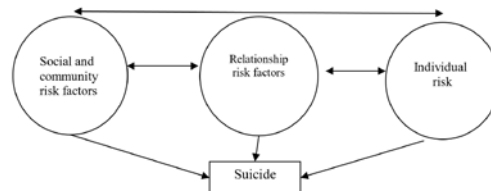


Figure 2. The risk factors of suicide in adolescents

By contrast, one study found a direct and significant relationship between high self-confidence and suicide, perhaps due to the fact that a high self-confidence is also sometimes associated with violence, risk aversion and anxiety [57].

Lack of coping skills

Exposure to unfavorable life events can lead to suicidal behaviors. Suicide is a response to environmental problems and stresses. Developing coping skills is one effective way to address unpleasant conditions, and adolescents who cannot deal with unfavorable conditions are more likely to commit suicide [48].

DISCUSSION

This narrative review examined the risk factors of suicide (ideations, thoughts and attempts) among adolescents (ages 10 to 24). The findings showed that various factors affect suicide among adolescents. Identifying these factors in the society via interpersonal relationships can help detect those at risk of suicide. The following algorithm was obtained for the risk factors of suicide:

Suicide is a global problem, but the factors associated with it (such as beliefs and attitudes) vary from one society to another [104]. Individual risk factors are significant factors that affect suicide; however, both individual and relationship risk factors depend on a large number of micro and macro factors originating from the larger society [131].

In the examined studies, many problems, such as inadequate social support and inappropriate relationships, were formed in the context of inappropriate communities and societies. These problems then led to individual risk factors, such as hopelessness, psychological problems, substance abuse, violence, low socioeconomic status, low self-esteem, sexual abuse, etc. These circumstances motivate the individual to think about and attempt suicide in hopes of freeing himself of personal problems [29, 31, 44, 60, 106, 130]; some studies, however, showed that a high

self-esteem [57] is correlated with suicidal ideations. A number of other studies showed that socioeconomic status [6, 37, 92], inappropriate body image [59], BMI [82], substance abuse [36], lack of proper relationships [28, 31, 36] and social support [33] are not associated with suicidal thoughts and suicide attempts. The findings of these studies are not in line with those of the other studies, mostly due to the differences in their sample populations, measurement instruments and, more importantly, culture. Suicide occurs when a person wishes to die as a result of not finding himself dependent on others and due to the deficiencies perceived from the environment, friends and family. This individual acquires the ability to harm himself and begins to feel unmoved in the face of death and life cessation [132]. Suicidal behaviors vary among different social groups, and people who are not well integrated in their community are more likely to commit suicide than those with strong community ties. Nonetheless, according to the strain theory of suicide, suicide is a mental disorder that can be brought on by social structures. Any increased risk of suicide can thus be linked with differences in values, discrepancies between aspirations and reality, relative deprivation and the lack of coping skills during crises [6].

In order to understand the risk factors of suicide among adolescents, this issue should be examined on several levels in the society as a byproduct and an interplay of genetics, biological processes, individual behaviors, the environment and social interactions. Special attention must be paid to the concepts of interaction and intersectionality [133]. Several other factors are also crucial for preventing suicide in adolescents, such as access to and acceptance of health services, proper communications and the delivery of services. Different organizations at different levels must increase their capacities to promote adolescent-friendly services [5] and provide effective services to prevent this global concern. The tools designed for adolescent self-care and communication with parents can be used to investigate

the needs of this group and monitor possible variables related to suicide in them [134-136].

CONCLUSION

Most suicides are preceded by certain signs in the individual's behavior, but in some cases, no signs precede the act of suicide. Properly identifying and assessing these signs among adolescents and establishing preventive measures and interventions to combat suicide are vital for the modern world. Individual factors, social and community factors, relationship factors and health factors and their intersectionality should be taken into consideration in the integrated efforts to prevent suicide. Each country should identify the risk factors for adolescents based on their culture and design preventive interventions in this regard and examine the effectiveness of the intervention program in large national studies.

LIMITATION

There were some limitations in this study. The current systematic review was limited to English language papers, thus information in other languages was not reported in this study. Furthermore, Gray literature, consisting of dissertations and congress abstracts, was not included in the study.

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ETHICAL CONSIDERATION

We tried to use reliable sources in reviewing the article and to be honest and trustworthy. Ethics approval was obtained from the Ethics Committee in Shahid Beheshti University of Medical Sciences with Ethical code: IR.SBMU.RETECH.REC.1396.919

CONFLICT OF INTEREST

The authors have no conflicts of interest relevant to this article.

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AUTHOR CONTRIBUTION

ZK: Project development, Data Collection, Manuscript writing

MS: project administration, writing-review, and editing, supervision

NM: Data Collection, Manuscript writing

MK: Project development, Data Collection

NA and SK: Data Collection

All authors have read and approved the final manuscript.

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