

Sex, Gender, and Suicidal Behavior



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Abstract This chapter reviews gender differences in suicide, commonly known as the gender paradox in suicide. While men are more likely to complete suicide, suicide attempts are more frequent in women. Although there are exceptions, this paradox occurs in most countries over the world, and it is partially explained by the preference of men for more lethal methods. Nevertheless, there are differences in the known risk factors for suicide between men and women, and this chapter summarizes the more relevant findings for the gender paradox. Apart from previous attempts, which still is the strongest predictor of death by suicide, with a higher rate in males than in females, we will emphasize in the role of male depression. It is

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commonly recognized that over 90% of people who die by suicide had a psychiatric diagnosis, mostly depression, and male depression seems to be a distinct clinical phenotype challenging to recognize, which might contribute to the gender paradox. Finally, in light of all the information reviewed, some recommendations on prevention of suicide from a gender perspective in the clinical setting will be made.

Keywords Gender · Gender differences · Prevention · Risk factors · Sex · Suicide · Suicide attempted

1 Introduction

Suicide is a complex multifactorial phenomenon; the precise process underlying suicide involves many issues still unresolved. Suicide rates are different according to region, sex, age, time, ethnic origin, and, presumably, death registration methods (Hawton and van Heeringen 2009). One of the classic risk factors for suicide is male sex/gender, with men being more likely to complete suicide and women to try it; this is known as the gender paradox in suicide (Canetto and Sakinofsky 1998). Apart from China, Bangladesh, and Lesotho, where there are more deaths by suicide in women than in men, this is a demonstrated fact worldwide (Naghavi 2019; WHO, Suicide Data 2019).

Sex differences in suicidal behavior have been extensively studied, but most of the research in this topic is made assuming equivalence between sex and gender, and, furthermore, only in most recent times, research has also focused on suicidal behavior in a non-binary gender (Fox et al. 2018). Sex and gender are constructs that should be differentiated. Essentially, sex refers to biology while gender involves cultural constructs (Clayton and Tannenbaum 2016), and differences in suicidal behavior are probably more related to cultural issues (i.e., gender) than only to a biological basis (i.e., sex). In suicidology, both constructs should be taken into account, but by now it is difficult to perform a specific search on sex or gender exclusively; therefore, this chapter will use both terms interchangeably, with a preference for the term “gender,” given the role of cultural factors in suicide phenomena.

In this chapter, we are going to review gender differences in suicide rates across different countries of the world. Then we will describe and reflect on gender differences in suicide methods. Next, suicide risk factors will be study focusing on the effect of male or female gender. Finally, different preventive approaches will be suggested in light of gender differences previously reviewed.

Across different sections of the chapter, it will be observed how the role of traditional masculinity is frequently involved in gender differences in suicide, and how men are a high-risk population, and specific and tailored interventions are needed for them.

2 Terminology

2.1 *Suicidal Behavior*

In this chapter, we use the terminology for suicide based on the definition given by O'Carroll et al. in 1996 (O'Carroll et al. 1996) and later redefined by Silverman et al. in 2007 (Silverman et al. 2007). Thus, here we use the term *suicidal behavior* for denoting any type of suicidality, that is, suicidal ideation, suicidal plans, non-fatal suicide attempts, and deaths by suicide. Subsequently, we will use the term *suicidal ideation* for “unelaborated thoughts related to the wish and/or intention of taking one's life,” *suicidal plan* for “an elaborated and structured suicidal ideation with decisions made as how to perform the suicide attempt,” and *suicide attempts* for “any act of self-harm performed with the intention of taking one's life”; suicide attempts could lead to *non-fatal suicide attempts* or *death by suicide*. Hence, in this chapter, we will mostly refer to *death by suicide* or just *suicide*. Non-suicidal self-injuries (NSSI), a descriptive term employed in the DSM 5, will not be addressed in this chapter. Furthermore, extended and assisted suicide are not part of this chapter.

2.2 *Sex and Gender*

Sex and gender are terms frequently used interchangeably in ordinary speech. Indeed, in some languages there are not two different words for both constructs. Although in scientific terms, sex and gender are not strictly exchangeable, both terms are non-exclusive, but are related to each other and influence health in different ways (Clayton and Tannenbaum 2016). Primarily, while sex refers to biology, the term gender includes psychosocial factors (Clayton and Tannenbaum 2016).

Sex refers to the biological characteristics that define humans as female or male, which is determined by the genetic information of chromosomes, and includes cellular and molecular differences (Dunn et al. 2016). The World Health Organization (WHO) states that “sex refers to the biological and physiological characteristics that define men and women” and “‘male’ and ‘female’ are sex categories” (WHO, Defining Sexual Health 2019). Male or female sexual differentiation is based in karyotype at birth, 46XX for female sex and 46XY for males, and is physiologically characterized by the gonads (ovary or testes), sex hormones (testosterone and estrogen), external genitalia (e.g., penis or vulva), and internal reproductive organs (e.g., uterus or prostate gland) (Clayton and Tannenbaum 2016). People with mixed sex factors are intersex.

On the other hand, **gender** refers to the socially constructed characteristics of women and men and comprises the social, environmental, cultural, and behavioral factors that influence a person's identity of being a man or a woman (Clayton and Tannenbaum 2016). In the sphere of gender, several aspects must be distinguished: gender assignment, gender roles, and gender identity. *Gender assignment* is how an

infant is classified at birth, as either male or female based on external genitalia (WHO, *Defining Sexual Health* 2019). *Gender roles or gender norms* are unspoken rules in the family, workplace, institutions, or global culture that influence individual attitudes and behaviors (Schiebinger and Stefanick 2016). Finally, *gender identity* refers to how individuals and groups perceive and present themselves (Clayton and Tannenbaum 2016), but rather than a binary concept, there are gender identity gradations from masculinity to femininity (Fausto-Sterling 2008). When a mismatch between gender identity and gender assigned exists, we refer to “transgender,” and so the term transgender includes people whose gender identity is the opposite of their assigned sex (trans men and trans women), but also includes people who feel not exclusively masculine or feminine (genderqueer, non-binary, bigender, pangender, genderfluid, or agender) (Fausto-Sterling 2008). Thus, gender identity is not an entirely fixed characteristic, and many transgender people move fluidly between identities over time, often without any specific labels (Haas et al. 2011).

Although, as it has been previously exposed, gender and sex are not equivalent, we should point out that in this chapter both terms will be used indistinctly since a specific search for each term is complicated due to the fact that previous scientific research has not generally made the distinction (Clayton and Tannenbaum 2016). A reflection on this should be made, and currently, many journals encourage authors to transparently report sex, gender, or even both in their works. Generally in research sex/gender are visually assigned to research participants without specifically asking, and even more, there are no validated tools for assessing gender, and an approach in which participants were asked first about sex assigned at birth and then about gender identity has been proposed (Clayton and Tannenbaum 2016).

Furthermore, transgender condition impacts death by suicide and suicide behavior, and it has been extensively studied, especially in recent years (Fox et al. 2018; Narang et al. 2018). Although highly interesting, this topic is beyond the scope of our review and will not be covered in this chapter.

3 Worldwide Suicide Rates by Gender

The World Health Organization (WHO) provides the most exhaustive and unbiased data on suicide rates from its member states and periodically updates them. Currently, the last available suicide data are from 2016 (WHO, *Suicide Data* 2019). According to WHO data, in 2016 the global male/female ratio of age-standardized suicide rates was 1.8, meaning that worldwide, men complete suicide almost twice more often than women (WHO, *Suicide Rates (per 100 000 population)* 2019). Interestingly, this ratio is particularly high in Europe (around 4:1) and in high-income countries but lower in low- and middle-income countries (around 1.6:1) (Saxena et al. 2014). Asian countries typically show much lower male/female ratios (Chen et al. 2012). Furthermore, comparing the information from the WHO countries, the male/female ratio ranged from 0.8 in Bangladesh and China to 12.2 in St. Vincent and the Grenadines (Bachmann 2018).

This is graphically shown in the map developed periodically by WHO, in which the lighter-colored countries represent those in which more women than men die by suicide and, on the contrary, the darker-colored ones represent those countries in which more men than women die by suicide (Fig. 1).

Similar figures are thrown by the Global Burden of Disease (GBD) Study (Naghavi 2019). According to GBD, male suicide age-standardized rate was higher (15.6 deaths/100,000, 95% uncertainty interval 13.7 to 17.2) than female rate (7.0 deaths/100,000, 95% uncertainty interval 6.5 to 7.4). However, the rate of decrease from 1990 to 2016 was lower for male (23.8%, 95% uncertainty interval 15.6% to 32.7%) than for female (49.0%, 42.6% to 54.6%). Figure 2 shows regional trends of age-standardized suicide rates for women and men.

Suicide rates vary in different countries throughout the world. Details of rates by country, according to WHO data (WHO, Suicide Rates (per 100 000 population) 2019), are shown in Table 1.

In this table, it could be observed how, in most countries, male suicide rates are higher than female, with Ukraine, Lithuania, or Russia among the top. Only in a limited number of countries, most from East Asia, the opposite happens. This is widely known for China (Simon et al. 2013), Bangladesh (Sharmin Salam et al. 2017), and Pakistan (Shekhani et al. 2018), but also consistently observed in African countries such as Morocco or Lesotho. Concerning Morocco, as in many other Arabic countries where suicide is a taboo act, there is a notable lack of national suicide rates, and studies on the topic are scarce (Bjegovic-Mikanovic et al. 2019). Finally, for Lesotho no specific studies about suicides have been found. Altogether, and in a simplistic approach, the highest male/female suicide rates are found in Eastern European countries and the lowest in the WHO Southeast Asia Region.

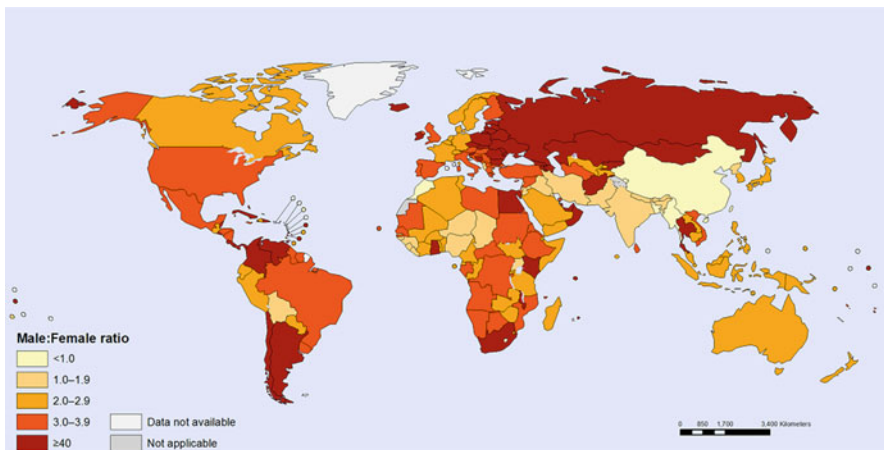


Fig. 1 2016 map of male/female ratio of age-standardized suicide rates from 2016. Picture obtained from WHO Global Health Observatory data repository

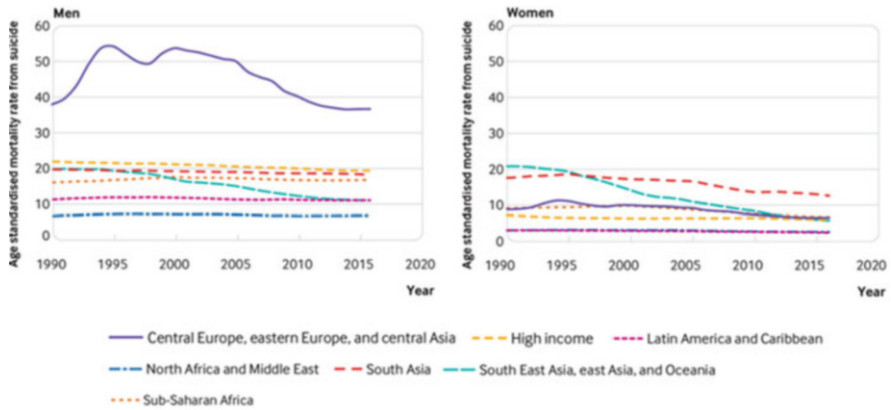


Fig. 2 Global Burden of Disease regions’ age-standardized suicide rates for women and men (1990 to 2016). Modification of figure from the Global Burden of Disease Study 2016 (British Medical Journal, 2019; 364: 194)

Although there are many unanswered questions regarding these differences in the male/female suicide ratio across countries, probably cultural factors must be taken into account to understand them (Canetto 2008). In this sense, the review of Ahmed et al. highlighted how, in the United Kingdom, rates of self-harm among South Asian women are much higher than among their White counterparts (Ahmed et al. 2007).

Finally, it is worth to mention how the research investment in suicide does not correspond with the worldwide distribution of suicide, and we should point out that more research should be developed to better understand the male-female gap in suicide (Lopez-Castroman et al. 2015).

4 Gender Differences in Suicide Methods

Returning to the concept of gender paradox in suicide, men completed suicide up to three times more than women, while for suicide attempts, an inverse ratio is found (Bachmann 2018), and this difference is partially explained by the preference of men for more lethal methods (Ajdacic-Gross et al. 2008; Saxena et al. 2014). In the latest overview of suicide methods, in 2008, authors differentiated hanging, drowning, falls, pesticide poisoning, other poisoning, firearms, and others (Ajdacic-Gross et al. 2008). Globally, for both genders together, the most commonly used methods to complete suicide are hanging, self-poisoning with pesticides, and use of firearms (Saxena et al. 2014). Methods differ between world regions and between males and females. Next, is summarized the latest data on methods for males and females according to different world regions:

Table 1 Year 2016 age-standardized suicide rates (per 100,000 population)

| Country | Both sexes | Male | Female |
|--------------------------|------------|------|--------|
| Afghanistan | 6.4 | 10.6 | 2.1 |
| Albania | 5.6 | 7.0 | 4.3 |
| Algeria | 3.3 | 4.9 | 1.8 |
| Angola | 8.9 | 14.0 | 4.6 |
| Antigua and Barbuda | 0.5 | 0.0 | 0.9 |
| Argentina | 9.1 | 15.0 | 3.5 |
| Armenia | 5.7 | 10.1 | 2.0 |
| Australia | 11.7 | 17.4 | 6.0 |
| Austria | 11.4 | 17.5 | 5.7 |
| Azerbaijan | 2.6 | 4.3 | 1.0 |
| Bahamas | 1.6 | 2.8 | 0.5 |
| Bahrain | 5.7 | 7.9 | 2.1 |
| Bangladesh | 6.1 | 5.5 | 6.7 |
| Barbados | 0.4 | 0.8 | 0.3 |
| Belarus | 21.4 | 39.3 | 6.2 |
| Belgium | 15.7 | 22.2 | 9.4 |
| Belize | 5.9 | 9.9 | 2.0 |
| Benin | 15.7 | 22.6 | 9.6 |
| Bhutan | 11.6 | 13.8 | 8.9 |
| Bolivia | 12.9 | 16.9 | 8.9 |
| Bosnia and Herzegovina | 6.4 | 10.6 | 2.5 |
| Botswana | 11.5 | 18.3 | 5.7 |
| Brazil | 6.1 | 9.7 | 2.8 |
| Brunei Darussalam | 4.5 | 6.2 | 2.8 |
| Bulgaria | 7.9 | 13.1 | 3.2 |
| Burkina Faso | 14.8 | 22.4 | 9.1 |
| Burundi | 15.0 | 23.1 | 7.7 |
| Cabo Verde | 15.1 | 24.1 | 7.7 |
| Cambodia | 5.9 | 9.0 | 3.2 |
| Cameroon | 19.5 | 26.9 | 12.5 |
| Canada | 10.4 | 15.1 | 5.8 |
| Central African Republic | 11.6 | 18.0 | 6.0 |
| Chad | 15.5 | 17.1 | 13.8 |
| Chile | 9.7 | 16.0 | 3.8 |
| China | 8.0 | 7.9 | 8.3 |
| Colombia | 7.0 | 11.5 | 2.8 |
| Comoros | 11.1 | 17.6 | 5.4 |
| Congo | 9.3 | 13.9 | 5.0 |
| Costa Rica | 7.5 | 12.8 | 2.3 |
| Cote d'Ivoire | 23.0 | 32.0 | 13.0 |
| Croatia | 11.5 | 18.8 | 5.1 |
| Cuba | 10.1 | 16.4 | 4.1 |

(continued)

Table 1 (continued)

| Country | Both sexes | Male | Female |
|--------------------|------------|------|--------|
| Cyprus | 4.5 | 7.2 | 1.9 |
| Czechia | 10.5 | 17.2 | 4.2 |
| South Korea | 10.6 | 14.8 | 8.0 |
| Congo | 9.7 | 15.0 | 4.9 |
| Denmark | 9.2 | 13.2 | 5.2 |
| Djibouti | 8.5 | 11.9 | 5.3 |
| Dominican Republic | 10.5 | 17.9 | 3.2 |
| Ecuador | 7.2 | 10.7 | 3.8 |
| Egypt | 4.4 | 7.2 | 1.7 |
| El Salvador | 13.5 | 24.8 | 4.3 |
| Equatorial Guinea | 22.0 | 31.3 | 10.8 |
| Eritrea | 13.8 | 22.4 | 6.1 |
| Estonia | 14.4 | 25.6 | 4.4 |
| Eswatini | 16.7 | 25.4 | 9.6 |
| Ethiopia | 11.4 | 18.7 | 4.7 |
| Fiji | 5.5 | 8.8 | 2.5 |
| Finland | 13.8 | 20.8 | 6.8 |
| France | 12.1 | 17.9 | 6.5 |
| Gabon | 9.6 | 15.0 | 4.3 |
| Gambia | 10.0 | 12.8 | 7.3 |
| Georgia | 6.7 | 12.3 | 1.9 |
| Germany | 9.1 | 13.6 | 4.8 |
| Ghana | 8.7 | 15.8 | 2.9 |
| Greece | 3.8 | 6.1 | 1.5 |
| Grenada | 1.7 | 2.1 | 1.0 |
| Guatemala | 2.9 | 4.4 | 1.7 |
| Guinea | 10.5 | 12.7 | 8.4 |
| Guinea-Bissau | 7.4 | 8.9 | 6.1 |
| Guyana | 30.2 | 46.6 | 14.2 |
| Haiti | 12.2 | 18.3 | 6.4 |
| Honduras | 3.4 | 5.3 | 1.7 |
| Hungary | 13.6 | 22.2 | 6.2 |
| Iceland | 13.3 | 21.7 | 4.7 |
| India | 16.5 | 18.5 | 14.5 |
| Indonesia | 3.7 | 5.2 | 2.2 |
| Iran | 4.0 | 4.9 | 3.1 |
| Iraq | 4.1 | 4.7 | 3.4 |
| Ireland | 10.9 | 17.6 | 4.2 |
| Israel | 5.2 | 8.2 | 2.4 |
| Italy | 5.5 | 8.4 | 2.6 |
| Jamaica | 2.0 | 3.2 | 0.9 |
| Japan | 14.3 | 20.5 | 8.1 |

(continued)

Table 1 (continued)

| Country | Both sexes | Male | Female |
|------------------|------------|------|--------|
| Jordan | 3.7 | 4.7 | 2.7 |
| Kazakhstan | 22.8 | 40.1 | 7.7 |
| Kenya | 5.6 | 9.7 | 2.1 |
| Kiribati | 15.2 | 25.9 | 5.4 |
| Kuwait | 2.2 | 2.5 | 1.7 |
| Kyrgyzstan | 9.1 | 14.8 | 3.7 |
| Lao | 9.3 | 12.9 | 6.1 |
| Latvia | 17.2 | 31.0 | 5.1 |
| Lebanon | 3.2 | 4.2 | 2.2 |
| Lesotho | 28.9 | 22.7 | 32.6 |
| Liberia | 13.4 | 13.8 | 13.0 |
| Libya | 5.5 | 8.7 | 2.3 |
| Lithuania | 25.7 | 47.5 | 6.7 |
| Luxembourg | 10.4 | 15.0 | 5.8 |
| Madagascar | 6.9 | 10.5 | 3.6 |
| Malawi | 7.8 | 13.7 | 3.2 |
| Malaysia | 6.2 | 8.7 | 3.6 |
| Maldives | 2.7 | 3.6 | 1.6 |
| Mali | 8.9 | 13.5 | 4.7 |
| Malta | 6.5 | 10.3 | 2.8 |
| Mauritania | 7.5 | 12.1 | 3.6 |
| Mauritius | 7.3 | 12.5 | 2.2 |
| Mexico | 5.2 | 8.2 | 2.3 |
| Micronesia | 11.3 | 16.2 | 6.2 |
| Mongolia | 13.3 | 23.3 | 3.8 |
| Montenegro | 7.9 | 12.6 | 3.6 |
| Morocco | 3.1 | 2.5 | 3.6 |
| Mozambique | 8.4 | 14.0 | 4.1 |
| Myanmar | 8.1 | 6.3 | 9.8 |
| Namibia | 11.5 | 19.4 | 4.9 |
| Nepal | 9.6 | 11.4 | 8.0 |
| Netherlands | 9.6 | 12.9 | 6.4 |
| New Zealand | 11.6 | 17.3 | 6.2 |
| Nicaragua | 11.9 | 19.2 | 5.0 |
| Niger | 9.0 | 11.5 | 6.7 |
| Nigeria | 17.3 | 17.5 | 17.1 |
| Norway | 10.1 | 13.6 | 6.5 |
| Oman | 3.5 | 4.8 | 0.9 |
| Pakistan | 3.1 | 3.0 | 3.1 |
| Panama | 4.4 | 7.6 | 1.2 |
| Papua New Guinea | 7.0 | 10.2 | 3.8 |
| Paraguay | 9.3 | 12.3 | 6.2 |

(continued)

Table 1 (continued)

| Country | Both sexes | Male | Female |
|-----------------------|------------|------|--------|
| Peru | 5.1 | 7.6 | 2.7 |
| Philippines | 3.7 | 5.2 | 2.3 |
| Poland | 13.4 | 23.9 | 3.4 |
| Portugal | 8.6 | 14.3 | 3.8 |
| Qatar | 5.8 | 7.3 | 1.1 |
| North Korea | 20.2 | 29.6 | 11.6 |
| Moldova | 13.4 | 24.1 | 3.8 |
| Romania | 8.0 | 13.9 | 2.4 |
| Russia | 26.5 | 48.3 | 7.5 |
| Rwanda | 11.0 | 16.9 | 0.0 |
| Saint Lucia | 7.3 | 12.7 | 2.1 |
| Saint Vincent | 2.4 | 3.9 | 0.9 |
| Samoa | 5.4 | 8.7 | 2.2 |
| Sao Tome and Principe | 3.1 | 4.2 | 2.1 |
| Saudi Arabia | 3.4 | 4.6 | 1.7 |
| Senegal | 11.8 | 20.3 | 5.2 |
| Serbia | 10.9 | 17.3 | 5.2 |
| Seychelles | 8.3 | 15.0 | 2.1 |
| Sierra Leone | 16.1 | 18.2 | 14.2 |
| Singapore | 7.9 | 11.1 | 4.9 |
| Slovakia | 10.1 | 18.4 | 2.6 |
| Slovenia | 13.3 | 22.4 | 4.5 |
| Solomon Islands | 5.9 | 8.5 | 3.2 |
| Somalia | 8.3 | 11.5 | 5.4 |
| South Africa | 12.8 | 21.7 | 5.1 |
| South Sudan | 6.1 | 8.3 | 4.1 |
| Spain | 6.1 | 9.3 | 3.1 |
| Sri Lanka | 14.2 | 23.3 | 6.2 |
| Sudan | 9.5 | 14.5 | 4.6 |
| Suriname | 23.2 | 36.1 | 10.9 |
| Sweden | 11.7 | 15.8 | 7.4 |
| Switzerland | 11.3 | 15.8 | 6.9 |
| Syria | 2.4 | 3.8 | 1.1 |
| Tajikistan | 3.3 | 5.0 | 1.7 |
| Thailand | 12.9 | 21.4 | 4.8 |
| Macedonia | 6.2 | 9.7 | 3.0 |
| Timor-Leste | 6.4 | 9.0 | 3.7 |
| Togo | 16.6 | 22.7 | 10.9 |
| Tonga | 4.0 | 5.2 | 2.9 |
| Trinidad and Tobago | 12.9 | 21.9 | 4.3 |
| Tunisia | 3.2 | 4.4 | 2.2 |
| Turkey | 7.2 | 11.3 | 3.2 |

(continued)

Table 1 (continued)

| Country | Both sexes | Male | Female |
|----------------------|------------|------|--------|
| Turkmenistan | 7.2 | 11.0 | 3.7 |
| Uganda | 20.0 | 21.2 | 18.7 |
| Ukraine | 18.5 | 34.5 | 4.7 |
| United Arab Emirates | 2.7 | 3.5 | 0.8 |
| United Kingdom | 7.6 | 11.9 | 3.5 |
| Tanzania | 9.6 | 14.3 | 5.4 |
| USA | 13.7 | 21.1 | 6.4 |
| Uruguay | 16.5 | 26.8 | 7.1 |
| Uzbekistan | 7.4 | 10.3 | 4.6 |
| Vanuatu | 5.4 | 8.1 | 2.7 |
| Venezuela | 3.8 | 6.6 | 1.2 |
| Vietnam | 7.0 | 10.8 | 3.4 |
| Yemen | 9.8 | 13.4 | 6.2 |
| Zambia | 11.3 | 17.5 | 6.2 |
| Zimbabwe | 19.1 | 29.1 | 11.1 |

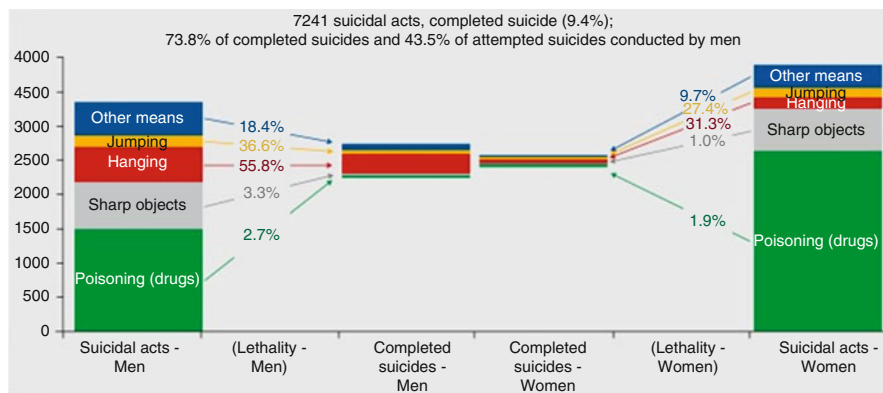
1. Africa: Suicide research in this continent is limited by a lack of systematic data collection; available data are from 60% of African population, which represents less than one third of African countries. The more common methods for suicide are hanging and poisoning, although across studies rates substantially varied (hanging 8–70%; poisoning 8–83%). Firearms are also a common method in some countries (range 0–32%). For both, suicides and suicide attempts, women have higher poisoning rates than males, whereas men tend to use violent methods such as hanging and firearms (Mars et al. 2014).
2. The Americas: Here, a distinction should be made between the United States and the rest of the countries, where significant differences are found in the last group. In the United States, suicides broadly occur by firearms in both genders (61% in males and 36% in females); furthermore poisoning represents 31% of suicide in women. In the other American countries, both men and women completed suicide by poisoning with pesticides (from 0.4% in Canada to 86% in El Salvador for men; from 1% in Canada to 95% in El Salvador for women) and hanging (from 8% in El Salvador to 77% in Chile for men; from 5% in Nicaragua to 63% in Chile for women) (Ajdacic-Gross et al. 2008; Fox et al. 2018).
3. Asia: globally, hanging and poisoning are the prevalent methods. In Hong Kong, people choose hanging (23% in men versus 48% in women) and falls (43% in men versus 23% in women). In the rest of Asian countries, females commit suicide by hanging (from 26% in South Korea to 60% in Japan) or by pesticide poisoning (from 4% in Japan to 43% in South Korea) (Jordans et al. 2014). China deserves a special mention, since more women die by suicide and poisoning with pesticides is the primary method, which reflects the role of women in rural China and the accessibility to pesticides here (Fox et al. 2018).

4. Europe: Globally, most common method, in both males and females, is hanging, except in Swiss males, where is firearm use. Men use firearm to commit suicide in second place in Finland, Norway, France, Austria, and Croatia (21–27%), while women poisoning or fall themselves. Slightly differences were found between countries (Bachmann 2018).
5. Australia and New Zealand: Hanging predominates in both male (45%) and females (36%), followed by firearms (12% in men versus 11% in women) and poisoning representing the third method of suicide (27% in men versus 20% in women) (Australian Institute of Health and Welfare 2014).

While globally these data point out how women who die by suicide choose methods with the same lethality than men, the same is not found for suicide attempts, and it has been shown how females survive suicide attempts more often than males because they use less lethal means (Cibis et al. 2012). Various studies developed in Europe illustrate these facts and explain the gender paradox by males choosing more lethal suicide methods and, in a minor extent, by a higher lethality of men’s suicidal acts, even using the same method than women (Freeman et al. 2017)

This is graphically shown in Fig. 3 from the work of Hegerl with data from OSPI-Europe project (“Optimising Suicide Prevention Programmes and their Implementation in Europe”) (Hegerl et al. 2009), where it is shown how women preferably choose drug overdose for attempting suicide with a less lethal outcome compared with men using poisoning with drugs as well. The same applies to all other methods, emphasizing that hanging is the most effective method in both men and women, with more lethal results in men (Hegerl 2016).

In Europe, more than 95% of people attempting suicide by poisoning survive, representing a low lethality of intoxications (Mergl et al. 2015). Nevertheless, in most low- and middle-income countries, poisoning is made with pesticides and other substances not available in Europe and more lethal than substances used in “European poisonings.” So, many of the suicidal poisonings in these countries result



Open access graphic (Hegerl 2016)

Fig. 3 Differences in suicide methods in men and women

in a lethal outcome and tend to equal male/female suicide rates or even exceed them, as is in the case of China, where in rural areas young women have easy access to pesticides.

5 Gender Differences in Suicide Risk and Protective Factors

This section reviews the main suicide risk factors from a gender perspective, focusing on facts and findings that try to provide evidence for clarifying the gender paradox in suicide. Thus, we consider the known risk factors such as sociodemographic factors, sexual orientation, religiosity, suicide family history, previous suicide attempts, mental disorders, medical conditions, childhood trauma and stressful life events, help-seeking and coping strategies, and biological risk factors.

Here, it is essential to point out that a synergistic relationship is usually found between risk factors. Suicide is never the consequence of a single cause, and complex explanatory models have been proposed to better understand the path toward suicide behaviors (Turecki and Brent 2016; van Heeringen 2012). The stress-diathesis model proposes that direct or proximal stressors interact with distal risk factors (neurobiological and psychological susceptibilities) to predict suicidal behaviors (van Heeringen 2012). Thus, the interpretation of each single risk factor listed in this chapter should be cautiously made.

5.1 Demographics Risk Factors

Age is a relevant moderator factor for gender differences for suicide. Although no gender differences in suicide rates are found under the age of 14 (Fox et al. 2018), there is a consistent tendency for suicide rates to increase with age (Bertolote and Fleischmann 2002). Suicide is the second leading cause of death among 15–19-year-old females worldwide (Saxena et al. 2014) and the first one in Southeast Asia among young females aged 15–29 (Jordans et al. 2014). In most countries, suicide risk is highest in older males, and in younger females, the risk for suicide attempt is highest (Naghavi 2019; Saxena et al. 2014). Overall, female suicide rates are relatively stable with increasing age, whereas for males suicide rates increase with age, tend to plateau in midlife, and reach the highest point with men aged over 75. This final late-life peak is most evident for certain countries such as the United States, France, and Germany (Kiely et al. 2019).

Being unemployed, retired, and single were all significant risk factors for suicide in men, with no effect in females, although it should be acknowledged as a limitation that most studies on this topic come from Europe (Qin et al. 2000; Tóth et al. 2014).

In women, having a young child is identified as a protective factor (Qin et al. 2003). These differences could be explained by gender differences in burdensomeness perception according to Interpersonal-Psychological Theory of Suicidal Behavior (Donker et al. 2014).

Regarding employment, it should be noted how certain professions are more related to suicide, and a higher risk is found in physicians in most countries, more in female than in male doctors (Schernhammer and Colditz 2004). Also, female nurses have a high risk (Agerbo et al. 2002). In these professional groups, a crucial factor involved in the high rates of suicide is access to methods (Agerbo et al. 2002).

5.2 *Sexual Orientation*

Minority sexual orientations (i.e., being gay, lesbian, or bisexual) have been linked to suicidal behavior. Some authors propose that “minority stress theory” may explain this relationship, as homosexual or bisexual people are frequently exposed to external stressors (more significant stigma, discrimination, or victimization) or even internal stressors such as internalized homophobia that may predispose to suicidal behavior (Miranda-Mendizábal et al. 2017). However, as death records do not routinely include sexual orientation, there are no accurate rates of completed suicide in people with minority sexual orientation (Haas et al. 2011). Some researchers have approached this issue through psychological autopsies studies and have generally concluded that minority sexual orientations are not over-represented among suicide victims; nevertheless, these studies have limitations, especially small samples, and results should be cautiously interpreted (Haas et al. 2011).

It should be noted that suicide behavior in minority sexual orientations is more prevalent in young people (Haas et al. 2011). A meta-analysis of longitudinal studies in youths found that sexual orientation is significantly associated with suicide attempts, but the relationship is not clear for completed suicide, as until then it has been explored in only one longitudinal study. Regarding gender differences, sexual orientation was found to be an independent risk factor for suicide attempts among males, more than among females (Miranda-Mendizábal et al. 2017).

5.3 *Religiosity*

Beliefs and personal values strongly influence a possible decision to commit suicide. Higher levels of religiosity across the main religions (Christianity, Hinduism, Islam, and Judaism) are historically related to decreased suicide risk (Gearing and Alonzo 2018). Many factors have been postulated to be involved in this protective effect: religious beliefs, involvement in public religious practices by church attendance, moral objections to suicide, lower aggression level among religious individuals, spirituality, or less substance abuse (Kralovec et al. 2018).

To the best of our knowledge, no specific studies taking into account the gender role on the influence of religiosity in death by suicide have been developed. Regarding suicide thoughts and suicidal behavior, different studies have shown how religion in women seems to be a stronger protective effect than in men, either in the general population (Neeleman et al. 1997; Neeleman and Lewis 1999; Rasic et al. 2011), in clinical samples (Kralovec et al. 2018), or in special populations such as high-risk pregnant women (Benute et al. 2011). Only in one study, developed in college students, no significant interactions between gender, religiosity, and suicide ideation were found (Taliaferro et al. 2009).

5.4 Family History

It is well known that family history of suicide increases suicide risk independent of family psychiatric history, and this seems to be stronger in women than in men (Qin et al. 2003). Similarly, family transmission of suicide risk is especially important when suicide happens on the maternal side (Agerbo et al. 2002). Nevertheless, to the best of our knowledge, no systematic research has been developed on this topic.

5.5 Previous Suicide Attempts

The most robust predictor for complete suicide are previous suicide attempts. The effect with 38% of women who completed suicide had a previous suicidal behavior in men, the figure rises to 62% (Ayuso-Mateos et al. 2012).

5.6 Mental Disorders

The majority of deaths by suicide are related to underlying mental diseases, with depression on the top (Bertolote et al. 2004; Bertolote and Fleischmann 2002; Too et al. 2019). It is commonly recognized that over 90% of people who die by suicide had a psychiatric diagnosis and even higher figures (98%) are found in an extensive review of 15,629 cases (Bertolote and Fleischmann 2002). Among all diagnoses, mood disorders were found in 30.2% of suicides, followed by substance use disorders (17.6%), schizophrenia (14.1%), and personality disorders (13.0%) (Bertolote et al. 2004). Globally, females suffer more frequently mental disorders than males (Balta et al. 2019), and also gender differences are known for the more prevalent disorders involved in suicides. Here is again the gender paradox: women suffer more from mental disorders while more men die by suicide.

In psychological autopsies, it is shown that affective disorders prevail in suicide in both genders. Substance use and schizophrenia are more common in male

suicides, whereas in anorexia nervosa, most of patients who died by suicide are women (Hawton 2000).

Next, we summarize information regarding gender differences for the most frequent disorders underlying deaths by suicide: mood disorders (depression and bipolar disorders), substance use disorders, schizophrenia (and psychosis in general), and personality disorders. Also, it should be taken into account that comorbidity of mental disorders increases the suicide risk (Cavanagh et al. 2003).

Concerning **depression**, it is known that it doubles the risk of suicide in the 90 days after hospital discharge (Olfson et al. 2016). As women suffer from a major depressive disorder 2–3 more times than men (Alonso et al. 2000; Kessler et al. 1993), it might be expected more deaths by suicide in women than in men. Possible explanations for this paradox are the different expressions of depression in men and women and the interaction of depression with other risk factors such as alcohol use in men (Lenz et al. 2019). Although not recognized in classification systems, a “male depressive syndrome,” widely supported by population studies and meta-analyses, has been proposed (Olfiffe et al. 2019; Wälinder and Rutz 2001). This male depression would be a distinct clinical phenotype characterized by a range of externalizing symptoms not captured by diagnostic criteria and, consequently, underdiagnosed and undertreated (Genuchi 2015; Martin et al. 2013). Thus, depressive men are more likely than women to present irritability, anger, aggression, substance misuse, low impulse control, risk-taking, impulsivity, and over-involvement in work (Olfiffe et al. 2019), and this depression appearance seems to be mainly influenced by men adjustment to masculine gender role norms (Genuchi and Valdez 2015). It should be noted how these “male traits” of depression are by themselves known suicide risk factors.

In **bipolar disorder**, a strong association with suicide has been found. In a large Danish register, the absolute risk of suicide in bipolar patients after their first hospitalization was around 8% for men and 5% for women (Nordentoft et al. 2011). The gender paradox of suicide is also present for bipolar disorders; however it might be less intense for bipolar disorder than for the general population (Beyer and Weisler 2016). The group of patients with higher suicide risk are young men in an early phase of the illness, especially those who have made a previous suicide attempt, those abusing alcohol, and those recently discharged from the hospital (Jamison 2000; Simpson and Jamison 1999). Among the risk factors specifically related to suicide in bipolar disorder, depressive polarity of the most recent mood episode, as well as depressive polarity of first episode, had the strongest association (Schaffer et al. 2015); this finding illustrates the gender paradox once again, as women tend to have a depressive polarity throughout the illness course.

In psychological autopsy studies, in 19% to 63% of suicides, there were found **substance use disorders (SUD)**, mostly **alcohol use disorders** (Schneider 2009), more commonly in male than in female suicides (Hawton 2000). However, only a limited number of observational studies have reported gender differences in SUD and suicide; therefore, in a recent meta-analysis on SUD and suicide, it was not possible to carry out a meta-analysis risk of suicide by gender (Poorolajal et al. 2016). Specifically for alcohol use, there is evidence from different studies on the

association of male gender, alcohol use, and suicide attempts (Boenisch et al. 2010). Acute alcohol use, or alcohol intoxication, deserves special mention, as it is related to suicide by itself (Bachmann 2018); according to a gender-stratified analysis (Kaplan et al. 2013), acute intoxication in deaths by suicide was more frequent in males than in females.

Comorbidity of SUD and other mental disorders seems to confer a heightened risk of suicide via impulsivity, hostility, and violence (Vijayakumar et al. 2011); all these are characteristically masculine traits (Lenz et al. 2019). Thus, although in the absence of evidence from meta-analysis (Poorolajal et al. 2016), the role of male gender should be taken into account in assessing the risk of suicide in men with mental disorders who also use drugs, especially alcohol.

In **schizophrenia**, male gender is traditionally considered a risk factor for suicide (Popovic et al. 2014). Therefore, the gender pattern of suicide in schizophrenia is similar to general population, and most studies have found higher suicide rates in men than in women (Hawton et al. 2005; Lester 2006), but differences between sex seem to be less marked than in general population (Carlborg et al. 2010) and there even are studies reporting no gender differences (Carlborg et al. 2008; Reutfors et al. 2009). The risk of suicide is highest within the first year after being diagnosed (Nordentoft et al. 2015), but in first-episode psychosis, the traditional gender pattern of suicide is not always found (Austad et al. 2015). Finally, in early-onset psychosis, which is psychosis starting before the age of 18, gender is not a consistent predictor of suicidality (Díaz-Caneja et al. 2015).

Personality disorders represent a high-risk group for suicide with 15% of inpatient and almost 12% of outpatient suicides (Bachmann 2018). Among personality disorders, in **borderline personality disorder (BPD)**, the association with suicide behavior is clear, even included as a diagnostic criterion (Vera-Varela et al. 2019). Nevertheless, in BPD, gender differences in suicidal behavior have been scarcely studied (Sher et al. 2019). In a recent meta-analysis of prospective studies, mean suicide rate ranged from 2% to 5%, but the effect of moderators, including gender, could not be studied due to the heterogeneity among studies (Álvarez-Tomás et al. 2019). Again, while most of BPD patients are women (Silberschmidt et al. 2015), almost 70% of BPD patients who completed suicide are men (Doyle et al. 2016); but contrary to general population, in BPD there are no gender differences in the proportion of suicide attempters or in lifetime number of suicide attempts (Sher et al. 2019). The second highest suicide risk group in personality disorders is **narcissistic personality disorder** (Bachmann 2018), but gender differences have not been studied in this subgroup.

5.7 *Medical Conditions*

The prevalence of suicide and suicide attempts is elevated not only in individuals with psychiatric illness but also in the context of physical health problems. Ultimately, any chronic disease may be associated with an elevated risk of suicide. An

essential issue in chronic physical illness is disability, which leads to an increase in suicidality. Studies show a variety of chronic diseases related to increased risk for suicide: chronic pain, heart disease, chronic obstructive pulmonary disease, stroke, cancer, congestive heart failure, and asthma (Bachmann 2018). Research also suggests that suffering from multiple physical health conditions confers an even greater risk for suicide (Juurlink et al. 2004).

In suicidality linked to cancer, a review has studied gender differences, concluding that also the gender paradox appears in this population. Thus, although there are exceptions, most studies found that suicide risk is higher in men than women (Robson et al. 2010). In other medical conditions, no systematic research on suicide gender differences has been found.

Nevertheless, an important issue to be taken into account when studying the relationship between somatic diseases and suicide is the role of comorbid psychiatric conditions. Many authors suggest that this comorbidity is what confers a higher risk for suicide in somatic diseases (Qin et al. 2014)

5.8 Childhood Trauma and Stressful Life Events

Suicide attempts and death by suicide are more frequent in people exposed to traumatic events in childhood compared with the general population, and this happens in both males and females (Zatti et al. 2017).

Concerning childhood trauma in a general sense, that is all kind of childhood trauma without distinctions. Some studies have found that suicidality is higher in women who have suffered childhood trauma than in men (Angst et al. 2014), but few works have separately study genders, so there is a lack of strong evidence (Zatti et al. 2017). In particular diagnoses, a recent review on the impact of gender and childhood abuse in psychosis found that women who suffered childhood abuse reported more suicide attempts compared to men (Comacchio et al. 2019).

The role of early sexual abuse on suicide and suicidal behavior has been extensively studied, and there is strong evidence about this relationship (Devries et al. 2014). Gender differences have been analyzed in at least two reviews. The first one is made with cross-sectional data, supporting previous knowledge of an increased odd of suicide in people (men and women) who have suffered childhood sexual abuse, and although sexual abuse was more frequent among females, the association between abuse and suicide attempts was higher in males (Rhodes et al. 2011). The second review is a meta-analysis of longitudinal studies (Devries et al. 2014) that found only two works which separately analyzed genders: in one of them, authors found higher risk of suicide attempts in males versus females (Brezo et al. 2008); the other revealed higher risk of death by suicides in females versus males (Cutajar et al. 2010). These findings are quite interesting, as in people who have suffered sexual abuses during childhood the gender paradox of suicide seems to be reversed.

While childhood trauma is a distal risk factor in explicative models of suicide, life stressors would be a proximal factor also playing a role in the suicide pathway.

Regarding life stressors, differences between genders are described; while men are more likely to experience different types of trauma, except for sexual and violent trauma, women tend to engage more in suicidal behaviors (Ásgeirsdóttir et al. 2018). Similarly, different types of stressors are more frequent according to gender; women tend to react to relational problems such as breakups and men to economic or work-related issues (Shaik et al. 2017). Here, traditional masculinity seems to play a critical role.

5.9 Coping Strategies and Help-Seeking

Men tend to respond to emotional stress with externalizing strategies like risk-taking, aggression, or substance use. Anger is also a negative emotion that men are culturally allowed to show. As previously exposed in this chapter, these coping strategies are related to traditional masculine traits, and, similarly, conformity to masculine norms is linked to a lower probability of help-seeking, as to be strong, resilient, and in control, also identified as male traits (Lenz et al. 2019; Seidler et al. 2016). Men often deny illness, suppress negative feelings, and refuse to admit depressive symptoms, waiting until late before seeking help (Oliffe and Phillips 2008). Thus, men are less likely than women to use healthcare services in general and mental healthcare services in particular; furthermore, men who look for help tend to delay service-seeking, to be reluctant to disclose health concerns, and worst to comply medical recommendations (Fox et al. 2018).

Help-seeking process involves, in addition to the initial act of seeking help, the patient's experience in consultation and subsequent treatment; and the effects of compliance with traditional male norms may also interfere with the therapy process, resulting in difficulties of attendance, compromise, or a non-stable therapeutic alliance (Seidler et al. 2016).

Nevertheless, contrary to the frequent assumption that men's engagement in help-seeking behaviors is rare, a recent review found that men do seek help if it is accessible, appropriate, and engaging (Seidler et al. 2016). This should be taken into account for designing resources tailored according patient gender.

Finally, it also should be noted that men tend to use emergency psychiatric services more than other healthcare facilities (Bachmann 2018). This situation turns emergency departments in critical spots for suicide treatment interventions, and when men with suicidal crisis attend to emergency departments, clinicians should make a special effort to initiate interventions in order to promote their commitment in a therapeutic plan.

5.10 Biological Risk Factors

A biological basis for suicide is known throughout brain post-mortem studies, genomic studies, and neuroimaging studies. Around 50% of suicide risk due to

diathesis is inherited, and this percentage might be higher in females compared to males (van Heeringen and Mann 2014). Despite a large number of studies on biological risk factors for suicide, the knowledge of biological mechanisms underpinning in suicide completion is limited, and the studies focusing on gender differences are scarce.

Genetic differences by gender have been reported in suicide in different samples: in a Portuguese sample, the 5-HTR6 gene 268 C/T SNP has a role in male suicide but not in females (Azenha et al. 2009); in a Japanese sample, men who died by suicide had a lower frequency of the minor allele of a single SNP in the NOS1 gene compared to controls and suicide in women (Cui et al. 2010). Also, a dysfunction in the serotonergic system is probably the most consistent biological risk factor for suicide, and this is connected with aggression and violence, both considered male traits (Lenz et al. 2019).

Studies on the biology of suicide from a gender perspective often focus on the main biological difference between men and women: sexual hormones. From this perspective, an attractive explanatory model of suicide, “the androgen model of suicide completion” (Lenz et al. 2019), has been proposed. The authors of this model posit that taking into account that male gender is a specific risk factor for suicide, androgen effects might be implicated in the suicidal process and numerous studies are presented showing direct and indirect evidence that increased prenatal androgen levels and also increased androgen activity in adulthood are involved in death by suicide.

The fact that male traits such as aggression, violence, and impulsivity are related to suicide supports the role of androgens in suicide (Lenz et al. 2019). Similarly, the finding of women attempting suicide more frequently during the follicular phase when there are higher testosterone levels also advocates this hypothesis (Baca-Garcia et al. 2010).

As far as biological factors are concerned, probably the most relevant fact to take into account is the role of the interaction of different distal suicide risk factors in the onset of epigenetic mechanisms. In this sense, the work of Turecki et al. is particularly enlightening when it states how sexual hormone activity and early-life stressful events interact and lead to a dysregulation of hypothalamic-pituitary-adrenal (HPA) axis which is known to be involved in suicide (Turecki 2014).

6 Toward a Tailored Prevention According to Gender

Suicide prevention programs include multilevel strategies to address population and individual suicide risk factors and generally include public awareness campaigns, training of community “gatekeepers,” and educational initiatives for GPs (Saxena et al. 2014). In this section, we will focus on initiatives that take place in clinical settings, even though population and public health approaches are essential to suicide prevention.

Previous reviews of the effectiveness of prevention programs have recommended the development of tailor-made interventions for specific risk groups (Zalsman et al. 2016). As previously shown throughout this chapter, men are a particular risk group, but gender differences in response to preventive strategies have received little research attention, and specific interventions focus in men are scarce (Struszczyk et al. 2019). The specificity of certain risk factors in men suggests that there is a need for specific interventions focusing on male factors. Some suggestions, based on previous research, are proposed below.

First of all, depression plays a crucial role in suicide behavior, and depression in men is poorly understood and, consequently, underdiagnosed and undertreated (Olfson et al. 2016). Results of Gotland study highlight how, after an educational program to enhance GP detection of depression, the overall rate of suicide decreased by 60%, but this change was related to female suicide reduction, whereas suicide males were not affected (Rutz et al. 1995). In many men, depression is manifested atypically, and their distress is undetected by the existing diagnostic tools (Seidler et al. 2016). All these findings reflect the necessity of specific tools for screening depression in men and changes in the training of GPs and mental health professionals, including a gender perspective. In response to the first requirement, some specific tools have been developed, such as the Gotland Male Depression Scale (Zierau et al. 2002) or the Masculine Depression Scale (Magovcevic and Addis 2008), the last one divided depression symptoms into internalizing and externalizing (e.g., aggression and irritability), with externalizing symptoms being more representative of depression in men.

The expression of traditional masculinity is closely related to the manifestation of depression in men (Wide et al. 2011), and depressive symptoms are contrary to male ideals, such as feelings of control, stoicism, strength, and success (Seidler et al. 2016). This contradiction usually causes men not to seek help and instead to have feelings of shame or weakness (Seidler et al. 2016). Here, psychotherapeutic and social approaches to redefine masculinity are useful. Reframing traditional male roles to a fluid and flexible masculinity according to contexts allows to cope better with depression and mental health problems (Seidler et al. 2016).

Furthermore, this masculinity, along with the difficulty to recognize depression in men, contributes to delay help-seeking (Seidler et al. 2016). Additionally, when men finally reach mental health services, therapies should be tailored according to most men's preferences. Studies have shown that men tend to prefer interventions based on problem-solving, short-term therapies, and group-based treatment options (Olliffe and Phillips 2008; Seidler et al. 2016). Gender differences in verbal abilities and the resistance of many men to share emotional problems may make talking therapies less attractive to some men (Hawton 2000). Also, sharing experiences with other suicide survivors has been shown to be helpful (Seidler et al. 2016).

Not only the therapeutic approach seems to be important for men but also the environment. Thus, many men demand less formal settings. In this sense, the use of interventions that promote social interaction and informal community-based support centers is highly valued by men. This is of particular interest in young men. Nevertheless, ultimately, and in order to avoid this stigmatization of mental health

facilities by men, incorporating mental health promotion strategies into the educational curriculum from a young age might be a solution (Seidler et al. 2016). Also, this strategy could help men to be more open and to recognize and express their feelings, helping to normalize the need for psychiatric care.

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