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A Systematic Review on Suicide and Youth: Biological, Psychological, Social and Environmental Risk Factors

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Abstract

Introduction: Suicide affects the lives of many individuals all over the world and is a severe public health concern. Among all the ages, youth suicide is one of the severe topics to be concerned about due to the years of their life lost. As a result, we require a thorough understanding of the risk factors contributing to young suicide cases. This systematic review uses thematic analysis to identify common themes and topics in recent literature on suicide and youth: biological, psychological, social, and environmental risk factors. Objective: This study aims to identify and distill the common themes in recent literature on suicide and youth. Methods: Literature was sourced from four databases and edited down based on abstract and content analysis. Findings: 71 articles were chosen and were reviewed to identify the main topics of discussion. Conclusion: Each factor brought different intentions on how they can contribute the youth to committing suicide or having suicide ideation. We also included evidence of the prevalence of the risk factors for youth suicides. Some suicide prevention has been included at the end of the article. Recommendation: These results serve as a source of reference for future research.

Keywords: Suicide, Youth, Suicide Attempt, Suicide Ideation, Suicide Risk Factors

Introduction

According to American Psychological Association, suicide is defined as the act of killing oneself. Suicide continues to be a global issue with over 800,000 people dying from it every year (Grimmond et al., 2019). It is the 15th greatest cause of death worldwide, accounting for 1.4% of all deaths (Bilsen, 2018). However, these estimations are most certainly an

underestimate of the true number of suicides. Deaths by suicide may go unnoticed or be misclassified as an accident or another cause of death. Additionally, because of suicide's delicate nature and the taboo that still surrounds it, suicide is not always acknowledged or reported to the public. Plus, registering a suicide is a complicated process, often involving judicial authorities.

According to Bilsen (2018), suicide attempts or non-fatal suicidal behavior are significantly more common than actual suicide, estimated to be 10–20 times more frequent. The yearly global prevalence of self-reported suicide attempts is estimated to be around 3 per 1,000 persons. Approximately 2.5% of the population attempts suicide at least once in their lives (Bilsen, 2018). Suicide among young people is one of the primary concerns that have to be addressed via effective preventative measures from public mental health. According to the Centers for Disease Control and Prevention, suicide is the second leading cause of death for young people ages 15 to 24 in the United States (Talking to Teens: Suicide Prevention, 2018). The general public is becoming more aware of the devastating consequences of youth suicide because of the direct loss of many young lives and the disruptive psychosocial and socioeconomic effects on a large scale. Suicide death is preventable by giving chances to intervene on this trajectory earlier in life if we better understand how and why suicide risk arises throughout youth.

There are three theoretical frameworks to explain suicide, and each one gives a thorough assessment of factors that contribute to suicidal thinking and attempts. First, the Interpersonal Theory of Suicide (IT) described the first ideation-to-action theory of suicide, creating a new generation of suicide theories (Van Orden et al., 2010 cited in Grimmond et al., 2019). It also established a framework for suicidality that was understandable and potentially falsifiable. Second, the Integrated Motivational-Volitional Model of Suicidal Behavior (IMV) was developed as the factor predictors that impact suicide ideation and the settings in which these ideas are carried out (O'Connor & Kirtley, 2017 cited in Grimmond et al., 2019). This is because suicidal thoughts and suicide attempts were presented as independent reasons. Third, Knlonsky and May termed the "ideation-to-action" framework based on empirical data as the Three-Step Theory (3ST) Klonsky (2015) cited in Grimmond et al., 2019). It is a simple, evidence-based, and actionable theory that breaks down suicide into four factors: pain, hopelessness, connection, and suicide capacity (Klonsky et al., 2021). Although each of these theories has its explanation and focuses on various aspects, there are some similarities, such as the need to distinguish between suicide ideation and actual attempts and the necessity to study the distinctions between suicidal thoughts and suicidal behaviors.

Therefore, it is essential to gather as much information about the risk factors that lead to suicidal behavior in youth, which is also the objective of this review. The aim is to review and gather the risk factors and alert the public about this issue should be concerned. A brief overview of the most significant risk factors will be provided in this review. The risk factors are categorized into biological, psychological, social, and environmental perspectives. The articles that we reviewed are based on the criteria we set. For instance, we focused on the age groups of suicide as one of the criteria because we only focus on youth. Besides, we only reviewarticles from 2018 years till today to ensure the context is the latest to be reviewed.

Methods

The articles have been chosen by searching on accredited sites. We eliminated articles that included topics such as suicide and youth, biological, psychological, social, and environmental risk factors in suicide, a predictor of suicidal ideation, and suicide attempts among youth and adolescents. We used mainly English language articles that were published in scientific databases which are in line with the main aim of this study to identify all studies within a selective sampling frame, that addressed the following research topics:

What is the role of biological, psychological, social, and environmental risk factors on suicide among youth?

The literature search was conducted from January to March 2022. We searched using keyword searches across four databases; PubMed, WOS, Google Scholar, and Science Direct. The keywords included; biological, psychological, social, and environmental risk factors of suicide ideation and attempt, Keywords were first searched individually with regards to each risk factor, then searched again paired with suicide and youth. Finally, the keywords were paired across all configurations and searched again. A time restriction was placed on the searches to identify only literature published from 2012 until the date of the search. 90 papers were identified. An abstract search was conducted to identify the subject matter. 15 articles that did not pertain to suicide and youth in the context of risk factors of suicide ideation and attempt were removed. Finally, an in-depth content analysis was conducted, further removing 4 papers based on the same criteria as the abstract search. A thematic analysis was then conducted through in-depth readings of all the identified literature. Major themes were extracted based on common discussion across multiple articles, and minor themes were identified as subsections to each major theme.

Discussion

Several studies have been conducted to identify biological, psychological, social, and environmental risk factors for suicide. Familial and genetic predisposition is identified as a contributing factor to suicide behaviors, psychiatric disorder is one of the psychological risk factors that have been identified as closely related to youth suicide. These factors can be intrinsic and extrinsic, and it strong relates to increasing the likelihood of development and progression of suicide ideation and behavior. Moreover, several social and environmental risk factors that lead to suicide have been identified by previous studies. Some example of environmental risk factors is local clusters of suicide that have a contagious influence, relational or social loss, barriers to seeking health services, particularly mental health and drug abuse treatment, pollution, and climate change.

Biological Risk Factors

Although stress, loneliness, and other environmental issues can contribute to suicide behaviors, researchers thought that other factors must be involved. Therefore, studies have beenconducted to identify biological risk factors for suicide (see Figure 1).

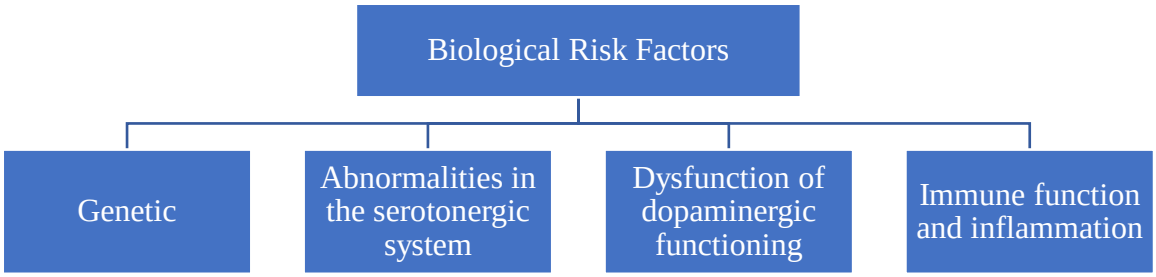

Figure1. Biological Risk Factors in Suicide

For decades, suicidal behavior has been known to run in the family. Familial and genetic predisposition is identified as a contributing factor to suicide behaviors. Suicidal thoughts and behaviors are moderately heritable, with a significant proportion of risk attributedto genetic variation (DiBlasi et al., 2021). Familial research has reported that genetic variationis significantly contributing to suicidal thoughts and behaviors (DiBlasi et al., 2021). Besides, suicide attempts are transmitted independently of psychiatric comorbidities (DiBlasi et al., 2021; Turecki et al., 2019). The results from previous twin and adoption studies revealed that the heritability of suicide behavior is ranging from 30% to 50% (DiBlasi et al., 2021; Turecki et al., 2019). According to Brent et al (2015), the risk of suicide attempts for offspring whose parents have a history of a suicide attempt is 5-fold greater compared to the general population. In addition, suicide risk is doubled for individuals who lost their parents through suicide compared to other causes of death (Turecki et al., 2019). These data show that suicidal behavior is supported by the concept of genetic transmission. Not only that but to get a more comprehensive picture of the genes that contribute to suicide, Docherty et al. (2020) conducted a genetic study and identified 22 genes that will potentially increase the risk of suicide. Besides, they also examined genetic risks for other problems that can contribute to suicide. The results revealed that individuals who died from suicide had significantly increased genetic risks for schizophrenia, impulsivity, and major depression (Docherty et al., 2020).

Moreover, serotonin is responsible for mood and anxiety, aggressiveness, circadian rhythm, sleep, feeding, and social behavior (Vargas-Medrano et al., 2020; Isarizadeh et al., 2022). Therefore, abnormalities in the serotonergic system are directly implicated in compulsivity and depression,leading to an increase in suicidal behavior (Vargas-Medrano et al., 2020; Turecki et al., 2019; Saadlou et al., 2022; Cha et al., 2018). Individuals who attempt suicide have decreased cerebrospinal fluid concentrations of 5-hydroxyindoleacetic acid (5-HIAA), the major metabolite of serotonin (Mann, 2013). The serotonin abnormalities are associated with suicidal behavior due to the involvement of the serotonergic system in depression and impulsive-aggressive behavior, whichserve as major risk factors for suicide (Pandey, 2013). Another biological factor is related to dopamine, dopamine is responsible for the ability to think and plan. It enables individuals to strive, focus, and experience pleasure. Several studies reported a good correlationbetween dysfunction of dopaminergic functioning and suicide (Fitzgerald et al., 2017; Ho et al., 2018; Pizzagalli et al., 2019).

Immune function and inflammation can also contribute to increasing the risk of suicide. The role of inflammation in suicidal behavior has been examined through research, and increased proinflammatory cytokines such as tumor necrosis factor, IL-6, IL-8, and IL-1β in individuals who attempted suicide or who died by suicide are identified (Turecki et al., 2019). There is some evidence suggesting a relationship between immune dysregulation and suicide.

Steiner et al. found increased microgliosis in the post-mortem brain of suicide victims with affective disorders and schizophrenia (Pandey, 2013). Researchers found a significant relationship between asthma and increased suicide attempts (Pandey, 2013) Increased plasma IL-6 levels are associated with impulsivity and violent suicide attempts, thus linking proinflammatory responses to the impulsive endophenotype for suicidal behavior (Turecki etal., 2019; Pandey, 2013). Moreover, there are other molecules associated with suicidal behavior including IL-2 and vascular endothelial growth factor, which are decreased in individuals with suicidal behavior (Turecki et al., 2019). Changes in levels of quinolinic acid and kynurenic acid are reported in individuals with suicidal behavior (Turecki et al., 2019). Not only that, the other molecule that is reported to increase suicide risk is a brain-tropic nematode which is Toxoplasma gondii, which may increase the risks of self-directed violence and suicide attempt (Turecki et al., 2019). Of note, T. gondii infection is found to trigger an immune response in the brain that could lead to decreased tryptophan availability, decreased serotonin biosynthesis, and increased levels of kynurenic acid. Apart from that, T. gondii infection may also lead to specific behavioral traits that are associated with suicidal behavior such as aggression and impulsivity (Turecki et al., 2019).

In short, familial and genetic predisposition, abnormalities in the serotonergic system, dysfunction of dopaminergic functioning, and immune function and inflammation can contribute to elevated suicide risk. However, other biological, psychological, social, and environmental factors lead to suicidal behavior.

Psychological Risk Factors

Psychological factors play a significant role in youth suicide. Several psychological factors affect suicide among youth, including psychiatric disorders, personality traits, and trauma, which are reviewed below (see Figure 2).

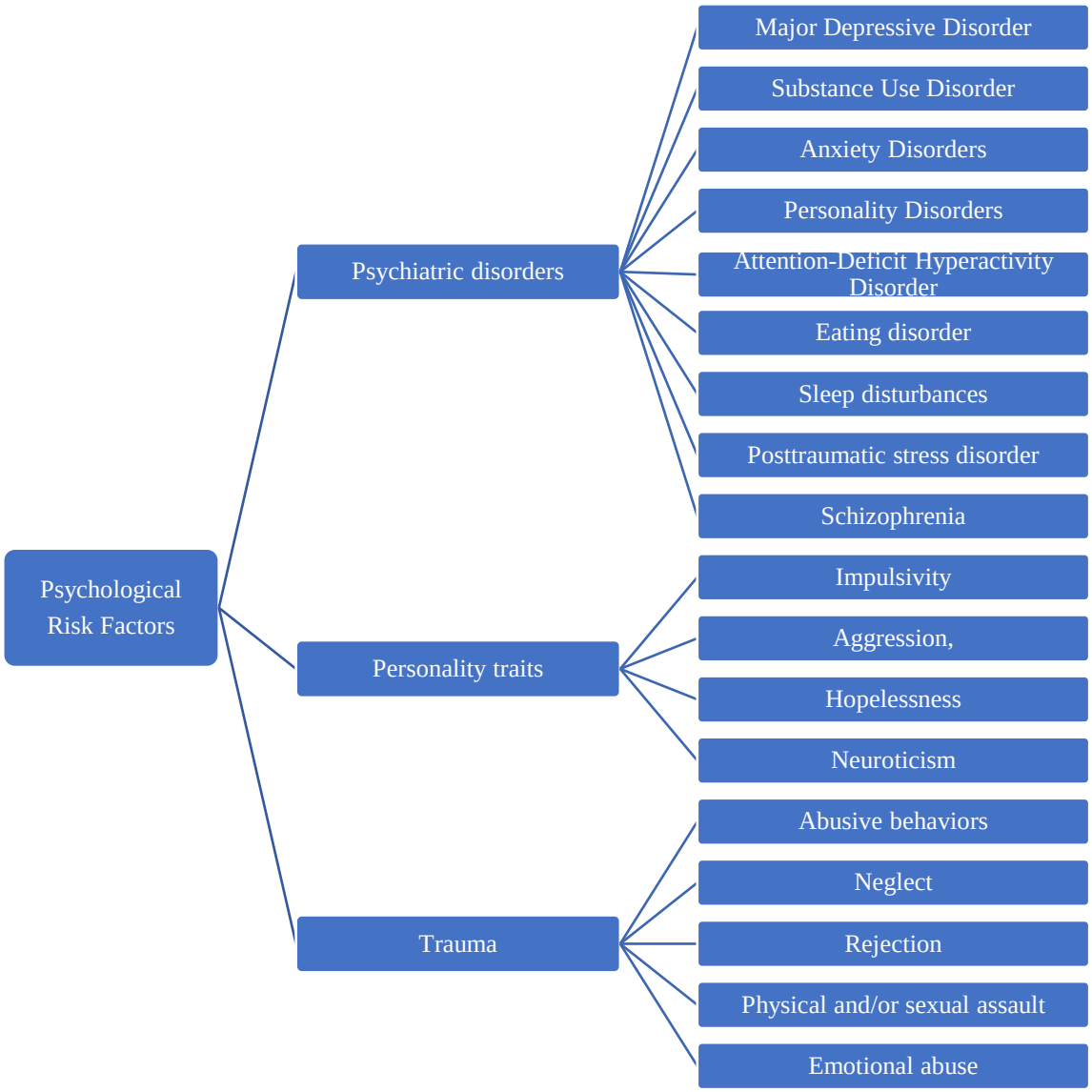

Figure2. Psychological Risk Factors in Suicide

Psychiatric disorder is one of the psychological risk factors that have been identified asclosely related to youth suicide. The finding that 75% of psychiatric disorders begin before age 24 is supported by a global meta-analysis of 192 studies in which the peak age of onset of various psychiatric disorders is 14.5 years (Hill et al., 2021; Solmi et al., 2021). This can be explained by the fact that youth are facing changes that span multiple domains and transition from one state to another, and thus they are vulnerable to mental health issues. A psychiatric disorder is recognized in around 90% of youth who commit suicide (Bilsen, 2018; Thompson & Swartout, 2017). Essentially, all mental disorders contribute directly or indirectly to suicide to some extent, with affective disorders and substance abuse having the greatest impact (Hill et al., 2021; Thompson & Swartout, 2017). For affective disorders, major depressive disorder (MDD) is the most prevalent diagnosis, with 35 percent of suicidal youth having it (Mullen, 2018). A study showed that as many as 8% of adolescents diagnosed with major depressive disorder (MDD) have completed suicide by young adulthood (O'Connor et al.,

2016), turning suicide into the second leading cause of death among youth. The severity of depression is positively correlated with youth stress and hopelessness and leads to high suicidal attempts (Lew et al., 2019; Perveen et al., 2020). In addition, the high prevalence of drug and alcohol use disorders is an important risk factor for suicide attempts (Esang & Ahmed, 2018). Between 27% and 50% of youth who died by suicide fitted the diagnosis of a substance use disorder (O'Neill & O'Connor,2020). Youth with substance use are three times more likely to attempt suicide again than those who did not (Subica & Wu, 2018). Other psychiatric disorders, such as anxiety disorders (Herres et al., 2019), personality disorders (borderline or antisocial personality disorder) (Chanen et al., 2022; Thompson et al., 2019), attention-deficit hyperactivity disorder (Liang et al., 2018), eating disorder (Wang et al., 2020), sleep disturbances (Verkooijen et al., 2018), posttraumatic stress disorder (Eskander et al., 2020; Li et al., 2022), and schizophrenia (Rhodes et al., 2019) have been identified as significant predictors of youth suicide. Moreover, suicide risk is greatly increased when there is a comorbidity of psychiatric disorders (Bachmann, 2018). The study stated fifty-four percent of youth with severe suicide attempts suffer from psychiatric comorbidity, with affective disorders and substance addiction disorders being the most common.

Personality traits are another psychological risk factor that is for suicide. There are several personality traits, such as impulsivity, aggression, hopelessness, and neuroticism identified to contribute to suicide risk (Costanza et al., 2021; Hafferty et al., 2019; Singh & Rao, 2018; Wolfe et al., 2019). Previous research has found considerable correlations between impulsivity and suicidal conduct (Lew et al., 2019). Youth with high impulsivity, when compared to the general population, are more likely to act on suicidal thoughts and attempt suicide. The move from suicidal thoughts to suicidal behavior is thought to be aided by increased impulsivity (Lew et al., 2019). Along with impulsivity, aggressiveness is a personality attribute linked to suicidal behavior. In Singh & Rao's (2018) study, results showed that male attempters were more impulsive, while females were more aggressive, but the suicide risk was about three times higher in the whole population with more aggression andnearly twice as high with higher impulsivity. Impulsivity is highly associated with aggressiveness and increased lifetime suicide attempts (Costanza et al., 2021; Singh & Rao, 2018). The hopelessness trait was proposed as the main factor in severe suicide attempts, especially among depressed youth (Wolfe et al., 2019). Hopelessness leads individuals to havea pessimistic view of the future and to react negatively to stimuli (Lew et al., 2019). Thus, severe suicide attempters showed significantly higher hopelessness than the general population (Wolfe et al., 2019). In addition, neuroticism is a personality trait that has recently been identified as the most important predictor of suicide risk among youth (Hafferty et al., 2019; Khosravi & Kasaeiyan, 2020; Na et al., 2020). A higher level of neuroticism level causes vulnerability, anxiety, impulsivity, depression, and angry hostility. The link between neuroticism and suicide is most likely due to the experience of negative emotions like helplessness, severe stress, and despair, which cause highly neurotic individuals to exhibit a range of negative emotions under stressful situations. As a result, the neuroticism personality trait makes individuals more vulnerable to psychosocial stress. Therefore, individuals are morelikely to have suicidal thoughts, try suicide, and eventually commit themselves (Khosravi & Kasaeiyan, 2020). Moreover, there are other personality traits, such as anxiety, perfectionism,psychoticism, paranoia, introversion, anger, and self-criticism were associated with suicide risks among youth (Cavelti et al., 2021; Turecki et al., 2019; Wong, 2018).

Early traumatic events are also associated with suicidal behavior among youths. Youthswho are exposed to abusive behaviors or neglect at an early age are more likely to have an increased risk of suicide (Souza, 2016; Thompson et al., 2018). In addition, Barbosaet al (2014) also indicated that neglect, rejection, and a history of physical and/or sexual assaultare all negative life events that are strongly linked to suicide. Apart from that, emotional abuse,in specific, might impair a person's psychological development and leave deep emotional scars that will carry them into adulthood, as well as stimulate serious psychopathologies (Barosa et al., 2014). Emotional abuse can lead to severe changes in emotional, cognitive, and behavioralfunctioning, as well as severe consequences on social interaction, self-esteem, and the ability to form healthy interpersonal relationships. It can also lead to depression, anxiety, and suicidality (Barbosa et al., 2014). In Thompson et al (2018) study, it was statistically shown that 78% of individuals who had suicide experience have childhood sexual abuse compared with 16% of their counterparts. In a population of students, the incidence of suicide conduct was34% who had suffered early trauma, compared to 18.1 % among those who had no history of trauma.

In summary, psychiatric disorders such as major depressive disorder, substance use disorder, and other affective disorders are the most common causes of suicide. Furthermore, personality characteristics such as impulsivity, aggression, hopelessness, and neuroticism havebeen linked to an increased risk of suicide. Early traumatic situations have also been related toyouth suicidal behavior. Youth who are exposed to abusive behaviors or neglect at a youngage are more prone to commit suicide. It can inhibit a person's psychological growth and leavesignificant emotional scars that will last until adulthood.

Social Risk Factors

Social risk factors are factors that carry the potential risk that affects an individual's lifestyle. These factors can be intrinsic and extrinsic, and it strong relates to increasingthe likelihood of development and progression of suicide ideation and behavior (see Figure 3). Several socialrisk factors that lead to suicide have been identified by previous studies (Bilson, 2018; Cheah et al., 2020; Machado et al., 2015; Olaoseibikan, 2020; Sharma et al., 2015; Thompson & Swatout, 2017; Vargas-Medrano, 2020).

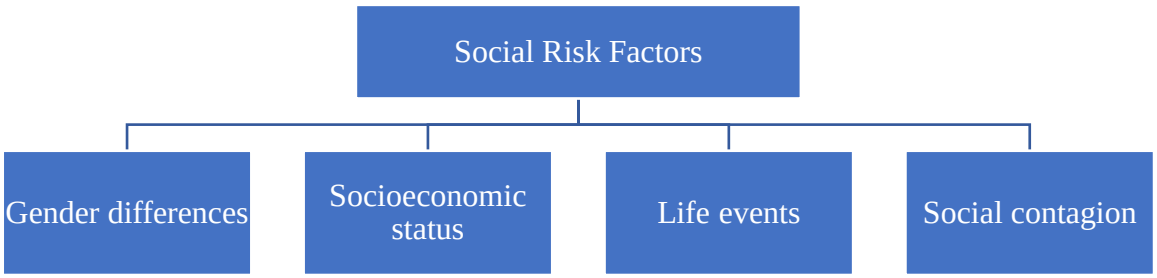

Figure3. Social Risk Factors in Suicide

One of the most commonly seen social risk factors that contribute to a higher chanceof suicide attempts is gender differences. It was found that the proportion of females in suicide

ideation and suicide attempts are higher than male (Bilson., 2018; Sharma et al., 2015). Findings from multiple countries unanimously show that the rate of suicidal ideation and suicidal attempts are higher in females (Bilson, 2018; Dendup et al., 2020; Olaoseibikan, 2020;Sarma et al., 2015). Although females portray a higher risk of attempting suicide, most of themare non-fatal or incompletion of suicide attempts. The prevalence of non-fatal suicide attemptsis 25-60 times more than fatal ones (Thompson & Swartout, 2018). Despite the fact of femalesare more likely to attempt suicide, males are three to four times more likely to die by suicide. Ruch et al (2019) have statistically shown that from 1976 to 2016, the number of youth suicide deaths in males and females are 68 085 males [80.1%] and 16 966 females [19.9%]. In terms of lifetime risk of suicide, the male is two to four times higher than women, whereas females are threeto nine times more likely to attempt suicide (Ruth et al., 2019).

Apart from that, socioeconomic status can be a social determinant for suicide rates. Astudy by Machado et al (2015) indicates that income inequality is positively associated with the suicide rate. Cross-sectional panel surveys show that in different nations, lower socioeconomic status can significantly lead to the ideation of suicide (Silva et al., 2016). Around 80% of all suicides take place in low and middle-income nations (WHO, 2021). Suicide death rates in Southeast Asia range from 15.6 per 100,000 to 5.6 per 100,000 in the Eastern Mediterranean. Europe has a suicide rate of 14.1 per 100,000, which is much higher than the global average of 10.7 per 100,000 (Olaosebikan, 2020). Machado et al. (2015) proposed an explanation of these results, whereas the inequality of socioeconomic status and income will make an inclination the sense of social fragmentation, and it shows a positive relationship with suicidal behavior. Suicidal behavior is characterized as a process that begins with frustration and leads to aggression. Individuals who face high levels of economic frustration are more likely to perform self-harm when they comparing to those who are in a better situation (Machado et al., 2015). Being poor may lead to prejudice, educational difficulties, poverty, a lack of essential foods and nutrients, and living in a high-crime region. Access to mental healthcare might be hampered by low socioeconomic levels (Silva et al., 2016). Those in the lowest quartile of family income in the area were 4.5 times more likely than those in the highest income areas to have repeated suicidal ideation lasting at least a week or a suicide attempt (Steele, 2017).

Life events play an important role in the risk of suicide among youths. Early-life stresscan be directly linked to suicidal behavior (Vargas-Medrano et al., 2020), but it comes with various life events. Nevertheless, Olaosebikan (2020) stated that some types of event stressors are found to be more likely associate with suicide in youth than others. Youth tend to discover their self-identity through social relationships such as peer groups, developing new intimate relationships, to build their self-assurance and security (Olaosebikan, 2020). Therefore, the loss ofa friend and facing relationship issues may potentially affect on youth's suicidal ideation and attempts. According to the study by Olaosebikan (2020), it was found that 20% of youths' suicide cases are due to social relationship issues. Academic stressors are strongly associated with suicidal behaviors as well (Kosik et al., 2017; Sörberg Wallin et al., 2017). Poor academic performance uniquely predicts serious mental illness, and it would potentially lead to suicidal behavior (Sörberg Wallin et al., 2017). School issues or academic stress was found to have a rate of 14% in youths' suicide cases (Olaosebikan, 2020). In addition, youths who arenot receiving education or not doing any job, are indicated to have a higher risk of suicide, dueto a lack of structure and few future possibilities (Olaosebikan, 2020). Due to limited access to

further education and work options, low school grades hurt young people's prospects, raising their risk of mental illness, including suicide (Wallinet al., 2017).

Social contagion has also been escalating as one of the social risk factors for suicide in today's digital age. Suicide contagion occurs when a person is exposed to suicide or suicidal behavior in their family, social group, or through media sources of suicide, and it can lead to an increase in suicide and suicidal behavior (Mueller et al., 2015). Youths are one of the most vulnerable population groups to social contagion (Olaosebikan, 2020). Several researchers have suggested using the word "imitation" rather than contagion. Learning through modeling, or imitation is the process of acquiring new patterns of behavior by observing the behavior of a model (Olaosebikan, 2020). Social contagion is also problematic behavior named copycat behavior (Aalai, 2018). In those who are at risk of suicide, direct and indirect exposure to suicidal behavior has been found to precede an increase in suicidal behavior (Aalai, 2018). Research shows that three characteristics will influence the modeling effect.

Firstly, it was shown that the more similarity between the young individual, the more the risk behavior will be imitated. Similarities are in terms of age, gender, mood status, or backgroundcontext. Secondly, the context of behavior will affect how likely youths will copy. The more the behavior is accepted as positive, comprehensible, and even admirable and brave, the more likely young people would imitate it. Thirdly, how often and in what approach the modeling behavior is presented matters as well. Research shows that such characteristics can eventuallylead to a suicide cluster (Aalai, 2018). Clusters nowadays can be arisen from social media news,specifically, repeated suicide cases from public celebrities (Aalai, 2018).

In a nutshell, social factors such as gender differences, socioeconomic status, life events,and social contagion play a significant role in affecting youths' intention in suicidal behaviors.

Environmental Risk Factors

Another significant aspect of suicide among youth is environmental risk factors. Some example of environmental risk factors is local clusters of suicide that have a contagious influence, relational or social loss, barriers to seeking health services, particularly mental healthand drug abuse treatment, pollution, and climate change (see Figure 4).

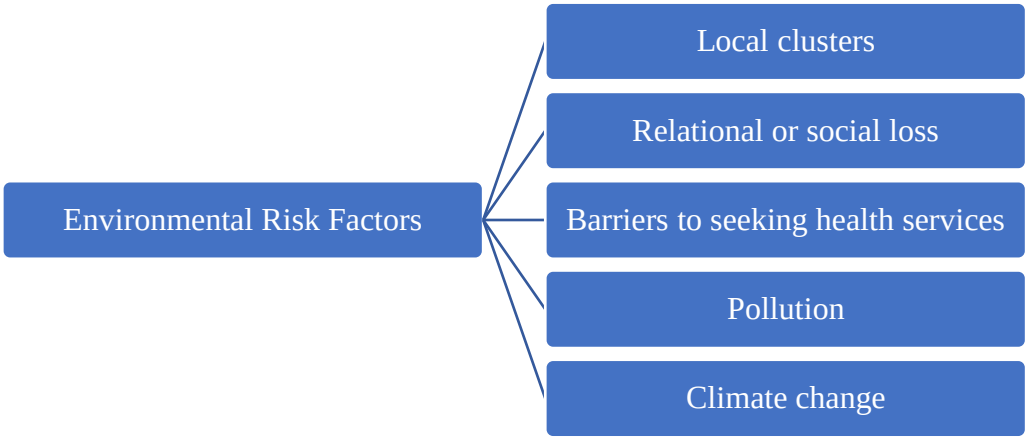

Figure 4. Environmental Risk Factors in Suicide

Suicide clusters may develop as there are a considerable number of suicides than predicted in a certain location, such as in institutions, schools, hospitals, and universities. It mayalso have geographically dispersed related occurrences and cluster-affected areas may be vulnerable to subsequent clusters. Social transmission, especially through person-to-person communication and the media are both strongly associated in clusters which makes suicidal behavior perceived to be prevalent thus, vulnerable young people are more inclined to socialize with those who are suicidal, and social cohesiveness contributes to the transmission of ideas and behaviors (Hawton et al., 2020). A past study from population-based studies in the United States suggested that 1–13% of teen suicides took place in suicide clusters (Gould et al., 1990). Another research noted suicide clusters were reported to generate about 56% of suicides in young adults under 25 years in Australia between 2010–12 (Robinson et al., 2016). Moreover,a study conducted in Ohio between 7th to 12th-grade students assessed the prevalence of suicidal ideation and suicide attempts associated with suicide clusters related to social media, memorials, vigils, and watching the Netflix series 13 Reasons Why. Among the participants, 9.0% reported suicidal ideation and 4.9% attempted suicide during the suicide cluster, and among students who posted suicide cluster-related content to social media, 22.9% reported suicidal ideation and 15.0% attempted suicide during the suicide cluster (Swedo et al., 2021). According to (Hawton et al., 2020) due to mass clusters occurring throughout a broad demographic and are geographically dispersed, the fraction of adolescent suicides which emerge as an aspect of these clusters is unknown. According to Abrutyn, Mueller & Osborne (2019), a succession ofrapid, unexpected suicide cases of high-status adolescents may have prompted the growth of new geographically generalized suicide concepts that became common thus, taken-for-grantedwhere adolescents picture death as a way for them to escape their pressure. Nevertheless, (Hawton et al., 2020) points out and explained detailed mechanisms that may explain the occurrence of suicide clusters. Such are social transmission, descriptive norms, assortative relating, and social integration and regulation. In addition to that Hawton et al (2020) suggest interventions for identifying and responding to suicide clusters by using real-time monitoring of suicidal behavior, sharing information with other areas regarding current and possible future clusters, and encouraging individuals to be vigilance for harmful social media coverage and revise intervention plans if necessary.

Climate change is increasingly recognized as having an impact on many aspects of human health (Watts et al., 2015). Nevertheless, it is crucial to figure out whether the likelihood of suicide is affected by the environment, because suicide causes more deaths worldwide than other types of conflict, war, and all other forms (Lim et al., 2012). The common linkage between climate change and suicide are air pollution, drought, and rising temperature. For instance, in association with an increase of 1 degree in temperature a month in the United States and Mexico, it is found that there is an increase in suicide rate at 7% and 2% respectively (Burke et al., 2018). Besides that, according to Brown et al (2019) adolescents' mental health has been significantly impacted by wildfires and had increased in symptoms such as depression, and suicidal thoughts along with decreased self-esteem and decreased quality of life. Years after being exposed to natural catastrophes, high rates of psychiatric symptomatology continue among adolescents, and youths are also influenced by the way their family members face the after-effects of natural disasters (Wang et al., 2013). For instance, following a crisis, youths lose autonomy, social ties, and a familiar environment, as well as hopelessness with society's reaction, building along with higher anxiousness (Weems

et al., 2016). On the other hand, a study by (Self-Brown, 2017) found that after environmental disasters, youths tend to exhibit post-traumatic growth, which is regarded as a positive post-disaster transformation linked to resilience, strengthening relationships, enhanced spirituality, and psychological maturation. Climate change is a significant problem for mental health because it creates a dilemma for future generations and is associated with anxiety and depression. The likelihood of developing mental health problems after a disaster is not evenly distributed, and studies have repeatedly shown that certain populations are much more susceptible than others. For instance, children and youth offer specific hazards considering their interaction within larger social and family settings, the adolescence character of their psychological development, and fundamental concerns founded on the knowledge that they'll be confronted with the repercussions of climatic changes for many years ahead (Hrabok et al., 2020).

In addition to that, individuals tend to build barriers preventing themselves from seeking help regarding mental health issues (Pisani et al., 2012) and it has been found that theseyouths tend to have suicidal ideation. Numerous reasons can cause barriers to mental health.

Starting from personal views or opinions that seeking mental health service is a sign of weaknesses, fear of being hospitalized, concerns about trust and confidentiality, and particularly among youth with suicidal ideation (Arora & Persaud, 2020). Furthermore, Arora & Persaud (2020), conducted a study on Guyanese youth and revealed shame and stigma, negative parental responses, and lack of exposure and beliefs on mental health services. On topof that, it is found that despite high rates of suicide among youth in Guyana no research to datehas examined the barriers to seeking mental health services. The researchers suggest thatfor Guyanese youth with suicidal thoughts, the findings relate to the need to minimize the stigmaassociated with mental health and mental health services. Mental health literacy programs, particularly encourage and promote mental health help-seeking education, improves the awareness,and minimize the stigma associated with mental health issues and treatment, may be effective. For instance, promoting effective and healthy parent-child conversation covering mental health topics boosts parent-school relations and addresses cultural values and beliefs, particularly on behavioral management.

In conclusion regarding environmental risk factors, it's a risk factor that may, directlyand indirectly, increase the rate of suicidal ideation, and attempts that may result in serious injuriesor death. This is because environmental risk factors can be associated with other risk factors such as biological, psychological, and social. For instance, living in an environment with constant droughts will lead to loss of energy, affect mood, and may lead to loss of quality of life. Another example is when constantly exposed to listening, reading, or talking regarding suicidal events also known to occur as suicide clusters, where in this event it may be a norm to suicide dueto the feeling of hopelessness. The environment risk factor may act as a trigger point which is then associated with other risk factors causing suicidal thoughts or attempts.

Conclusion

To summarize, biological factors, including familial and genetic predisposition, abnormalities in the serotonergic system, and dysfunction of dopaminergic functioning have been related to suicidal behavior among youth. Besides, immune function and inflammation would also

negatively impact the youth about suicide death or suicidal behavior. From the view of psychological factors, psychiatric disorders such as major depressive disorder, substance use, anxiety disorder, personality disorder, etc., are the leading of suicide among youth. Besides, youth with impulsivity, aggression, hopelessness, and neuroticism caused them to have suicide attempts in higher chances. Youth with trauma exposure to abusive behavior when they were young is also one of the factors that cause them to attempt suicide. Moreover, social risk factors explained that gender differences also affect suicide attempts. Individuals from lower socioeconomic status families have higher suicide behavior. Besides, life events such as social relationships and poor academic performance might affect the youth to attempt suicide. Not just that, social contagion, also named copycat behavior, will influence youth to attempt suicide before they realize the meaning of this behavior. Lastly, the environmental factors showed us suicide clusters at institutions, schools, universities, or hospitals often lead to youth committing suicide due to the social transmission of person-to-person communication and the media. Climate change is one of the environmental factors leading youth to suicide, and it brings along with biological, psychological, and social factors has also been explained above. Youth often set barriers to seeking mental health services for themselves due to the fear of stigmatization, prejudice, and inequality treatment from the public. This is also one environmental factor that triggers youth to attempt suicide.

After understanding the four factors that lead youth to suicide, it is never late for us to prevent this issue. Adults such as parents, education institutions, or the public should be concerned and take action on prevention. For instance, parents should be a listener when their children are acting differently than before. Starting the conversation with "tell me more about how you're feeling" may psychologically help them as they feel connected with someone that they trust. Parents should also be compassionate by expressing love to their children. Besides, teachers from educational institutions should also notice their students' behavior. Bully cases, academic stress, and social interactions in schools can be the factors that lead youth to attempt suicide. Most importantly, the public is also responsible for suicide prevention as stigmatization, prejudice, labeling, and discrimination are the biggest fear for youth to seek mental health services.

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