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Sociodemographic Antecedent Validators of Suicidal Behavior: A Review of Recent Literature

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Abstract Suicidal behavior and its prevention constitute a major public health issue. Etiology of suicidal behavior is multifactorial. Whereas current research is mostly focused on clinical and biological risk factors, the sociodemographic risk factors for suicidal behavior, first highlighted by Durkheim, have received less attention. Besides the well-known impact of age and gender, sociodemographic variables such as marital and parental status, education, occupation, income, employment status, religion, migration or minority status, and sexual orientation are repeatedly reported to play an important role in suicidal behavior. This narrative review aimed to summarize recent research on sociodemographic risk factors for suicidal behavior and to elicit possible implications for suicide prevention.

Keywords Suicide attempts · Risk factor · Economy · Profession · Sexuality · Marital status · Parenthood

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Introduction

Suicidal behavior (SB) is a major public health issue. Recent worldwide statistics estimate about 400 suicide attempts and 11.4 suicides per 100,000 persons every year [1]. Mental disorders constitute one of the major risk factors related to SB but only a minority of mental-disordered persons ever attempts suicide, and inversely not all suicide attempters or completers have a mental disorder [2]. Moreover, although in recent years various biological factors have been consistently associated with SB [3], taken individually they account for a small part of the variance in SB. In comparison, sociodemographic factors have received less attention. The effect of some of these factors may be modified through policies and public health interventions, hence their importance for suicide research and prevention (Fig. 1) [4].

The sociological aspects of SB were underlined in the famous work of Durkheim [5, 6]. Durkheim saw an individual first and foremost as a social being and suggested an inverse relationship between the suicide rates and the degree of social integration. A modern perspective on social aspects of SB is provided by Joiner's interpersonal theory of suicide [7]. Epidemiological data also support a social approach to SB. Suicide rates in any given country are mostly constant over time [1], but sharp differences can be found between neighboring countries or regions [8]. Moreover, suicide rates follow different patterns through life depending on the country [1].

We conducted a narrative review of studies written in English assessing sociodemographic dimensions of suicide attempts and completed suicide. We searched original studies published in PubMed in the last 5 years using the medical subject heading (MeSH) terms "*suicide, attempted*" and "*suicide*" combined with the MeSH terms "*socioeconomic factors,*" "*demographic factors,*" "*gender,*" "*age,*" "*income,*" "*economy,*" "*occupation,*" "*migration,*" "*sexual orientation,*"

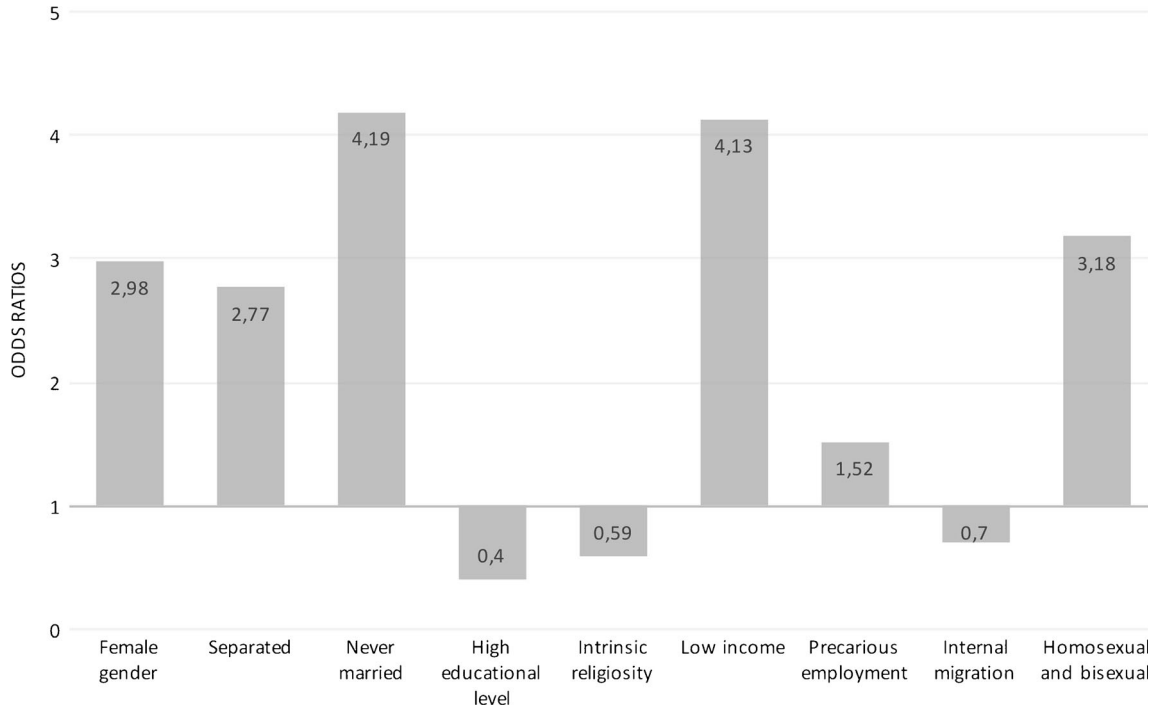

Fig. 1 Risk (odds ratios) of attempting suicide associated with sociodemographic factors. References: [9, 39, 46, 58, 83, 107, 115, 116]

"*marital status*" or "*parenthood status.*" A total of 2968 articles were found; we selected the most relevant articles by reading the titles and when necessary the abstract (IC and JLC). The list of references was also reviewed to identify other studies of interest. Some studies published before 2011 were included if they provided background information on the topic.

Age, Gender, Parenthood and Marital Status

The rates of SB vary through life. In high-income countries, adolescents and young adults, as well as females, make more frequent non-fatal suicide attempts. Recent clinical studies have replicated these findings in middle-income countries [9, 10]. Conversely, advanced age and male gender are associated with completed suicide. Globally, the highest suicide rates are found among people aged 70 years and older [1]. A recent study in Korea confirmed that the increase in suicide rates with advancing age was independent of gender [11]. However, disparities exist between low- and middle-income countries (LMIC) and high-income countries. LMICs show higher suicide rates among young adults and elderly women, but lower suicide rates among middle-aged men, than high-income countries [1, 12].

Cohort effects may partly explain the greater suicide rates affecting middle-aged populations in developed countries. Phillips et al. used an Age-Cohort-Period model to analyze suicide rates from 1935 to 2010 in the USA and demonstrated that they followed birth cohorts along the twentieth century. Within the study period, suicide rates declined until they reached the lowest level in the cohorts born between 1915 and 1945 and then rose gradually for baby-boomers and later cohorts. The "silent generation", born between 1925 and 1945 and presenting the lowest suicide rate, currently comprises part of the oldest age ranges. Hence, the current high suicide rates in middle-aged Americans might be consistent with this cohort pattern [13••]. The declining of marriage [14], religious involvement and long-term employment, as well as unstable economic conditions [15], could explain why suicide increased with the boomer generation. Women were less touched by this increase than men, probably because of a more favorable social status and the beneficial effects on health of full-time jobs [13••, 16].

The profile of suicide attempters may depend on the age at the first attempt according to an admixture analysis performed in a sample of 368 attempters [17]. Two distinct profiles were found depending on the age of onset of the first suicide attempt: (1) attempting suicide before 26 years was associated with anxiety, substance abuse and sexual abuse; (2) making the first attempt after 26 was associated with depression. The age may be also used to characterize attempters later in life. An Indian study compared 1159 suicide attempters depending on their age (<65 or >65 years). The elderly showed a greater proportion of married subjects, low educational level, unemployment and living in rural areas, and they reported physical illnesses, depressive disorders or family history of psychiatric disorders more often compared to the <65 age group [18].

Other factors mediate the relationship between gender and SB. A 2012 WHO report found a correlation between the male-to-female suicide ratio and the country economic level from 3.5 in high-income countries to 1.6 in LMIC. A multicentric 2-

year follow-up of 273 suicide attempters in France revealed that women had higher anxiety and impulsivity while men were more often concerned with addictions and showed greater suicidal intentionality. Besides, the risk of re-attempt was related to post-traumatic stress disorder (PTSD) and depression severity in women and to alcohol abuse in men [19••]. Male attempters were also more likely to misuse alcohol and to report work-related stressors than females in a recent Indian study involving 299 inpatients [20]. Likewise, a Japanese study including 193 suicide attempters in a critical care unit found greater prevalence of work-related stressors among males and family problems among females [21]. The prevalence of lifetime suicide attempts in a 30-year-long cohort study in Switzerland ($n = 591$) was 8.1 % for women and 5.1 % for men. Female attempts were associated with childhood sexual abuse and occurred more frequently before the age of 20, whereas depression and anxiety were more prevalent among men [22]. In another Swiss sample, women attempted suicide twice as often as men but men were more frequently concerned with substance abuse and severe psychiatric disorders [23].

Marital status and parenthood are also relevant factors influencing SB. In fact, being single or living alone has been classically associated with an increased risk of completed suicide. Qin et al. performed a data analysis of the Danish Cause of Death Register and showed that single males were at greater risk of suicide than married ones [24]. An evaluation of suicide using the Hungarian Demography Register showed a comparable trend with a stronger protective effect of marriage against suicide in males compared to females [25]. The impact of marital status on SB also depends on mental health factors. In Denmark, marriage was found to increase suicide risk among psychiatric patients [26].

In the general population, impaired couple relationships, partner violence [27], complex attachment patterns or trauma history [28] may increase the risk of SB. Moreover, the study of the Queensland Suicide Register in Australia confirmed that suicides increased after separation, independently of mental disorder. Separated males aged 15 to 24 years showed the highest risk for suicide with a relative risk (RR) of 91.6! [29]. Using the Hofstede Index to measure cultural dimensions, Yip et al. reported a moderating effect of cultural factors on SB following divorce. This effect depends on gender. For instance, suicide rates among divorced men increase along with levels of individualism (defined as low integration of individuals in primary groups) across world regions, whereas this is not the case for women [30]. Kposowa et al. also showed a significant increase in suicide rates among divorced males but not females. Interestingly, no association between widowing and suicide was found [31].

Qin et al. suggested that the protective effect of marriage for females was a consequence of parenthood [24]. Accordingly, Hoyer et al. [32] showed that married parous women were at lower risk of suicide than married non-parous ones. The assessment of the Belgian National Mortality Database showed that having a young child was a protective factor against suicide for women after the death of their husband [33]. However, the protective effect of parenthood was absent in men. Intriguingly, old men with children were at greater risk for suicide than childless men in the context of bereavement. This could be explained by the feeling of being a burden to the children, especially for men with only one child [33].

Education, Income and Occupation

A recent review of 31 studies investigating socioeconomic position (SEP) in Asia revealed that the factors with the most consistent association with SB were low educational level and subjective or objective financial problems [34]. As for education, two recent studies in Japan and Hungary reported that high educational levels were associated with a reduced risk of suicide [25, 35]. In the Hungarian study, this effect was stronger in males.

Socioeconomic inequality, rather than absolute income, is a determining factor linked to SB. In a recent study, income was related to suicidal thoughts and attempts before adjustment [36•]. However, when income was ranked within different social comparison groups defined by sex, educational level and region, absolute income was no longer significant, and the association was better explained by income rank in each group. The same pattern was found when considering lifetime suicidal thoughts and attempts as well as suicidal thoughts in the past year. These findings are in line with the social rank theory suggesting that changes in social rank determine the emergence of psychopathology [37, 38]. Mental disorders also moderate the association between income and suicide attempts or suicidal ideation. Mentally disordered persons with a low income level are more likely to report SB in the past 12 months compared to better-off patients [39]. The relation between income and suicide was weaker among subjects free from any mental diagnosis.

Classically, occupations with easy access to lethal methods for suicide, such as farmers, policemen [40, 41] or physicians [42–44], were considered to be at greater risk. However, in the last decade suicides among farmers and non-manual or health-related occupations have decreased [43]. Suicide risk among farmers may depend on their age and job position [45], being especially frequent if the employment is precarious [46].

Conversely, suicide rates increase in manual and low-skilled occupations [47]. Milner et al. confirmed this trend in a meta-analysis including 34 research articles. Low-skilled occupations (such as laborers, cleaners and machine operators) exhibit the highest suicide rates. The association of low-skilled occupations and suicide might be mediated by a poor social environment [48•]. In the same line, low-skilled workers in the construction industry were at greater risk of

suicide than those employed in skilled trades between the years 2001 and 2010 [49].

Although recent studies reported a greater risk of SB in law enforcement compared with the general working population [50, 51], prior studies pointed out a decrease in the police suicide rate [52] or no excess of suicides [40]. Suicides may concern particularly Caucasian officers [50] in middle age (40-44 years) and do not increase among retired officers [53]. In a psychological autopsy study, depression and impaired social and affective relationships were associated with completed suicide among police officers. More than half of the cases had used their service weapons [54]. Interestingly, suicides may be more common in small police departments because of poor access to health service, perceived isolation, lack of anonymity and greater workload [51]. Of note, suicide prevention programs among policemen such as "Together for Life" have led to a 79 % decrease in the number of suicides in the Montreal police forces [55].

Religion

Durkheim proposed that religion could play a protective role against suicide through the link between religious activities and social integration [6]. Religious affiliation was found to have a protective effect against lifetime suicide attempts [56], mediated by moral objections to suicide reflecting individuals' religious beliefs [56], while religious denomination was irrelevant.

Three components of religious involvement have been distinguished in a sample of 164 euthymic bipolar I outpatients using the Duke Religious Index: organizational religious activity, non-organizational religious activity and intrinsic religiosity [57••]. An inverse correlation was found between non-organizational religious activities, intrinsic religiosity and lifetime history of suicide attempts. Interestingly, organizational religious activities (representing the social and relational dimension of religion) were not related to suicide attempts. In other words, contrary to Durkheim's theory, social integration associated with religious practice does not constitute the main protective factor against suicide. The superior significance of non-organizational religious activities was supported by a previous study [58]. The association between religious attendance and mental health seems independent of social support and the type of worship [59]. In the same line, Robinson et al. showed that suicide attempt rates were not correlated with the frequency of religious service attendance in the US, despite a protective effect against suicidal ideation [60]. Altogether, these data show a protective effect of religious affiliation against suicide independent of organizational aspects.

According to Caribé et al., the dimension impulsivity-resilience could mediate the effect of religiosity on SB [61]. Low impulsivity levels are also associated with high resilience among euthymic bipolar subjects [62].

The protective effect of religion against suicide has been confirmed in a meta-analysis (9 studies) and depends on cultural factors, religious homogeneity and age range [63]. This effect is significant in western countries but not in eastern ones. Accordingly, no correlation between suicide attempt rates and religion was found in a study conducted in India and Vietnam [64]. In US ethnic groups, no association between religious attendance and suicidality was found among Asian, African-American and Afro-Caribbean subjects in contrast with Hispanics and non-Hispanic Whites [60].

Another Chinese study emphasized the necessity to consider the whole belief system including interactions between its parts. The study showed a weak protecting effect of religion against suicide and highlighted the interaction between religious and political beliefs (explicit belief in a political doctrine). Religiosity was a protecting factor for political believers but a risk factor for non-political believers [65].

Reasons for living may protect against SB [66] and have been investigated as a mediating factor between the level of religiosity and suicidality. Among young individuals reporting serious suicidal ideation or previous suicide attempts, private religious faith increased the reasons for living, acting as a protective factor independently of gender [67].

Employment and Economy

The impact of the recent economic recession on suicidality is controversial. Authors from different countries have compared suicide attempts or completed suicide before and after the 2008-2010 economic crisis. The literature review demonstrates the existence of nonlinear and complex interactions relying on both phenomena.

There are divergent data concerning the link between economic crisis and suicide. Official data concerning 2000-2010 completed suicides from the Hellenic Statistical Authority do not indicate any clear relationship between suicidal rates and socioeconomic indices during the last decade in Greece, a country that was particularly exposed to the crisis [68]. Similarly, a recent study [69] found limited evidence of a strong, population-wide detrimental effect of economic downturns on suicide mortality in the USA and revealed considerable heterogeneity by gender, socioeconomic position and time period. However, the crisis might affect the rates of suicide attempts and completed suicides differently. In 2011 a survey including 2256 individuals drawn from the Greek national telephone number databank showed a 36 % increase of the suicide attempt rate between 2009 and 2011 correlated with the experience of economic distress [70].

The relation between economic crisis and SB is not linear and depends on specific factors such as unemployment rate,

employment concerns and access to welfare benefits. Hawton et al. showed that the 2008-2010 economic crisis had a differential effect on self-harm rates in three English cities, increasing in Manchester and Derby because of growing unemployment, but not in Oxford [71].

There is vast evidence in the literature on the adverse effects of unemployment on physical and mental health at both the individual and aggregate level. In this context, there is an increased risk for SB among the unemployed [72], and longitudinal studies revealed that the strength of this association is stronger in men. Importantly, the characteristics of unemployed individuals have changed, and previously less vulnerable groups such as professionals and white-collar workers have experienced unemployment on a significant scale [72].

Phillips et al. found a significant association between unemployment and suicide rates in different geographic areas during the last economic crisis, particularly among middle-aged males and females (45-64 years) [73••]. A recent study reported an increase in suicide rates in Italy during the crisis only among men of working age (25-64 years) [74].

Beside unemployment, fiscal austerity also has an impact on suicide rates in times of economic recession. Fiscal austerity measures were associated with suicide rates in the WHO Mortality Database even after adjustment by age and gender [75]. These measures seem to affect males and the elderly population (over 45 years of age) who have a greater proportion of fixed incomes and less economic flexibility.

Moreover, the relationship between economic recession or growth and suicide rates differs according to the world region and the basic level of development of a country. Blasco-Fontecilia et al. investigated the correlation between gross domestic product (GDP) adjusted for purchasing power parity per capita and suicide during the past 30 years in ten WHO regions [76]. Three world subregions with divergent correlations can be delineated according to the authors. For instance, the correlation is positive (higher GDP and higher suicide rates) for developing countries in Latin America and the Caribbean and in high-income economies such as Japan and South Korea. However, for most developed countries the association between GDP per capita and suicide rates is negative (higher GDP and fewer suicides). In some European countries (Estonia, Hungary, Latvia and Lithuania), this correlation follows an inverted U-shape curve in which positive correlation becomes negative when a given threshold of economic development is reached. Several factors might explain this variability. First, economic growth in poor countries might be accompanied by increasing social exclusion and economic and health inequalities in a context of weak healthcare systems. In contrast, stronger universal healthcare systems, developed mental health policies and perceived social integration may explain the negative correlation found in developed European countries [76].

Emigration and Ethnic Minorities

In this section, we investigated specific risk factors influencing suicide rates among displaced populations (migrants and refugees). SB has been particularly studied among Buthanese refugees who have been resettled in the US since 2008 (57,000). Since re-settlement, an excess of suicides has been registered among this population (16 suicides). The age-adjusted annual suicide rate was 24.4/100,000 compared with 12.4/100,000 for US residents [77, 78]. Psychological autopsies identified devaluation of professional and language skills as leading negative factors associated with suicide [79]. Unexpectedly, suicide concerned mostly subjects belonging to high social levels. This corresponds to results of studies showing lower female suicide rates among lower castes in Nepal [80] despite greater exposition to anxiety and depression [81]. In addition to previous studies, impulsivity and copycat effect were underlined as a leading factor of SB among Bhutanese refugees [82].

The impact of internal migrations on SB has been investigated. In China, internal migrant workers (Sichuan province) showed no significant increase of SB compared with permanent residents from the same communities but rather a decrease in depressive disorders [83]. This is in accordance with the "healthy migrant effect." In fact, healthier migrants choose to leave home in order to reach better socioeconomic conditions. Li et al. reported better mental well-being among migrant workers in Guangzhou than in a control population of urban workers [84]. This effect is mostly significant among the elderly who benefit from lower pre-migration expectations and stronger social support (marriage) than younger migrants. Another study reports lower suicide rates in migrant workers in the Zhejiang province compared to non-migrants [85]. Multivariate analysis did not reveal any association between internal migration and poorer mental health in Brazil except among unemployed women [86]. The vulnerability of women excluded from the labor market could be due to a low perceived control over their social environment [87, 88].

SB associated with international migration is mediated by several factors. In Austria, suicide rates in immigrant groups were positively associated with suicide prevalence in the country of origin [89].

Brown et al. examined the acculturation stress phenomenon among Latino immigrants in the US. The suicide attempt rate increases with the time spent in the host country, which could be due to persistent difficulties in reaching the expected socioeconomic level and a progressive weakening of coping strategies and cultural values [90]. The characteristics of the host country

could also modify the risk for SBs. The density of non-western minorities in the neighborhood of four cities in The Netherlands has been inversely correlated with suicide rates among non-western migrants compared with native Dutch. SB decreased when ethnic density rose, and this pattern was particularly clear among second-generation migrants in this study [91•].

Evaluating 11 European countries, Bursztein et al. reported that immigrants exhibited higher rates of suicide attempts than native citizens [92]. Moreover, suicide attempt rates are related to the completed suicide rates in the country of origin for each immigrant group, independently from suicide rates in the host country. This supports the continuum hypothesis that connects suicide attempts and completed suicide [92].

Whereas greater suicide rates were reported among second-generation migrants compared to the first-generation ones in Sweden [93], recent data from Australia did not confirm this pattern [94].

Table 1 Potential variables moderating the relationship between demographic factors and suicidal behavior

	Suicide attempts	Completed suicide
Age	Gender	Gender
		Country economic level
		Birth cohort
		Marital status
Gender	Males: substance abuse, alcohol use disorders, work stressors	-
	Females: anxiety, impulsivity, PTSD, depression, family problems, childhood abuse	
Marital status	Time after separation	Mental health
		Quality of the relationship
		Partner violence
		Attachment patterns
		Trauma history
		Cultural factors
		Parenthood
Income	Income rank	-
	Mental disorders	
Occupation	Age	Access to lethal methods
	Type of occupation	Skill level
	Economic sector	Depression
		Social relationships
Economy	Unemployment	Unemployment
		Fiscal austerity
		Gross domestic product
Religion	Intrinsic religiosity	-
	Non-organizational religious activity	
	Cultural environment	
	Whole belief system	
	Reasons for living	
Emigration	Completed suicide rate in the country of origin	Employment
		Social integration
	Gender	Cultural disparities/acculturation conflict
	Acculturation conflict	
		Basal socioeconomic level
		Type of migration (Internal/ international)
		Host country (ethnic minority)
Sexual orientation	Gender	-
	Homosexual or bisexual	

Sexual Orientation

Homosexual and bisexual persons (HBs) might be more likely to suffer from mental disorders and SB [95–97]. However, the current evidence is not conclusive since many studies are hampered by methodological problems in the selection of the sample, particularly in the identification of the sexual orientation. King et al. [98] listed the definition of sexual orientation and SB, the difficult recruitment and aleatorization of the sample, cultural, personal and legal barriers to specify sexual orientation, problems in identifying a suitable control group, and the analyses of confounding factors such as substance use or personality traits among these problems. In psychological autopsy studies also a retention of information or even voluntary concealment of the sexual orientation of the victim by the relatives might exist [99, 100]. In transgender subjects, there is also a selection bias since the patients that are examined are those that seek surgical or hormonal therapy [101]. Nevertheless, HBs are at risk of poor mental health (especially if age >55 years) [102]. In a systematic review, HBs were more likely to have mental disorders than heterosexuals, including depression, anxiety and alcohol or substance dependence in the last year [102]. These conditions are known risk factors for SB. The estimated RR for a lifetime suicide attempt in HBs compared to the general population was 2.5 [98]. The stress associated to coming-out in youth has been related with depression and the feeling of burdensomeness that may lead to SB according to the interpersonal theory of suicide [103].

SB is not evenly distributed among HBs. In a study on 3813 adolescents and young adults, the odds ratios (ORs) for having made 1-4 prior suicide attempts was 4.5, 9.6 and 21.6 for subjects who had heterosexual activity only, HB attraction or HB sexual activity respectively compared to the rest of the sample. These odds ratios were much higher in the HB population compared to heterosexuals among grand repeaters (with 5 or more lifetime attempts). Indeed, 20.7 % of HB males and 5.4 % of HB females were grand repeaters (compared to 1.2 % and 0.9 % in male and female heterosexuals, respectively) [104]. The effect of sexual orientation might be moderated by cultural factors. A study in three Asian cities [105] showed that HB individuals of 15-24 years were more likely to report suicidal ideas, but not suicide attempts, compared to heterosexual individuals of the same age group. In Australia, a national telephonic survey ($n = 10531$) found about four times more recent suicidal ideation and lifetime suicide attempts among homosexual men and bisexual women than their heterosexual counterparts [106].

Similar results were obtained in a recent meta-analysis [98]. Compared to the general population and independently of gender, HBs show a higher risk of lifetime suicidal ideation and suicide attempts. Of note, bisexuals might also be particularly at risk of attempting suicide according to a systematic review [97]. In a meta-analytic review on suicidality among HBs under 21 years, the ORs increased progressively with its severity: suicidal ideas: 1.9; suicidal intent or planning: 2.2; suicide attempt: 3.2; suicide attempt requiring medical care: 4.2. An estimated 20-30 % of transgender persons might have attempted suicide in their lifetime [107], and a greater risk of SB might be associated with the feeling of internalized transphobia [108] or experiencing bullying [109]. In the same vein, a study with more than 8,000 male HBs found that suicide attempts in the last year were associated with physical violence, sexual violence or work discrimination [110].

HB persons were not over-represented in psychological autopsy studies of suicides. However, a Danish study that analyzed the gender of registered partners of suicide victims in a 12-year period estimated a high age-adjusted suicide mortality risk in men, but not women, living with persons of the same sex. This risk was nearly eight times greater than for men with a history of heterosexual marriage [111]. Contradicting these findings, a national survey on 17,886 US subjects found a six-fold risk of suicide among women with female sexual partners and failed to find higher risk of suicide among males with any male sexual partners [112].

Finally, the review by Haas et al. [101] highlights the very high suicide rates among transgenders after sex reassignment surgery. However, their results are based on old studies on persons who were under hormonal [113] or surgical treatment in a region with a very high suicide base rate [114].

Conclusions

The moderating effect of sociodemographic factors on the risk of SB has been known for many decades. However, in the last years it has become evident that this relationship is complex and depends on several intercurring factors (Table 1). In other words, with the exception of sex and age, which show generally consistent patterns of SB, the increased risk that has been reported for many sociodemographic factors is highly dependent on the context. For instance, being part of a social minority is associated with an increased likelihood of attempting suicide if the minority suffers marginalization (a very recent example found in the Inuit communities in Canada). Inversely, coming from a poor country to a small and integrated community in a richer one might prove a protective factor. Reflecting this complexity is difficult, and suicidal research needs to integrate sociodemographic factors in theoretical models in order to adapt suicide prevention policies to social groups at risk.

Compliance with Ethical Standards

Conflict of Interest Ismael Conejero, Jorge Lopez-Castroman, Lucas Giner and Enrique Baca-Garcia declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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- •• Of major importance

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