CHAPTER ONE

What Is Suicidal Behavior, and Can It Be Prevented?

Learning Objectives

- What are suicidal and nonsuicidal self-injury behaviors?
- How common are suicidal behaviors?
- Why are common myths about suicide wrong?
- What is the stress–diathesis model of suicidal behavior?
- How do mental disorders such as depression relate to suicide?
- What are the three main approaches to suicide prevention?

Introduction

Every 40 seconds someone in the world takes his or her own life, and each day more than 120 Americans kill themselves (WHO, 2014; MMWR, 2017). Sadly, the number of American suicides is increasing each year. Many more individuals attempt to take their own lives, and the number of suicide attempts increase, particularly among young people. Nonsuicidal, self-injurious behaviors are even far more common than suicide attempts.

Many myths regarding suicide continue to exist, as we will see later. One of the most persistent myths is the idea that suicide cannot be prevented or that suicide risk cannot be treated. This view contributes to the continuing high number of people who kill themselves, or who try to do so. The costs of suicide are huge from an economical point of view. For example, the total cost of suicidal behavior in the United States is estimated at $93.5 billion. But also at individual levels the costs of suicide are huge. Every suicide is the tragic outcome of profound personal suffering and mental pain. But every suicide also affects the people who stay behind – with feelings of shame, guilt, and pain – and who consequently may become suicidal themselves. The lifetime prevalence of exposure to suicide is nearly 22%, indicating that more than one in five individuals will experience a suicide in their close surroundings (Andriessen et al., 2017). Stopping mental pain is commonly cited as the major motivation for suicide, but the sad reality is that suicide does not stop mental pain: suicide only transfers the pain to those left behind.

Suicide is preventable. It is estimated that every $1 spent on preventive interventions saves $2.5 in the cost of suicide (Shepard et al., 2016). Suicidal behavior never has one single cause, but the many causal factors are now well known, and insights in to the mechanisms leading to suicidal behavior have increased substantially. These insights make it possible to develop preventative strategies at various levels.

1.1 Behavioral Aspects of Suicidal Behaviors

The neologism "suicide" most probably first appeared in the seventeenth century, coming from the words *sui* (of oneself) and *caedere* (to kill). The World Health Organization defines suicide as "the act of killing oneself deliberately, initiated and performed by the person concerned in the full knowledge or expectation of its fatal outcome." Suicide attempt is defined as "any non-fatal suicidal behavior, referring to intentional self-inflicted poisoning, injury or self-harm, which may or may not have fatal intent or outcome" (WHO, 2014).

Until the end of the 1960s, suicide attempts were considered failed suicides. Since then, several terms have been introduced that reflect the operationalization of nonfatal suicidal behavior as separate behaviors. These terms include "parasuicide," "pseudosuicide," "deliberate self-harm," "self-harm," and "nonsuicidal self-injury" (NSSI), reflecting the increasing insight that suicidal behavior is not a homogeneous phenomenon but a spectrum of self-destructive behaviors that may differ from each other in terms of lethality, planning, and intent. However, even these terms are difficult to operationalize: "lethality" may refer to medical or somatic damage due to the suicide attempt or to the methods used to attempt suicide, while there are no objective measures of "planning" or "intent." There have been numerous approaches to classifying nonfatal suicidal, self-injurious behaviors based on theoretical, behavioral, clinical, or epidemiological characteristics, but disagreement persists (Silverman, 2016). A distinction between NSSI and attempted suicide, mainly based on suicidal intent, is now commonly made in research and in clinical guidelines, particularly in the United States. *The Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-5), the manual of psychiatric diseases, includes suicidal behavioral disorder and NSSI as clinical situations that require a more in-depth investigation to determine if a formal diagnosis as a mental disorder should be considered along with a proposed set of diagnostic criteria. Under suicidal behavior, specifiers are included relating to the violence of the method used, the medical consequences, and the degree of planning involved.

Table 1.1 Nonsuicidal reasons for self-harm (Edmondson et al., 2016)

Responding to distress
- Managing distress (affect regulation) – managing painful unpleasant emotional states, including making emotional pain physical, blocking bad memories
  - Interpersonal influence – changing or responding to how others think or feel; help-seeking
  - Punishment – usually of self, occasionally of or by others
  - Managing dissociation – either switching off or bringing on feelings of numbness and unreality
  - Averting suicide – nonfatal self-harm to ward off suicidal acts or thoughts

Self-harm as positive experience
- Gratification – self-harm as comforting or enjoyable
- Sensation seeking – through a sense of nonsexual excitement or arousal
- Experimenting – trying something new
- Protection – of self or others
- Developing a sense of personal mastery

Defining the self
- Defining boundaries – self-injury as a means of defining or exploring personal boundaries
- Responding to sexuality – through self-harm as creating quasi-sexual feelings or expressing sexuality in a symbolic way
- Validation – demonstrating to self and occasionally to others one's strength or the degree of one's suffering
- Self as belonging or fitting in – to a group or subculture
- Having a personal language – including one for remembrance: a means of conjuring up or acknowledging good past feelings or memories

The report of many nonsuicidal reasons by self-harming individuals supports a categorical distinction between suicide attempts and NSSI (Edmondson et al., 2016). Most common themes in studies of nonsuicidal reasons for self-harm behavior include managing distress and exerting interpersonal influence, followed by punishment and managing dissociation (see Table 1.1).

Less frequently described but nonetheless repeatedly endorsed are reasons to do with averting suicide, sensation seeking, defining personal boundaries, and coping with sexuality. There also appear to be motives for the act that are perceived as positive or adaptive, at least by the self-report of respondents, in terms of self-affirmation or validation.

Criticism regarding the use of the term NSSI is due to the fact that much of the literature on NSSI focuses on young people, and indeed few studies have been carried out in adults. Furthermore, there are obvious difficulties in labeling behaviors as definitively nonsuicidal when they greatly increase the risk of future self-inflicted death as is shown in longitudinal studies (see later discussion). Underestimation of suicide risk associated with NSSI implicates the danger that those with NSSI will be given lower priority and receive poorer treatment than others (Kapur et al., 2013). An additional problem is that suicidal intent may be difficult to assess reliably, given that individuals engaging in self-harming behaviors often report ambivalence (i.e., not caring whether they live or die) and multiple motivations. A study in adults even found that one-third endorsed experiencing suicidal thoughts while engaging in NSSI (Klonsky, 2011). Retrospective evidence suggests that the strongest risk for engaging in NSSI is a history of suicidal behavior and ideation (Brunner et al., 2007), while other studies show that NSSI frequently precedes suicidal thoughts and behaviors, suggesting that NSSI may act as a "gateway" to suicidal behavior, whether or not via the enabling of the capability for suicide (Whitlock et al., 2013; Grandclerc et al., 2016). An alternative view is to regard NSSI and suicide attempts as dimensional variants of self-injurious behavior, with the presence or absence of suicidal intent not representing a categorical distinction (Orlando et al., 2015). Such an interpretation is supported by the apparent similarity of neurobiological underpinnings for NSSI and suicidal thoughts (Maciejewski et al., 2014). Such an underlying and possibly common neurobiological vulnerability, i.e., a shared so-called diathesis, is the major topic of this book.

1.2 Epidemiological Aspects

1.2.1 Occurrence of Suicidal Behaviors

Suicide rates vary greatly according to regions and countries, as shown in Figure 1.1 (WHO, 2017).

According to the most recent global estimations, 804,000 suicide deaths occurred worldwide in 2012, representing an annual global age-standardized suicide rate of 11.4 per 100,000 individuals in the population (WHO, 2014). This means that in 2012, every 40 seconds someone in the world took their own life. In the same year, suicide accounted for 1.4% of all deaths worldwide, making it the fifteenth leading cause of death. Globally, suicides account for 56% of all violent deaths: More

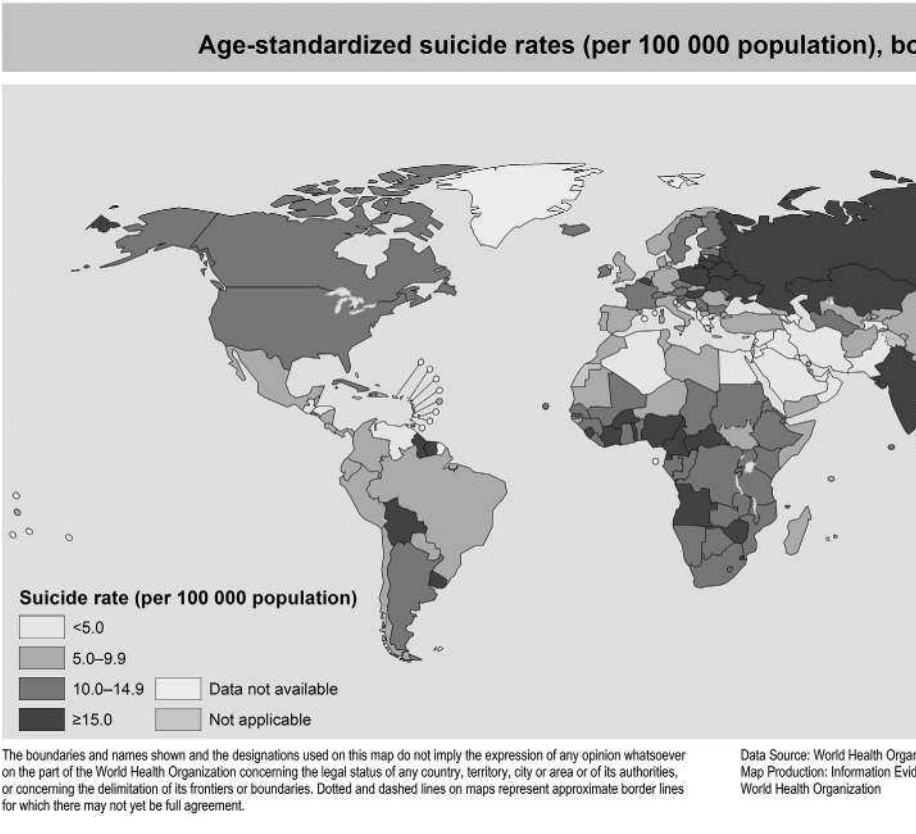

Figure 1.1 Suicide rates in the world. See color plate 1. Age-standardized suicide rates (per 100 000
http://gamapserver.who.int/mapLibrary/app/searchResults.aspx

people die from suicide than from crimes and war combined. In general, Asian and Eastern European countries have the highest rates, Central and South American and eastern Mediterranean countries have the lowest rates, and rates in the United States, Western Europe, and Africa are somewhere in between. But the situation is changing rapidly, with, for instance, strong increases in the United States in recent years, as we will see later. Although differences in rates between countries and regions may to a certain extent reflect differences in case ascertainment and in the availability and recency of reported data (Windfuhr et al., 2016), they more probably are genuine, and influenced by differences in the prevalence of specific risk and protective factors (see later discussion) and broader societal factors (such as social deprivation and political change).

Despite an increase in the global population, the absolute number of suicides has fallen by about 9%, from 883,000 to 804,000 between 2000 and 2012. The global suicide rate has fallen 26% (23% in men and 32% in women) during the 12-year period from 2000 to 2012, which is faster than the 18% decrease in overall mortality. Unfortunately, increases in suicide rates (these are the number of death by suicide per 100,000) have been reported in many countries. For example, suicide rates have increased in the United States in recent decades more than 30%, from 10.5 in 1999 to 13.0 in 2014, and thus are now higher than the global average (Curtin et al., 2016).

Self-injury mortality (SIM), a combination of known suicides by any method and estimated deaths from drug self-intoxication that have been classified by medical examiners and coroners as accident or undetermined, also increased substantially in the United States. There were an estimated 40,289 self-injury deaths in 1999 and 76,227 in 2014. The estimated crude rate for SIM thus increased 65% between 1999 and 2014. The SIM rate thereby continuously exceeded the kidney disease mortality rate and surpassed the influenza and pneumonia mortality rate by 2006. By 2014, the SIM rate converged with the diabetes mortality rate. Also by 2014, SIM accounted for 32 and 37 years of life lost for male and female decedents, respectively (Rockett et al., 2016).

Increases in rates of suicide and self-injury mortality have been related to many factors, ranging from adverse economic changes to reductions in the availability of psychiatric beds (Bastiampillai et al., 2016). Concerning economic factors, a study of 63 countries estimated that an excess of 5,000 suicide deaths worldwide in 2009 were related to the global financial crisis, with the effect of unemployment on suicide rates being stronger in countries with lower pre-crisis unemployment rates

(Nordt et al., 2015). In the United States, economic downturns such as the 2007/2008 recession were associated with an increase of 1.22 deaths per 100,000 population among those with lower educational levels, compared with an increase of 0.17 per 100,000 in those with more than 12 years of education (Harper et al., 2015). Careful analysis of epidemiological data suggests that recession may hurt but that austerity kills, particularly via increased suicide rates (Stuckler & Basu, 2013). An increase in unemployment rates, however, may not explain the effect of financial crises on suicide rates, and the causal relationship between the increase in unemployment and increase in suicide has indeed been questioned for both the United States and Europe (Fountoulakis, 2016). When unemployment rates are low, the suicide rate among unemployed persons is high, but when unemployment increases and the composition of unemployed persons shifts to include more mentally healthy persons, the suicide rate of unemployed persons decreases. In addition, it appears that the number of suicides increases several months before unemployment increases. The most likely explanation is that mental health care deteriorates during periods of economic crisis and austerity. Also, patients constitute a specifically vulnerable group, which is hit harder by a crisis in a selective and accumulated way. This accumulation of stressors might be the cause behind the increase in suicide rates (Fountoulakis, 2016).

There are few regional or national data on the occurrence of nonfatal suicidal behavior or NSSI in the general population. Most data regarding suicide attempts come from studies of visits to general hospitals following self-injurious behavior, a few providing data that enable the calculation of national rates. Between 2006 and 2013 approximately 3.5 million visits to US emergency departments for attempted suicide and self-harm were reported, suggesting an annual population-based rate of approximately 170 per 100,000 (Canner et al., 2016). In Europe, Ireland has a national registry of such visits to general hospitals countrywide, based on which the rate of self-harm (with varying levels of intent and various underlying motives) was estimated at 204 per 100,000 in 2015 (NSRF, 2016). Nationwide individual-level register data on the entire population living in Denmark from 1994 to 2011 revealed an average incidence rate of self-harm of 131 and 87 per 100,000 among females and males, respectively. Among women in the 15–24 age group, an almost 3-fold increase in rates was observed during the study period (Morthorst et al., 2016). Based on data from the WHO World Mental Health (WMH) Survey Initiative, involving 17 countries from different parts of the world, the estimated lifetime prevalence of suicide attempts

in the overall cross-national adult general population sample is 2.7% (Nock et al., 2008). A systematic review of studies of the prevalence of NSSI and deliberate self-harm (DSH) in adolescent samples across the globe shows a mean lifetime prevalence of 18% and 16%, respectively (Muehlenkamp et al., 2013). The number of emergency department visits for self-inflicted injury among adolescents has increased substantially from 2009 to 2012 in the United States (Cutler et al., 2015). Noteworthy is the increasing use over the last decade of potentially more lethal methods such as hanging and jumping from heights as a method of self-harm (Vancayseele et al., 2016). Research clearly shows that the use of more lethal methods increases the risk of future fatal suicidal behavior.

1.2.2 Demographic Influences

Three times as many men die of suicide as women (though in low- and middle-income countries the male-to-female ratio is much lower, at 1.5 men to each woman). Globally, suicide rates are 15.0 for males and 8.0 for females, and suicides account for 50% of all violent deaths in men and 71% in women (WHO, 2014). Rates of attempted suicide are generally higher among females than among males. For example, the Irish national registry report shows that rates in 2015 were 186 and 222 for males and females, respectively (NSRF, 2016).

The proportion of all deaths due to suicide and the rank of suicide as a cause of death vary greatly by age. In high-income countries suicide is most common among middle-aged and elderly men, but rates among young people are increasing. Globally, among young adults 15–29 years of age, suicide accounts for 8.5% of all deaths and is ranked as the second leading cause of death (after traffic accidents). Among adults aged 30–49 years, suicide accounts for 4.1% of all deaths and is ranked the fifth leading cause of death. Rates of nonsuicidal self-harm are highest in young age groups. In the United Kingdom, for example, two-thirds are younger than 35 years (Geulayov et al., 2016). Figure 1.2 clearly shows that suicide is a leading cause of death in young people, particularly those aged between 10 and 35 years.

Seasonal variation in suicide rates has also been reported, with peak incidences in spring and summertime, and suicide rates appear to correlate with latitude and exposure to sunshine (Christodoulou et al., 2012). In the next chapter, neurobiological effects on the geographic distribution of suicidal behaviors will be discussed, ranging from genetic factors to lithium concentrations in drinking water.

Rank	10–14	15–24	25–34	35–44	45–54	55–64	65+
1	Unintentional Injury 763	Unintentional Injury 12,514	Unintentional Injury 19,795	Unintentional Injury 17,818	Malignant Neoplasms 43,054	Malignant Neoplasms 43,054	Heart Disease 507,138
2	Malignant Neoplasms 428	**Suicide 5,491**	**Suicide 6,947**	Malignant Neoplasms 10,909	Heart Disease 34,248	Heart Disease 76,872	Malignant Neoplasms 419,389
3	**Suicide 409**	**Homicide 4,733**	**Homicide 4,863**	Heart Disease 10,387	Unintentional Injury 21,499	Unintentional Injury 19,488	Respiratory disease 131,804
4	**Homicide 158**	Malignant Neoplasms 1,469	Malignant Neoplasms 3,704	**Suicide 6,936**	Liver Disease 8,874	Respiratory disease 17,457	Cerebro-vascular 120,156
5	Congenital Anomalies 156	Heart Disease 997	Heart Disease 3,522	**Homicide 2,895**	**Suicide 8,751**	Diabetes Mellitus 14,166	Alzheimer's Disease 109,495
6	Heart Disease 125	Congenital Anomalies 386	Liver Disease 844	Liver Disease 2,861	Diabetes Mellitus 6,212	Liver Disease 13,728	Diabetes Mellitus 56,142
7	Respiratory disease 93	Respiratory disease 202	Diabetes Mellitus 798	Diabetes Mellitus 1,986	Cerebro-vascular 5,307	Cerebro-vascular 12,116	Unintentional Injury 51,395
8	Cerebro-vascular 42	Diabetes Mellitus 196	Cerebro-vascular 567	Cerebro-vascular 1,788	Respiratory disease 4,345	**Suicide 7,739**	Influenza & Pneumonia 48,774
9	Influenza & Pneumonia 39	Influenza & Pneumonia 184	HIV 529	HIV 1,055	Septicemia 2,542	Septicemia 5,774	Nephritis 41,258
10	Benign Neo, or Septicemia 33	Cerebro-vascular 186	Congenital Anomalies 443	Septicemia 829	Nephritis 2,124	Nephritis 5,452	Septicemia 30,817

Figure 1.2 Ten leading causes of death, United States, 2015. See color plate 2.

1.2.3 The Suicidal Process

Self-injurious thoughts and behaviors are risk factors for future suicide attempts and for death by suicide (Ribeiro et al., 2016). The strongest risk factor for suicide is a previous suicide attempt, and there might be a 70-fold increase in the likelihood of a subsequent attempt and close to a 40-fold increase in the likelihood of death following a suicide attempt (Harris & Barraclough, 1997). Characteristics of prior attempts – including number, recency, intent, and lethality – thereby appear to be important indicators of risk of subsequent suicide.

Early research focused heavily on distinguishing NSSI from suicidal outcomes, but more recent findings indicate that the longitudinal effects of NSSI on suicidal behavior may be much stronger than originally anticipated (Asarnow et al., 2011; Wilkinson et al., 2011). Individuals engaging in DSH have a substantially increased risk of suicide (Beckman et al., 2016). For example, based on a median 5-year follow-up of a large cohort, the suicide rate was estimated at 278 per 100,000 in self-poisoning patients versus 7 per 100,000 in controls. The median time from hospital discharge following self-poisoning to suicide was nearly 600 days (Finkelstein et al., 2015).

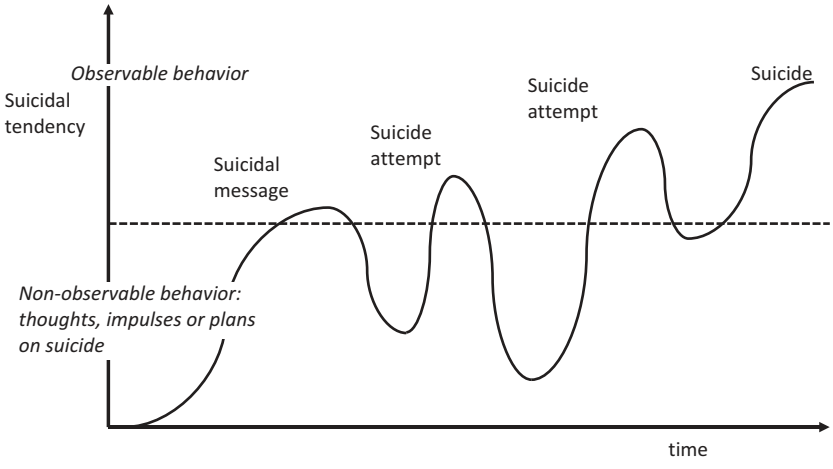

Figure 1.3 The suicidal process (adapted from Retterstøl, 1993).

Findings from longitudinal epidemiological studies thus suggest a relationship between suicidal thoughts, nonfatal suicidal behaviors including NSSI, and suicide. Such findings support the concept of the suicidal process, which is also apparent from psychological autopsy studies of individuals who died due to suicide. The suicidal process is defined as the development and progression of suicidal thoughts and behaviors as a process within an individual and in interaction with their surroundings. The process may evolve through thoughts about taking one's own life, which may grow through often repeated nonfatal suicidal behaviors with increasing lethality and suicide intent, and end with death by suicide (van Heeringen, 2001).

Figure 1.3 shows an example of such a suicidal process that may start with fleeting thoughts about suicide or with a wish for a temporary oblivion or escape from emotional pain, which may precipitate suicidal behaviors. Stressors such as adverse life events and major depressive episodes may thus precipitate suicidal behaviors in the course of the process (Oquendo et al., 2014a; see also Chapter 2). Only small parts of the process – above the dotted line – may become known to those closest to the person (Retterstøl, 1993). The general population National Comorbidity Survey in the United States shows cumulative probabilities of 34% for the transition from suicidal thoughts to a plan, 72% from a plan to a suicide attempt, and 26% from thoughts to an unplanned attempt. About 90% of unplanned and 60% of planned first suicide