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## Suicide Prevention: does it work?

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#### ABSTRACT

The risk factors of suicide which occur in people of all genders, ages and ethnicities, although complex to fully understand, share certain characteristics that include depression (other mental disorders, psychosis or substance abuse disorder), a prior suicide attempt, family history of a mental disorder or substance abuse, family history of suicide, family violence (including physical or sexual abuse), having guns or other firearms in the home, incarceration and exposure to others' suicidal behavior (such as that of family members, peers, or media figures). Research suggests that people who attempt suicide differ from others in many aspects of how they think, react to events, and make decisions. This paper reviews the global trends on suicide and the prevention of suicide according to program evaluation, risk and protective factors, type of intervention, level of intervention and the interface between clinical and public health levels. The major interventions for the prevention of suicide are reasonable care and treatment of mental and addictive disorders, restricted access to lethal means of suicide such as firearms, pesticides, etc., improvement of media portrayal of suicide, school-based programs, availability of hotlines and crisis centers, and training of primary health care personnel.

**KEY WORDS:** *Suicide; Risk factors; Global trends; Prevention*

#### INTRODUCTION

Suicide is a serious public health problem around the world. The connection between suicide and mental disorders was firmly established in the eighteenth century. Indeed in 1845, Bourdin affirmed that suicide is always a form of mental disease.<sup>1</sup> The French Philosopher Albert Camus asserted that *there is but one truly serious philosophical problem and that is suicide*<sup>2</sup>, and suggested that suicide amounts to a confession that life is not worth living.

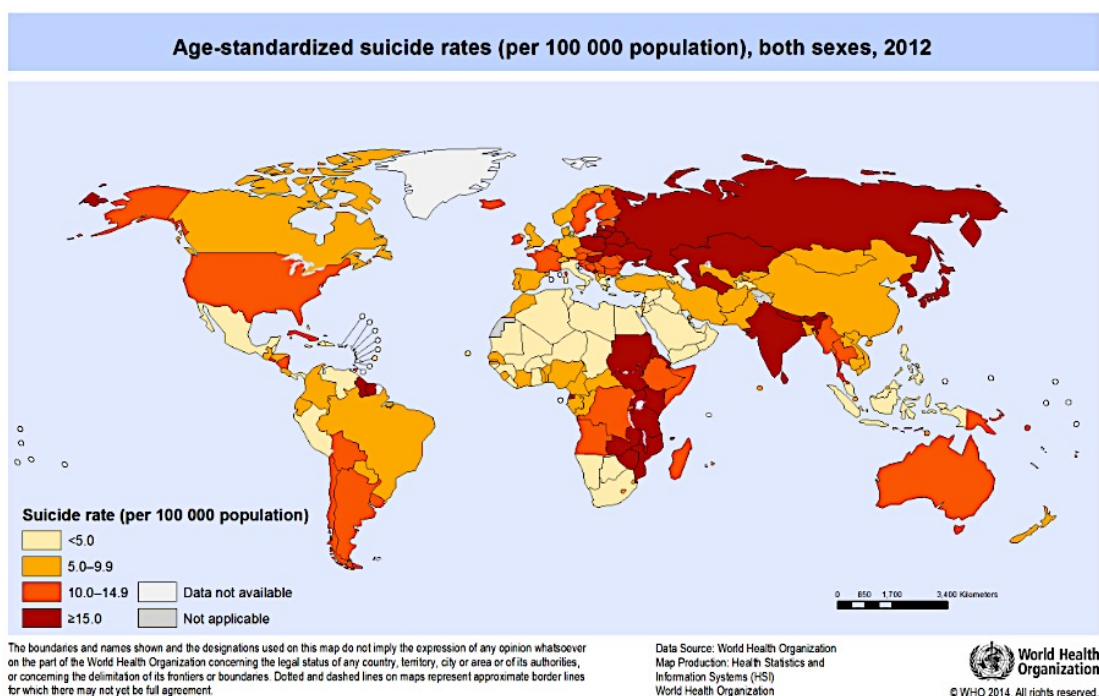
Suicide is tragic but it is often preventable if the risk factors for suicide are known. People of all genders, ages and ethnicities can be at risk for suicide. It is interesting to note that suicidal ideation is reported far more often by females than males.<sup>3</sup> Statistics indicate that male suicides traditionally outnumbered female suicides. Canetto and Sakinofsky concluded that the gender paradox of suicidal behavior is a real phenomenon and not a mere artifact of data collection.<sup>4</sup> McLoughlin *et al*<sup>5</sup> reviewed the research literature on teenage suicide from 2003 to 2014 and observed the gender paradox of elevated suicidal ideation in females with higher completed suicide rates in males

in teenage populations worldwide, with the notable exceptions of China and India. The main risk factors for suicide are major depressive disorder, addictive disorders, previous suicide attempts and family history of suicide.<sup>6</sup> Depression is the most relevant cause found, combined with chronic physical suffering, loss, abandonment, loneliness and family conflicts.<sup>7</sup>

### GLOBAL TRENDS

Suicide is a global phenomenon in all regions of the world and was considered as the second leading cause of death among 15 – 29 year olds globally in 2012.<sup>7</sup> Over

800,000 people die due to suicide every year and there are many more who attempt suicide. **Figure 1** demonstrates that 75% of global suicide occurred in low- and middle-income countries in 2012.<sup>8</sup> The age-standardized suicide rates obtained from the World Health Organization Mortality Database show that young adults and elderly women in low- and middle-income countries (LMICs) have much higher suicide rates than their counterparts in high-income countries, while middle-aged men in high-income countries have much higher suicide rates than middle-aged men in the LMICs.<sup>9</sup>



**Figure 1: Global trends on suicide (Ref no. 7)**

The US Center for Disease Control and Prevention figures on suicide and self-inflicted injury showed that suicide was the second leading cause of death among people aged 15 – 34 years in the United States in 2013 including more than 50% cases of firearm suicide, followed by deaths due to suffocation and poisoning.<sup>10</sup> The 2013 figures on suicide deaths in the United Kingdom published in the statistical bulletin

highlighted a 4% increase in suicide rate from 2012 to 2013 with male suicide rate more than three times higher than the female rate (19.0 deaths per 100,000 males and 5.1 deaths per 100,000 females) and more than half the deaths were due to hanging, strangulation and suffocation, followed by poisoning.<sup>11</sup> According to the Australian Bureau of Statistics, there were 2,522 deaths from intentional self-suicide

in 2013, resulting in a ranking as the 14th leading cause of all deaths. About three-quarters of these were male, and the most frequent method of suicide was hanging, strangulation and suffocation (55.2%) followed by poisoning.<sup>12</sup> The National Crime Records Bureau reported a 5.7% increase in suicide rate during the decade from 2003 to 2013 in India with highest number of death among youth in the age group of 15 – 29 years, and hanging as the most common means of committing suicide (39.8%), followed by poisoning (27.9%).<sup>13</sup>

According to the most recent data available from the 2014 WHO report, six European countries fall within the top 20 countries with the highest estimated suicide rates globally; Lithuania has the fifth highest suicide rate globally at 28.2 deaths per 100,000, Kazakhstan has the 10th highest at 23.8 deaths per 100,000, and Turkmenistan has the 14th highest with 19.6 deaths per 100,000 population.<sup>14</sup> Compared with 2007, the suicide rate in the Netherlands has risen by 25 percent in the year 2013.<sup>15</sup> WHO African suicide data showed an increase of 38% in suicide rates in the African Region from 2000 to 2012 with intentional pesticide ingestion as the most common method of suicide.<sup>16</sup>

### SUICIDE PREVENTION EFFORTS

Suicide prevention programs were initiated in the nineteenth century in New York (National Save-A-Life League) and London (Suicide Prevention Department of the Salvation Army) in 1906, in Vienna (Suicide Prevention Agency) in 1948, and in Berlin (Suicide Prevention Service) in 1956.<sup>17</sup> Finland was the first country to fully implement a nationwide suicide prevention strategy with multiple objectives and the Suicide Prevention Project (1986-1996) was implemented with its aim to reduce the suicide rate by 20% by 1995.<sup>18</sup> Evaluation of the program indicated a reduction of suicide by 9% from 1987 and 18% from

1990.<sup>18</sup> The 'Signs of Suicide (SOS)', a school-based prevention program for secondary schools was incorporated in the United States with two prominent suicide prevention strategies into a single program by combining curricula to raise awareness of suicide and its related issues with a brief screening for depression and other risk factors associated with suicidal behavior and showed a reduction in suicide attempts by 40% in a randomized controlled study conducted by Aseltine *et al.*<sup>19</sup>

The Israel Defense Forces Suicide Prevention Program was implemented in 2006 with the objectives of reducing weapon availability, de-stigmatizing help-seeking behavior, integrating mental health officers into service units, and training commanders and soldiers to recognize suicide risk factors and warning signs, and its evaluation showed a 57% decrease in the suicide rate following the administration of the program.<sup>20</sup> In Australia, the implementation of the National Youth Suicide Prevention Strategy (NYSPPS) in 1995 saw substantial declines in suicide in young men after an epidemic rise in male suicide rates over the 1970s to 1990s.<sup>21</sup> There exist many 'suicide prevention services' as well as 'crisis centers' aiming to prevent suicide. In 2014, the National Institute of Mental Health introduced its 'New Research Agenda for Suicide Prevention' highlighting the need for better risk detection, outreach and treatment access, reducing the lethal means for self-harm, and aiming to reduce suicides in the United States by 40% in 10 years.<sup>22</sup>

### RISK AND PROTECTIVE FACTORS

People possessing risk factors are considered to have greater potential for suicidal behavior; on the other hand, protective factors reduce the likelihood of suicide. Understanding the interactive relationship between risk and protective factors in suicidal behavior and the

modification of this interaction are challenges to suicide prevention.<sup>23</sup> Forster *et al.* have proposed an interesting typology of *fixed risk factors* – age, sex, ethnicity, marital status, economic status, sexual orientation and previous suicide attempts, and *potentially modifiable Risk Factors* – anxiety, hopelessness, life satisfaction, access to means, continuity of care, psychiatric illness, medical illness and social isolation.<sup>24</sup> The impact of some risk factors can be reduced by certain interventions such as lithium maintenance therapy in manic-depressive disorders<sup>25</sup> and addiction treatment<sup>26</sup>. According to Malone *et al.*, the factors that protect against suicide include feelings of responsibility toward family, fear of social disapproval, moral or religious objection to suicide, greater survival and coping skills, and a greater fear of suicide.<sup>27</sup> Some of the most protective factors of suicide are reasonable care for mental and addictive disorders, restricted access to lethal means of suicide, and cultural and religious beliefs that discourage suicide and support self-preservation. A systemic review of suicide prevention strategies concluded that physician education in depression recognition and treatment and restricting access to lethal methods effectively reduce suicide rates.<sup>28</sup>

### **Risk Assessment**

Thienhaus *et al.* suggested the assessment of the patient's situation in his or her current life and living environment, the patient's continuum of suicide risk, the psychiatric disorder, potential deterrents to suicide and the impact of the interview on the patient.<sup>29</sup> Pisani *et al.* propose risk formulations which synthesize data into four distinct judgments to directly inform intervention plans: (1) risk status (the patient's risk relative to a specified subpopulation), (2) risk state (the patient's risk compared to baseline or other specified time points), (3) available resources from

which the patient can draw in crisis, and (4) foreseeable changes that may exacerbate risk.<sup>30</sup> Population attributable risk (PAR) is the best way to calculate the contribution of specific risk factors mainly for two purposes: one, in relation to "fixed factors" that can be improved from a close follow-up, and another for "modifiable factors" that indicate the type of intervention needed for both at individual and population level.<sup>31</sup> There is an urgent need for the consideration of PAR when designing and implementing suicide prevention programs.<sup>32</sup> The major interventions for the prevention of suicide are reasonable care and treatment of mental<sup>25</sup> and addictive disorders<sup>26</sup>, restricted access to lethal means of suicide such as firearms, pesticides, etc.<sup>33</sup>, improvement of media portrayal of suicide<sup>34</sup>, school-based programs<sup>19</sup>, availability of hotlines and crisis centers<sup>35</sup> and training of primary health care personnel<sup>36</sup>.

### **CASE STUDY ON U.S. MILITARY PERSONNEL**

We conclude by examining the outcome of a study that focused on suicide in the US military (a status aptly illustrated in **Figure 2**) and examined the risk and protective factors. The study was the largest study of mental health risk and resilience conducted among U.S. military personnel. The rationale for the study was driven by the notions that historically, the suicide death rates in the U.S. Army have been below the civilian rate, the suicide rate in the U.S. Army began climbing in the early 2000s, and by 2008, was found to exceed the demographically-matched civilian rate (20.2 suicide deaths per 100,000 vs. 19.2). The study indicated that a rise in the suicide deaths from 2004 to 2009 occurred not only in currently and previously deployed soldiers, but also among soldiers never deployed; nearly half of soldiers who

reported suicide attempts indicated their first attempt was prior to enlistment; and soldiers reported higher rates of certain mental disorders than civilians, including attention deficit hyperactivity disorder (ADHD), intermittent explosive disorder (recurrent episodes of extreme anger or violence), and substance use disorder<sup>37-39</sup>. Schoenbaum *et al.*<sup>38</sup> examined the suicide and accident death rates in relation to basic socio-demographic and army experience factors in regular army soldiers and found increased suicide rates among those who had never been deployed, and also found that being deployed increased the suicide

risk for women more than it did for men. It was interesting that suicide risk still remained lower for deployed women than for deployed men. The data suggest that being male, white, or a junior enlisted rank put individuals at the highest risk of suicide. The authors reported a correlation between demotion and suicide risk: soldiers who had been demoted in the past two years experienced increased suicide risk, compared to those without such demotions. There was also increased risk in soldiers without at least a high school diploma or a GED certificate, compared to soldiers with similar or higher degrees.

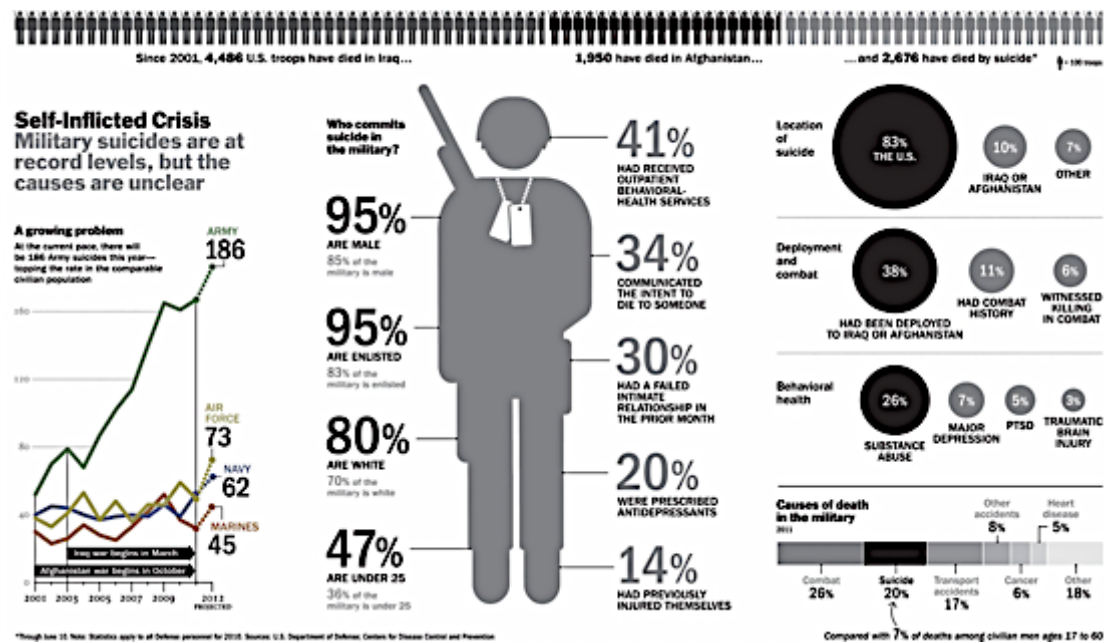


Figure 2: Military Suicides in the U.S. Army – TIME

Nock *et al.*<sup>37</sup> sought to explain the findings from a survey of more than 5,000 non-deployed soldiers, designed to shed light on suicidal thoughts, plans, and attempts before and after entering the Army. Recruitment interviews revealed that 13.9 percent of soldiers considered suicide at some point in their lifetime, 5.3 percent made a suicide plan, and 2.4 percent attempted suicide, with between 47 to 60 percent of these outcomes first occurring prior to joining the Army. Nock *et al.*<sup>37</sup>

found that soldiers attempting suicide appeared to be lower-ranking, enlisted, female, and to have been previously deployed. Certain pre-enlistment mental disorders, including panic disorder and post-traumatic stress disorder, linked to increased rates of suicide attempts after joining the Army. In fact, approximately one-third of post-enlistment suicide attempts tied back to pre-enlistment mental disorders. Pre- and post-enlistment mental disorders accounted for 60 percent

of first suicide attempts in the Army<sup>37</sup>. The soldiers' pre-enlistment patterns of suicidal thoughts and behaviors remained lower than suicidal thoughts and behaviors reported by a demographically-matched civilian group. However, once in the Army, the onset of suicidal thoughts and planning became more common than among comparable civilians. Both groups had similar rates of suicide attempts<sup>37</sup>.

Kessler *et al.*<sup>39</sup> describes a comparison of the same set of non-deployed soldiers and a group of similarly aged civilians. Rates of common mental disorders in the U.S. Army are compared with a demographically-matched civilian population from the National Comorbidity Survey Replication, a national household study that assesses mental disorders. The study estimated how common certain mental health disorders are among Army soldiers, and whether the disorders developed prior to entering the Army. Interestingly, the most common disorders in soldiers included ADHD and intermittent explosive disorder. Almost 85 percent of those who self-identified as having had a mental health disorder reported that the problem began prior to joining the Army. For some of the disorders—including ADHD, intermittent explosive disorder, and substance use disorder—an early age of onset occurred more among soldiers than in civilians. The study also looked at role impairment, which is whether the disorders seriously affected the soldiers' home life, work performance, social life, or close relationships. Severe role impairment was found to be substantially more common among soldiers with a mental disorder than those without<sup>39</sup>. The three studies alluded to point to risk factors, which may help identify potential protective factors, focus on existing prevention programs, and foster the development of novel efforts to reduce suicide and suicidal thoughts and actions among service members at higher risk.

From the foregoing discussions, it is clear that a previous suicide attempt is the most important predictor of death by suicide. Evidence regarding the overall efficacy of suicide prevention programs is important in identifying which strategies should be prioritized to achieve the biggest impact.

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#### REFERENCES

1. Bourdin CE. Du suicide considere comme maladie. Paris: De Hennuyer & Turpin. 1845.
2. Camus A. Le mythe de Sisyphe. Paris: Gallimard; 1942.
3. Paykel ES, Myers JK, Lindenthal JJ, Tanner J. Suicidal feelings in the general population: a prevalence study. *Br J Psychiatry*. 1974;124:460-9.
4. Canetto SS, Sakinofsky I. The gender paradox in suicide. *Suicide Life-Threat Behav*. 1998;28(1):1-23.
5. McLoughlin AB, Gould MS, Malone KM. Global trends in teenage suicide: 2003-2014. *QJM*. 2015;108(10):765-80.
6. Kirkcaldy BD1, Siefen GR, Urkin J, Merrick J. Risk factors for suicidal behavior in adolescents. *Minerva Pediatr*. 2006;58:443-50.
7. Minayo MC, Cavalcante FG. Suicide attempts among the elderly: a review of the literature (2002/2013). *Cien Saude Colet*. 2015;20(6):1751-62.
8. WHO. Suicide data. Available from: [http://www.who.int/mental\\_health/prevention/suicide/suicideprevent/en/](http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/)
9. WHO. Global Health Observatory (GHO) data. Available from: [http://www.who.int/gho/mental\\_health/en/](http://www.who.int/gho/mental_health/en/)
10. CDC. Suicide and self-inflicted injury. Available from:

- <http://www.cdc.gov/nchs/fastats/suicide.htm>
11. Office for National Statistics (ONS). Suicides in the United Kingdom, 2013 Registrations. *Statistical Bulletin*. 2015. Available from: [http://www.ons.gov.uk/ons/dcp171778\\_395145.pdf](http://www.ons.gov.uk/ons/dcp171778_395145.pdf)
  12. Australian Bureau of Statistics. 3303.0 - Causes of Death, Australia, 2013. Available from: <http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/3303.0~2013~Main%20Features~Suicides~10004>
  13. National Crime Records Bureau. Suicide in India. Available from: <http://ncrb.gov.in/adsis2013/suicides%202013.pdf>
  14. WHO Europe. Data and statistics. Available from: <http://www.euro.who.int/en/health-topics/noncommunicable-diseases/mental-health/data-and-statistics>
  15. CBS. Statistics Netherlands: suicides rise substantially again. Available from: <http://www.cbs.nl/en-GB/menu/themas/bevolking/publicaties/artikelen/archief/2014/2014-4204-wm.htm>
  16. WHO. First WHO report on suicide prevention. Available from: <http://www.who.int/mediacentre/news/releases/2014/suicide-prevention-report/en/>
  17. Shneidman ES. Suicide prevention. In: Corsini R, editor. *Encyclopedia of psychology*. Vol 3. New York: Wiley. 1984:383.
  18. Upanne M, Hakanen J, Rautava M. Can suicide be prevented? The Suicide Project in Finland 1992-1996: goals, implementation and evaluation. Helsinki: Stakes. 1999. Available from: <http://julkari.fi/bitstream/handle/10024/76109/mu161.pdf?sequence=1>
  19. Aseltine RH Jr, DeMartino R. An outcome evaluation of the SOS Suicide Prevention Program. *Am J Public Health*. 2004; 94(3): 446–451.
  20. Shelef L, Tatsa-Laur L, Derazne E, Mann JJ, Fruchter E. An effective suicide prevention program in the Israeli Defense Forces: A cohort study. *Eur Psychiatry*. 2015;31:37-43.
  21. Page A, Taylor R, Gunnell D, Carter G, Morrell S, Martin G. Effectiveness of Australian youth suicide prevention initiatives. *Br J Psychiatry*. 2011;199(5):423-9.
  22. Swanson JW, Bonnie RJ, Appelbaum PS. Getting Serious About Reducing Suicide: More "How" and Less "Why". *JAMA*. 2015;314:2229-30.
  23. Mościcki EK. Identification of suicide risk factors using epidemiologic studies. *Psychiatr Clin North Am*. 1997;20:499-517.
  24. Forster P, Wu L. Assessment and treatment of the suicidal patient in an emergency setting. In: Allen MH, editor. *Emergency psychiatry*. Washington: American Psychiatric Publishing. 2002:75-113.
  25. Baldessarini RJ, Tondo L, Hennen J. Effects of lithium treatment and its discontinuation on suicidal behavior in bipolar manic-depressive disorders. *J Clin Psychiatry*. 1999;60 Suppl 2:77-84.
  26. Yuodelis-Flores C, Ries RK. Addiction and suicide: A review. *Am J Addict*. 2015;24(2):98-104.
  27. Malone KM, Oquendo MA, Haas GL, Ellis SP, Li S, Mann JJ. Protective factors against suicidal acts in major depression: reasons for living. *Am J Psychiatry*. 2000;157(7):1084-8.
  28. Mann JJ, Apter A, Bertolote J, Beautrais A, Currier D, Haas A, et al. Suicide prevention strategies: a systematic review. *JAMA*. 2005;294(16):2064-74.

29. Thienhaus OJ, Piasecki M. Assessment of suicide risks. *Psychiatr Serv*. 1997;48(3):293-4.
30. Pisani AR, Murrie DC, Silverman MM. Acad Psychiatry. 2015. [Epub ahead of print]
31. Qin P, Agerbo E, Mortensen PB. Suicide risk in relation to socioeconomic, demographic, psychiatric, and familial factors: a national register-based study of all suicides in Denmark, 1981-1997. *Am J Psychiatry*. 2003;160(4):765-72.
32. Bertolote JM. Suicide prevention: at what level does it work? *World Psychiatry*. 2004;3(3):147-51.
33. Lester D. Preventing suicide by restricting access to methods for suicide. *Arch Suicide Res*. 1998;4:7-24.
34. Schmidtke A, Schaller S. The role of mass media in suicide prevention. In: Hawton K, van Heeringen K, editors. *The international handbook of suicide and attempted suicide*. New York: Wiley. 2000:675-97.
35. Gould MS, Kalafat J, Harrismunfakh JL, Kleinman M. An evaluation of crisis hotline outcomes. Part 2: Suicidal callers. *Suicide Life Threat Behav*. 2007;37(3):338-52.
36. Rutz W, von Knorring L, Wålinder J. Frequency of suicide on Gotland after systematic postgraduate education of general practitioners. *Acta Psychiatr Scand*. 1989;80(2):151-4.
37. Nock MK, Stein MB, Heeringa SG, Ursano RJ, Colpe LJ, Fullerton CS, et al. Prevalence and correlates of suicidal behavior among soldiers: results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry*. 2014;71(5):514-22.
38. Schoenbaum M, Kessler RC, Gilman SE, Colpe LJ, Heeringa SG, Stein MB, et al. Predictors of suicide and accident death in the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS): results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry*. 2014;71(5):493-503.
39. Kessler RC, Heeringa SG, Stein MB, Colpe LJ, Fullerton CS, Hwang I, et al. Thirty-day prevalence of DSM-IV mental disorders among nondeployed soldiers in the US Army: results from the Army Study to Assess Risk and Resilience in Servicemembers (Army STARRS). *JAMA Psychiatry*. 2014;71(5):504-13.