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Cross-national prevalence and factors associated with suicide ideation and attempts in older and young-and-middle age people

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Disclosure statement

No conflict of interest was reported by the authors. The views expressed in this paper are those of the authors, and do not necessarily represent the views or policies of the World Health Organization.

Data availability statement

The raw data from Study on global AGEing and adult health (SAGE) are available through the WHO Multi-Country Studies Data Archive at:

<http://apps.who.int/healthinfo/systems/surveydata/index.php/catalog>.

The specific data from Collaborative Research on AGEing in Europe (COURAGE in Europe) supporting the findings of the present study are available from the first author [MC], upon reasonable request.

Abstract

Objectives To report prevalence estimates of 12-month suicide ideation and attempts in young-and-middle age adults and older people, as well as their respective associated factors.

Methods A total of 52,150 community-dwelling adults who completed the adapted version of the Composite International Diagnostic Interview-Depression Module were included from SAGE and COURAGE in Europe studies. The presence of 12-month suicide ideation and attempts was measured among the participants who screened positively in the Depression Module. Global and national prevalence estimates of 12-month suicide ideation and attempts were calculated according to the total sample. Logistic regression analyses were conducted to separately determine factors associated with suicidal ideation and with suicide attempts in young-and-middle age adults and older adults.

Results Higher estimates of 12-month suicidal ideation were found for high-income countries and people aged 65 years and older. Higher negative affect, higher disability, and presence of food insecurity were associated with 12-month suicidal ideation and suicide attempts for young-and-middle-adults and older adults. Higher isolation, being female, and greater number of chronic health conditions were also related to 12-month suicidal ideation in both age groups. Younger age was associated with 12-month suicidal ideation for older people, and with suicide attempts in the young-and-middle age group. Finally, higher income was related to lower rates of 12-month suicidal ideation for the young-and-middle age group.

Conclusions Older people are at increased risk of suicidal ideation globally and of suicide attempts in some countries. There were common and different factors related to suicide in adults and older adults.

Keyword Epidemiology; Cross-national study; Prevalence; Suicide

Introduction

Suicide is an important public health problem in all age groups (World Health Organization, 2014). At the global level, suicide ideation and attempts are more prevalent in the younger age groups (Nock et al., 2008). However, if we consider that the global population is increasingly aging (World Health Organization, 2015), that the number of suicide attempts is increasing among young adults in some countries (Borges, Benjet, Orozco, & Medina-Mora, 2017; Olfson et al., 2017), and that one out three young-and-middle age adults with a history of suicidal ideation again experience suicidal ideation 10 years later (Borges et al., 2006), the number of older people with suicide ideation and attempts is likely to increase in the future. On the other hand, societal changes and chronicity of some non-communicable diseases might have lead older people to accumulate a considerable amount of factors that have been associated with suicidal behaviors, such as higher social isolation, loneliness, loss of role, disability, and morbidity, among others (De Leo and Kölves, 2017).

Suicide experts are currently discussing whether late-life suicide should be explained by new theoretical frameworks, or by age-specific adaptations of existing suicide theories (Van Orden and Conwell, 2016). Authors in favor of generating new theories suggest that suicide in late life is a different phenomenon, both etiologically and epidemiologically (Van Orden and Conwell, 2016). In line with this argument, some studies have found different factors related to suicide for older adults and young and middle age adults. For example, alcohol problems and marital status (single/divorced/widowed) have been related to suicidal ideation in young adults and middle age groups, but they are not so relevant in people aged 65 and older (Miret et al., 2014). On the other hand, previous

studies have found common correlates of suicide ideation and attempts across age groups; for example, higher social connectedness has been reported to be a protective factor from suicide attempts in older (Fässberg et al., 2012) and young adults (Donald, Dower, Correa-Velez, & Jones, 2006). Although ill-physical health is more frequent as people age, physical health problems have been associated with suicidal ideation in both young and old age population groups (Ferro et al., 2017; Lapierre, Desjardins, Prévile, Berbiche, & Lyson Marcoux, 2015). All this evidence would probably support the use of common suicide theories across adult age groups.

In spite of this topic being increasingly reviewed (Conwell, 2014; Van Orden and Conwell, 2016), to our knowledge none of the previous studies have analyzed factors related to suicide in different adult age groups separately, including samples from different countries. This is something to consider, since age risk groups for suicide ideation and attempts might be different from one country to another (Nock et al., 2009). The existing large cross-national studies reporting risk factors for different age groups have mainly analyzed people aged 65 years and younger (Borges et al., 2010; Jordans et al., 2017). In addition, the studies directly comparing suicide risk factors between older people and other age groups have collected samples from only one country, and particularly from high-income countries (Jo, Jeon, & Oh, 2017; Miret, et al., 2014), despite the fact that 78% of suicide deaths occur in low-and-middle income countries (LAMICs) (World Health Organization, 2014). The sparse evidence on factors related to suicide in different age groups in LAMICs is based on clinical samples (Kumar, Anish, & George, 2015), which overlooks the considerable amount of the population that do not attend any health care center in these countries (Bruffaerts et al., 2011).

Therefore, the aim of the present study is to explore cross-national and country prevalence, and factors associated with suicide ideation and attempts in the elderly and young-and- middle-age adult groups, separately.

Methods

Sample

The participants of this study come from two cross-national studies. Wave 1 from the World Health Organization (WHO) Study on Global AGEing and Adult Health (SAGE), which comprised data from China, Ghana, India, Mexico, Russia, and South Africa. Data collection was conducted between 2007 and 2010. The SAGE participating countries were classified as LAMICs according to the World Bank's country rankings during the fieldwork period (World Bank, 2010). The Collaborative Research on Ageing in Europe (COURAGE in Europe) was a cross-sectional study collecting data from three high-income European countries (Finland, Poland, and Spain). COURAGE in Europe's fieldwork took place between 2011 and 2012. SAGE and COURAGE in Europe included nationally representative samples of community-dwelling adult population (18 years and older). However, people aged 50+ years were overrepresented in the sampling, since both studies were focused on the ageing population. Person-level analysis weights, which included sample selection and a post-stratification factor, were calculated for each country. More details about the sample design can be found elsewhere for SAGE and COURAGE in Europe (Garin et al., 2015). The individual response rates ranged from 51% in Mexico to 93% in China. All the interviews were conducted face-to-face at the participants' homes by lay trained interviewers.

A total of 53,287 participants were jointly collected in SAGE and COURAGE in Europe. A proxy interview (including a short version of the survey) was conducted in case the participants were cognitively impaired or not able to respond to the interview by themselves (n=592). From the directly interviewed participants, a total of 52,150 participants (98.97%) answered an adapted version of the Composite International Diagnostic Interview-Depression module. These participants consisted of the analytical sample for the present study. From this number, a total of 4,308 participants (8.26%) were positive for the depression screening. People that were negative to the screening section were assumed to be negative to 12-month suicide ideation/attempt.

All the study methods were approved by the World Health Organization's Ethical Review Committee in the case of the SAGE study. Moreover, each SAGE participating country obtained ethical approvals through their respective institutional review bodies. Ethical approval for the COURAGE in Europe survey was obtained from the local ethics research review boards in each country. Written informed consent from each participant was also obtained in both studies.

Measures

SAGE and COURAGE in Europe shared common questions. All the questions were translated from English into the local languages, following the WHO translation guidelines (World Health Organization, 2009). Further information of the translation process for each country can be found in the country national reports in SAGE study (World Health Organization, 2018), and by authors' request in the case of COURAGE in Europe.

Suicide information was assessed with an adapted version of the depression module of the WHO Composite International Diagnostic Interview (Kessler and Üstün, 2004). Individuals who positively screened in the depression module: i.e. experienced at least one

of the following three symptoms for two weeks or longer: i) “felt sad, empty or depressed”, ii) “lost interest in most things you usually enjoy such as personal relationships, work or hobbies/recreation”, iii) “have been feeling your energy decreased or that you are tired all the time” were later asked whether they had experienced suicide ideation and attempts. Presence of 12-month suicidal ideation was directly collected by the question: “During this period, did you think of death, or wish you were dead?”. The presence of a 12-month suicide attempt was directly assessed using the question “During this period, did you ever try to end your life?”

In addition, gender, age (in years), level of education, marital status, food insufficiency, high household income, number of chronic health conditions, alcohol use, global disability (Üstün, Kostanjsek, Chatterji, & Rehm, 2010), positive and negative affect (Miret et al., 2012), and social isolation were included as factors potentially related to suicide behaviors. The selection of all these study variables was based on previous literature (Bantjes et al., 2016; Fässberg et al., 2016). A detailed explanation on the study variables can be found in the supplementary appendix A.

Data analyses

Firstly, bivariate comparisons using chi-squared tests were conducted to test differences between participants who positively screened depression and those who did not in the main demographic variables (age, gender, education and marital status). Cramer’s V was used as effect size measure.

Secondly, all the study variables potentially related to suicide ideation/attempt were compared by age and country groups. Chi-squared tests for categorical variables and unpaired t -test for continuous variables were used to compare the two age groups. Chi-square tests and ANOVA tests were used for comparing differences across countries in

categorical and continuous variables, respectively. Cramer's V for the chi-square analyses, Cohen's d for the t -test and Cohen's f for the ANOVA were used as measures of effect size. Cohen's guidelines (1988) were used for interpreting the effect sizes: Cramer's V values of 0.10, 0.30 and 0.50 indicates low; middle and high effect sizes; these cut-off points are 0.20, 0.50 and 0.80 in the case of unpaired t -tests; and 0.10, 0.25, and, 0.40 in the case of ANOVA tests.

Thirdly, weighted national estimates of suicidal ideation and attempts were calculated for the total sample, and separately for country between the two age groups (18-64 and 65 years and older). Prevalence estimates were also calculated by income level of the countries (LAMIC versus high-income). Post-standardizations according to age and gender United Nations global population ratio in the year 2010 (United Nations, 2017b) were conducted to facilitate comparability across countries in the global estimates. For the age group estimates, global gender ratio standardizations were applied. Rao–Scott χ^2 , which is a design-adjusted version of the chi-squared for population estimates (Rao and Scott, 1984) was used to compare global estimates of suicide ideation and attempts across, the groups of age (18-64 vs. 65 years and older), and the groups of income-level of the countries (LAMICs vs. high-income countries). Pairwise comparisons on the national prevalence estimates of 12-month suicidal ideation and of 12-month attempts were also conducted across countries.

Finally, four multiple logistic regression models were conducted to determine which study variables were related to the presence of 12-month suicide ideation and of 12-month suicide attempts in the two age groups: young-and-middle age adults (18-64 years old), and older adults (65 years and older). Odds Ratios (ORs) and 95% Confidence Intervals (CIs)

were reported in all these models, after adjusting for country. All the statistical analyses were conducted with STATA version 14.

Results

Sample characteristics

Participants who screened positive in the depression module were more likely to be younger ($\chi^2(1)=46.16$; $p<0.001$; $V=0.03$), female ($\chi^2(1)=184.23$; $p<0.001$; $V=0.06$), less educated ($\chi^2(5)=323.52$; $p<0.001$; $V=0.08$), and married ($\chi^2(1)=226.98$; $p<0.001$; $V=0.07$) compared to those negative to the screening.

General sample characteristics of the sample were reported by age groups (Table 1).

Significant differences were found for all the study variables across age groups, except for food deprivation. These differences were medium for physical problems as older people experienced higher number of physical problems ($\chi^2(3)=0.006$; $p<0.001$; $V=0.34$) and higher disability ($t(51763)=-73.02$; $p<0.001$; $d=0.68$). The rest of the effect sizes were small (Table 1).

[Table 1 near here]

Sample characteristics were also different across countries (Table 2). However, most of these differences were small except for food deprivation ($\chi^2(8)=0.007$; $p<0.001$; $V=0.39$), disability ($F(8, 51765)=715.09$; $p<0.001$; $f=0.33$), isolation ($F(8, 51863)=668.93$; $p<0.001$; $f=0.32$), positive affect ($F(8, 51264)=602.42$; $p<0.001$; $f=0.32$), and negative affect ($F(8, 51264)=535.57$; $p<0.001$; $f=0.28$), where moderated differences were detected across countries (Table 2).

[Table 2 near here]

Global estimates of suicide ideation and attempts

Table 3 shows the prevalence estimates of 12-month suicide ideation and of 12-month suicide attempts for the whole sample. A total of 2% of people reported 12-month suicide ideation, whereas 0.5% had attempted suicide in the previous 12 months.

Participants from high-income countries reported higher suicidal ideation than people from LAMICs ($\chi^2(1)=8.00$; $p=0.005$). However, no differences were found in the prevalence of 12-month suicide attempts between high-income countries and LAMICs. Rates of suicidal ideation ($\chi^2(1)=159.84$; $p<0.001$) and suicide attempts ($\chi^2(8)=40.33$; $p=0.001$) varied considerably across countries (Table 3).

[Table 3 near here]

Pairwise comparisons on the 12-month prevalence estimates of suicide ideation and attempts across countries are reported in Table 4. With the exception of South Africa, the estimated prevalence of 12-month suicidal ideation was lower in China than in the rest of the countries. India showed higher estimates of 12-month suicidal ideation and attempts than Russia, South Africa, and Poland. Furthermore, higher estimates of 12-month suicide attempts were found in Spain in comparison with China, Russia, Finland, and Poland (Table 4).

[Table 4 near here]

Suicide ideation and attempts estimates by age groups

Table 5 displays 12-month suicidal ideation and suicide attempts estimates for the two groups aged 18-64 years and 65 years and older, respectively. Suicidal ideation rate was significantly higher for older people than for the young-and-middle age people ($\chi^2(1)=139.01$; $p<0.001$) in the total sample. Particularly, older people reported suicidal

ideation rates at least 1.5 times higher than young-and-middle-age people in Ghana, India, and Spain.

No differences were found for suicide attempts among young-and-middle age and old people in the total sample. However, different country profiles were found. 12-month suicide attempts were 2 times more likely for older people in India. In contrast, suicide attempt rates were almost 90% lower for older people than for younger people in Mexico and South Africa (Table 5).

[Table 5 near here]

Factors related to 12-month suicide ideation

Factors associated with 12-month suicidal ideation in the two age groups are included in table 5. Female gender, food deprivation, higher disability, higher negative affect, greater number of chronic health conditions, and higher isolation were factors related to 12-month suicidal ideation in both young-and-middle age and older people. Higher household income ($OR=0.75$; $p=0.001$) was related to lower likelihood for suicidal ideation in young-and-middle-age people. However, income was not significantly associated with either suicide ideation or attempts in the older people group. Finally, 12-month suicidal ideation was less likely for younger people ($OR=0.98$; $p=0.002$) within the group of people aged 65 and older, whereas age was not a relevant factor for young-and-middle age group.

[Table 6 near here]

Factors related to 12-month suicide attempts

Finally, factors associated with 12-month suicide attempts are displayed for adults and older people separately in table 6. Higher negative affect, higher disability, and presence of food deprivation were associated with the presence of 12-month suicide attempts in the 18-

64 years and 65 years and older groups. Furthermore, being female ($OR=0.73$; $p=0.050$), younger age ($OR=0.97$; $p<0.001$), higher isolation ($OR=1.13$; $p=0.026$), and higher number of chronic health conditions were related to the presence of 12-month suicide attempts in the 18-64 years group. People with more than two health conditions ($OR=2.69$; $p=0.044$) also showed a higher likelihood for reporting suicide attempts in the group of 65 years and older.

[Table 7 near here]

Discussion

This study provides important cross-national evidence on the prevalence of suicidal behavior, and adds knowledge to the existing discussion on which correlates of suicide are relevant for older people and which ones are shared with other adult age groups.

Our study reported a global prevalence of 2% and 0.5% for 12-month suicide ideation and 12-month suicide attempts, respectively. Both estimates were very similar to previous cross-national studies (Borges, et al., 2010). Also, in line with previous evidence (Borges, et al., 2010), estimates of suicide attempts did not vary between high-income countries and LAMICs. However, higher prevalence rates of 12-month suicidal ideation were found for high-income countries. This result is not congruent with the previous studies that have not found such difference (Borges, et al., 2010). At this point, we can only speculate on the reasons for the LAMICs having lower rates of suicidal ideation in this study. One of the reasons might be due to the economic situation that took place during the data collection period. Whereas some LAMICs, such as Ghana, India or China, experienced an economic growth that helped many people to get out of poverty (World Bank, 2018), other high-income countries such as Spain suffered from an economic recession which led to more than 20% of the Spanish population being at risk of poverty (Nikolka, 2013).

Another explanation might be related to living arrangements. Although the number of people living alone is increasing worldwide, the regions with higher rates are the western high income countries (United Nations, 2017a). In this line, one study reported that prevalence of wishes of death in older people was higher in European countries with lower number of intergenerational households (Stolz, Fux, Mayerl, Rásky, & Freidl, 2016). Finally, methodological differences, including the fact that elderly people were not always surveyed in prior studies and the specific countries that have been evaluated previously might probably explain these differences.

Estimated rates of 12-month suicide ideation and attempts also varied significantly across countries. Further cross-national studies should analyze whether specific national characteristics might explain these differences.

Although no global differences were found for suicide attempts between older and younger-and-middle age adults, the group of 65 years and older experienced higher suicidal ideation than people aged 18-64 years, in the total sample. This result is not congruent with previous cross-national studies that reported higher rates for young adults (Nock, et al., 2008). One possible explanation of this result might be related to the fact that negative views towards the elderly are increasing (Ng, Allore, Trentalange, Monin, & Levy, 2015). The relationship between age discrimination and suicide behaviors is still not well-established (Conwell, 2018). However, negative perceptions of ageing have been associated with depression and anxiety (Freeman et al., 2016), which are factors associated with suicidal ideation. Another interpretation might be related to the use of different measures of suicide ideation across studies. Particularly, our measure was related to wishes of death (also known as passive suicidal ideation) rather than active ideation (i.e. whether people have seriously considered taking their own life). Some authors have suggested that older

people are more likely to disclose wishes of death than younger people (Gallo, Anthony, & Muthén, 1994). However, other studies have also showed that passive suicidal ideation is not normative in older people and that it is also linked to emotional distress (Van Orden et al., 2014). Further multi-generational cohort studies should analyze whether suicidal ideation is now more frequent in older people than in the past.

As reported in previous studies, global and age-specific suicide ideation and attempt estimates varied considerably across countries (Borges, et al., 2010). Older people from Spain, South Africa, and India showed higher 12-month suicidal ideation estimates. Although further studies should confirm this result, it is possible that these three countries have lately transitioned (for a number of different reasons) from higher levels of intergenerational cohabitation to less favorable environments for older people (Castiello et al., 2008; Schatz and Ogunmefun, 2007; Vaidya and Raje, 2014).

Our study also reported different factors related to suicide ideation and attempts for older and young-and-middle age groups, regardless of the country effect. Younger age was associated with lower 12-month suicidal ideation for people age 65 years and older. A previous cross-national European study also reported that wishes of death increased in older people as they age (Stolz, et al., 2016).

Higher social isolation was related to 12-month suicidal ideation in both age groups and with 12-month suicide attempts in the young-and-middle age group. However, higher isolation was not related to suicide attempts in older people. This was not an expected finding, since social isolation has been frequently related to fatal and non-fatal suicide attempts in older people (Fässberg, et al., 2016). It might be possible that the reduced number of older people who positively screened to suicide attempts in comparison with the total sample size of older participants have affected the isolation-suicide attempts

relationship. However, there could also be some explanation for this result. According to socio-emotional selectivity theory (Carstensen, Fung, & Charles, 2003), older people might desire not to be highly engaged in community activities, but mainly to have high-quality social interactions. Therefore, it could be possible that lower community participation might have a greater emotional impact on young-and-middle-age groups than in older people.

Higher number of chronic health conditions was linearly related to higher 12-month suicide ideation and attempt rates in young-and-middle age people. In turn, older people had to experience at least two chronic health conditions and more than two chronic health conditions to be at higher risk for 12-month suicide ideation and attempts, respectively. Our results are congruent with one study (Scott et al., 2010), and suggest that although physical problems are more frequent in the elderly, their emotional impact might be higher in young-and-middle age. Physical problems that appear earlier in life are probably associated with higher likelihood of developing mental health problems and with work and social difficulties (Gledhill, Rangel, & Garralda, 2000), which are all factors positively related to suicidal behaviors.

Moreover, the present study also showed that there were relevant factors related to 12-month suicidal ideation and to 12-month suicide attempts in both age groups. One of them was higher disability. Several factors, ranging from depressive symptoms to feelings of burdensomeness and pain, have been proposed as potential influences on the disability and suicide ideation relationship (Khazem, 2018). Food deprivation was also a factor related to suicide ideation and to suicide attempts both in young-and-middle age adults and in older adults. In contrast, higher household income was not associated with suicide attempts in any age group. Food deprivation rather than low family income was found to be

related to suicide ideation and attempts in adolescents (Alaimo, Olson, & Frongillo, 2002). Household food insufficiency has been longitudinally associated with increased depressive and anxiety symptoms (Hadley and Patil, 2008). It might be possible that the relationship between food insufficiency and suicidal behaviors might be mediated by poor mental health. Nonetheless, a reversal explanation, i.e. people with suicide problems might experience a higher prevalence of food insufficiency, could not be completely ruled out.

Higher negative affect was also related to 12-month suicidal ideation and attempts in young and middle age adults and in older adults, after controlling for the country effects. This result is in line with previous studies (Yamokoski, Scheel, & Rogers, 2011). In contrast, our study did not find that lower positive affect was related to suicide ideation or attempts (Hirsch, Duberstein, Chapman, & Lyness, 2007). Some authors argued that positive affect might be related to higher problem solving skills, which subsequently might decrease suicidal behaviors (Joiner Jr et al., 2001). However, other authors have not found a significant effect of positive affect on suicidal ideation after controlling for negative affect measures (Yamokoski, et al., 2011).

The results of this study, although valuable, should also be interpreted taking into account some limitations. Firstly, it is possible that the study did not identify all participants with suicidal ideation and suicide attempts, since the questions about suicidal ideation and attempts were posed only to those who screened into the depressive episode module. The analyses showed that the participants who screened into the depression module and those who did not were different in terms of demographic characteristics. While our multiple adjusted models controlled for these variables, these differences need to be considered when interpreting our findings. This limitation might also explain the low **national** prevalence rates found in some LAMICS where the role of depression for suicide

is lower than in other countries (World Health Organization, 2014). In spite of this, depression is still a risk factor for suicide in both high and low- and middle-income countries (Nock, et al., 2009) therefore, it is likely that a majority of participants with suicidal ideation and suicide attempts had been identified. The large scarcity of cross-country data on suicide for people 65 years and older makes the present study valuable even considering this limitation. On the other hand, the questions regarding suicidal ideation and attempts were self-reported, which implies that they may be subject to differential denial in some age groups. In addition, the total sample was large, but the specific age estimates of suicide attempts were based on small numbers in some countries, such as South Africa, Finland, and Poland. Therefore, some specific country estimates of suicide attempts should be interpreted with caution. In addition, our measure of suicide ideation was related to wish to die, which has been differentiated from active suicidal ideation (Baca-Garcia et al., 2011). These different questions might also explain some differences found with previous cross-national studies. Nonetheless, the presence of wishes to die has been reported as clinically important as the presence of active suicidal ideation (Baca-Garcia, et al., 2011). Furthermore, we acknowledge that young and middle age adults are heterogeneous groups, who probably have different factors related to suicide. However, the number of people who positively screened 12-month suicide attempts was not large enough to differentiate between young and middle age adults in the regression analyses. Lastly, this study was cross-sectional, so the direction of the relationships cannot be defined.

In spite of these limitations, our study has firstly highlighted that older people were at increased risk for suicidal ideation globally and for suicide attempts in some countries. The ageism and other societal changes should be further studied in relationship with suicide

in older people, worldwide. Although further research is probably warranted, the present study has found relevant factors related to 12-month suicide ideation and attempts that were common across all the adult age groups and others that were only relevant to one age group. All these results suggest that general suicide theories could somehow be applied across different adult age groups. However, specific age suicide theories are also probably necessary in order to describe the changing emotional role of some factors across the adult lifespan.

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Table 1. Unweighted sample characteristics across age groups

n (%)	18-64 years	≥ 65 years	<i>p</i> *	Cramer's <i>V</i>
Gender			<0.001	0.02
Female	19 607 (66.06)	10 074 (33.94)		
Male	14 474 (64.44)	7 986 (35.56)		
Education level			<0.001	0.19
Less than primary	11 158 (55.79)	8 841 (44.21)		
Primary completed	5 774 (62.52)	3 461 (37.48)		
Secondary completed	6 128 (74.53)	2 094 (25.47)		
More than secondary	10 193 (75.48)	3 545 (24.52)		
Marital Status			<0.001	0.20
Married	26 066 (71.94)	10 168 (28.06)		
Widowed/Separated/Single	7934 (50.26)	7 851 (49.74)		
Household income			441.62 <0.001	0.09
1 st , 2 nd quintiles	12 066 (59.88)	8 083 (40.12)		
3 rd , 4 th and 5 th quintiles	21 559 (68.91)	9 744 (31.09)		
Food deprivation			0.26	--
No	29 352 (65.27)	15 619 (34.73)		
Yes	4 646 (65.96)	2 398 (34.04)		
Number of chronic health conditions			<0.001	0.34
None	12 350 (85.03)	2 175 (14.97)		
One	12 815 (68.86)	5 795 (31.14)		
Two	5 795 (53.72)	4992 (46.28)		
More than two	3121 (37.97)	5098 (62.03)		
Alcohol use			<0.001	0.08
Abstainers	24 482 (63.13)	14 296(36.87)		

Occasional drinking	8 520 (70.92)	3 493 (29.08)		
Heavy drinking	977 (80.35)	239 (19.65)		
Mean (SD)	18-64 years	≥65 years	<i>p</i>*	Cohen's <i>d</i>
Isolation	1.17 (1.19)	1.76(1.43)	<0.001	0.46
Negative affect	7.24 (13.05)	6.17 (12.64)	<0.001	0.08
Positive affect	71.01 (26.96)	73.43 (26.60)	<0.001	0.09
Disability	11.44 (15.00)	23.33 (21.73)	<0.001	0.68

**p* values corresponded to Chi-squared analyses for categorical variables and to unpaired t-tests for continuous variables

Table 2. Unweighted sample characteristics across countries

n (%)	China	India	Mexico	Russia	South Africa	Ghana	Finland	Poland	Spain	p*	Cramer's V
Gender										<0.001	0.10
Female	7721 (26.01)	6875 (23.16)	1625 (5.47)	2766 (9.32)	2 319 (7.81)	2406 (8.10)	1100 (3.71)	2370 (7.98)	2505 (8.44)		
Male	6725 (29.94)	4344 (19.34)	1004 (4.47)	1526 (6.79)	1171 (7.62)	2682 (11.94)	821 (3.66)	1570 (6.99)	2078 (9.25)		
Education level										<0.001	0.30
Less than primary	5593 (27.96)	6245 (31.22)	1419 (7.09)	113 (0.56)	2202 (11.01)	3023 (15.11)	20 (0.10)	119 (0.59)	1269 (6.34)		
Primary completed	2828 (30.62)	1716 (18.58)	592 (6.41)	313 (3.39)	792 (8.57)	628 (6.80)	234 (2.53)	869 (9.41)	1265 (13.69)		
Secondary completed	3157 (38.39)	1395 (16.96)	279 (3.39)	775 (9.42)	503 (6.12)	279 (3.39)	304 (3.70)	977 (11.88)	555 (6.75)		
More than secondary	2827 (19.55)	1867 (12.84)	339 (2.34)	3090 (21.37)	470 (3.25)	1047 (7.24)	1361 (9.41)	1975 (13.66)	1493 (10.33)		
Marital status										<0.001	0.26
Married/In partnership	2333 (14.78)	2509 (15.89)	959 (6.07)	1835 (11.62)	1864 (11.81)	2026 (12.83)	717 (4.54)	1739 (11.01)	1806 (11.44)		
Single/ Widowed/ Divorced	12100 (33.39)	8709 (24.03)	1670 (4.61)	2451 (6.76)	2094 (5.78)	3031 (8.36)	1204 (3.32)	2201 (6.07)	2777 (7.66)		
Household income										<0.001	0.05

1st, 2nd quintiles	5539 (27.48)	4134 (20.51)	1082 (5.37)	1588 (7.88)	1543 (7.66)	1992 (9.88)	771 (3.83)	1829 (9.08)	1675 (8.31)		
3rd, 4th and 5th quintiles	8836 (28.19)	7014 (22.38)	1543 (4.92)	2699 (8.61)	2466 (7.87)	3089 (9.85)	1136 (3.62)	2102 (6.71)	2461 (7.85)		
Food deprivation										<0.001	0.39
Yes	151 (2.14)	1899 (26.95)	676 (9.59)	528 (7.49)	1120 (15.90)	2194 (31.14)	27 (0.38)	339 (4.81)	112 (1.59)		
No	14 273 (31.73)	9318 (20.72)	1953 (4.34)	3740 (8.32)	2873 (6.39)	2861 (6.36)	1888 (4.20)	3601 (8.01)	4471 (9.94)		
Chronic health conditions										<0.001	0.13
None	3938 (27.11)	4092 (28.17)	571 (3.93)	787 (5.42)	655 (4.51)	1432 (9.86)	467 (3.21)	1197 (8.24)	1387 (9.55)		
One	5728 (30.77)	3551 (19.08)	983 (5.28)	1030 (5.53)	1943 (10.44)	2178 (11.70)	607 (3.26)	1139 (6.12)	1454 (7.81)		
Two	2939 (27.24)	2091 (19.38)	659 (6.11)	1007 (9.33)	892 (8.27)	1066 (9.88)	476 (4.41)	759 (7.04)	899 (8.33)		
More than two	1841 (22.39)	1485 (18.06)	416 (5.06)	1468 (17.85)	540 (6.57)	412 (5.01)	371 (4.51)	845 (10.28)	843 (10.25)		
Alcohol use										p<0.001	0.28
Abstainers	11390 (29.37)	10501 (27.07)	225 (5.74)	2847 (7.34)	3377 (8.71)	3466 (8.94)	636 (1.64)	2033 (5.24)	2312 (5.96)	1	
Occasional drinking	23032 (19.16)	682 (5.68)	386 (3.21)	1360 (11.32)	531 (4.42)	1525 (12.69)	1185 (9.86)	1839 (15.31)	2203(18.34)		
Heavy drinking	686	36 (2.96)	18 (1.48)	83 (6.83)	85 (6.99)	72 (5.92)	100 (8.22)	68 (5.59)	68 (5.59)		

	(56.41)										
Mean (SD)	China	India	Mexico	Russia	South Africa	Ghana	Finland	Poland	Spain	<i>p</i> *	Cohen's <i>f</i>
Isolation	1.69 (1.22)	0.92 (1.14)	2.09 (1.59)	1.75 (1.32)	1.10 (1.17)	0.92 (1.17)	0.86 (0.94)	1.26 (1.30)	1.77 (1.46)	<0.001	0.32
Negative affect	2.42 (8.05)	10.58 (14.20)	10.27 (16.18)	10.39 (14.18)	3.96 (10.92)	4.33 (9.88)	5.37 (10.56)	8.67 (16.28)	10.59 (14.83)	<0.001	0.28
Positive affect	71.52 (29.39)	61.51 (26.67)	65.52 (27.80)	66.62 (23.39)	87.67 (19.87)	79.16 (22.48)	80.24 (20.93)	72.18 (27.32)	81.36 (18.58)	<0.001	0.30
Disability	8.21 (12.63)	22.31 (19.22)	17.03 (18.57)	20.36 (19.07)	17.74 (19.75)	20.71 (19.62)	7.92 (13.60)	17.13 (21.40)	10.85 (17.78)	<0.001	0.33

**p* values corresponded to Chi-squared analyses for categorical variables and to ANOVA for continuous variable

Table 3 –Global prevalence estimates of suicide ideation and attempts by country and by income level of the countries (n=52,150)*

Country	Total sample	Sample screened positive for depression		12 month Suicidal ideation			12 month Suicide attempts		
		n	%	n	%**	95% CI	n	%**	95%CI
China	14,446	321	2.22	100	0.57	0.34/0.97	48	0.31	0.14/0.66
India	11,219	1,602	14.28	538	4.27	3.73/4.88	102	0.94	0.67/1.33
Mexico	2,629	338	12.86	111	4.57	2.72/7.58	26	1.92	0.76/4.75
Russia	4,292	328	7.64	144	2.52	1.46/4.34	12	0.16	0.04/0.54
South Africa	4,032	182	4.51	86	1.49	0.78/2.85	42	0.76	0.36/1.59
Ghana	5,088	443	8.71	192	2.46	1.75/3.46	44	0.77	0.37/0.16
Finland	1,921	155	8.07	66	3.67	2.27/4.95	6	0.41	0.16/1.04
Poland	3,940	305	7.74	114	1.87	1.39/2.52	26	0.39	0.23/0.63
Spain	4,583	634	13.83	233	3.98	3.42/4.85	54	1.08	0.73/1.16
Rao–Scott χ^2 (p)					159.84 (≤0.001)			40.33 (0.001)	
Country Income level									
Low and middle	41,706	3,214	7.71	1171	2.38	2.05/2.74	274	0.53	0.39/0.72
High	10,444	1,094	10.47	413	3.07	0.26/3.59	86	0.74	0.54/1.02
Rao–Scott χ^2 (p)					8.00 (0.005)			2.32 (0.13)	
Total	52,150	4,308	8.26	1584	2.43	2.14/2.78	360	0.55	0.42/0.73

*Data were weighted and standardized according to the United Nations age and gender global population ratio

**All percentage estimates were calculated according to total sample

Table 4. Pairwise comparisons across countries in the prevalence obtained for 12-month suicidal ideation and 12-month suicide attempts.

	China	India	Mexico	Russia	South Africa	Ghana	Finland	Poland	Spain
China	-	<0.001	0.001	0.007	0.077	<0.001	<0.001	<0.001	<0.001
India	0.002	-	0.80	0.022	<0.001	<0.001	0.34	<0.001	0.56
Mexico	0.076	0.29	-	0.14	0.018	0.097	0.49	0.029	0.64
Russia	0.34	0.002	0.052	-	0.23	0.94	0.21	0.39	0.076
South Africa	0.15	<0.001	0.22	0.049	-	0.13	0.004	0.50	<0.001
Ghana	0.13	0.57	0.22	0.042	0.97	-	0.090	0.25	0.011
Finland	0.64	0.040	0.10	0.24	0.32	0.30	-	0.005	0.66
Poland	0.63	<0.004	0.089	0.11	0.21	0.19	0.87	-	<0.001
Spain	0.002	0.61	0.37	<0.001	0.37	0.38	0.023	0.003	-

Note: Values above the diagonal are showing *p* values obtained for pairwise comparisons in terms of suicidal ideation, while values below the diagonal are showing those *p* values for pairwise comparisons in terms of suicide attempts. In bold, significant differences found.

Table 5- Specific age-prevalence estimates of 12-month suicidal ideation and of suicide attempts for the total sample by country

		18-64 years (n=35,486)			65 years and older (n=18,854)			Old/Adult ratio	Rao-Scott χ^2 (p)
12-month	n	%	95% CI	n	%	95% CI			
suicidal ideation									
China	68	0.58	0.32/1.03	32	0.55	0.37/0.83	0.94	0.01 (0.93)	
India	364	3.87	3.29/4.54	174	7.46	6.18/8.97	1.93	27.28 (<0.001)	
Mexico	66	4.80	2.74/8.30	45	3.17	1.97/5.04	0.66	1.14 (0.28)	
Russia	50	2.40	1.26/4.54	94	3.58	1.91/6.59	1.49	0.95 (0.33)	
South Africa	70	1.58	0.78/3.18	16	1.00	0.43/2.32	0.63	0.52 (0.47)	
Ghana	93	2.09	1.34/3.26	99	5.19	4.12/6.54	2.48	13.26 (<0.001)	
Finland	49	3.85	2.78/5.32	17	2.42	1.48/3.93	0.67	1.59 (0.21)	
Poland	67	1.75	1.12/2.50	47	2.73	1.84/4.04	1.56	3.10 (0.07)	
Spain	131	3.69	2.90/4.70	102	6.00	4.70/7.64	1.62	9.49 (0.002)	
Total	958	2.27	1.95/2.65	626	3.74	3.03/4.61	1.64	139.01 (≤0.001)	
12-month suicide attempts									
China	33	0.31	0.14/0.72	15	0.26	0.14/0.48	0.83	0.12 (0.72)	
India	68	0.82	0.54/1.26	34	1.80	1.20/2.68	2.19	6.96 (0.008)	
Mexico	19	2.17	0.85/5.45	7	0.29	0.11/0.79	0.13	11.63 (<0.001)	
Russia	5	0.17	0.04/0.64	7	0.10	0.03/0.29	0.58	0.21 (0.64)	
South Africa	39	0.85	0.40/1.82	3	0.09	0.02/0.33	0.10	14.69 (<0.001)	
Ghana	22	0.73	0.31/1.71	22	1.09	0.70/1.68	1.49	0.66 (0.42)	
Finland	5	0.45	0.17/1.17	1	0.17	0.02/1.24	0.37	0.53 (0.47)	
Poland	22	0.40	0.23/0.68	4	0.30	0.06/0.67	0.75	0.14 (0.70)	
Spain	36	1.10	0.71/1.70	18	0.94	0.57/1.58	0.85	0.06 (0.79)	
Total	249	0.54	0.40/0.74	111	0.60	0.44/0.80	1.11	3.02 (0.54)	

*Data were weighted and standardized according to the United Nations gender population ratio

Table 6- Factors associated with 12-month suicidal ideation by age groups

Variables	18-64 year		≥ 65 years	
	OR	95% CI	OR	95% CI
Male	0.62***	0.53/0.73	0.69***	0.55/0.87
Age	0.99	0.99/1.02	0.98**	0.96/0.99
Education (ref. more than secondary)				
Less than primary	0.92	0.73/1.17	1.33	0.95/1.85
Primary completed	1.02	0.80/1.31	1.11	0.79/1.57
Secondary completed	1.10	0.86/1.41	1.19	0.81/1.73
Marital status (ref. widowed/separated/single)	0.91	0.77/1.08	0.84	0.68/1.05
High household income (ref. 1 st , 2 nd , 3 rd quintiles)	0.75***	0.64/0.88	0.84	0.68/1.04
Food deprivation (ref. no)	1.64***	1.38/1.97	1.44**	1.13/1.83
Number of chronic health conditions (ref. none)				
One	1.53***	1.24/1.23	0.96	0.64/1.43
Two	2.05***	1.63/2.59	1.51*	1.03/2.22
More than two	3.65***	2.88/4.62	2.09**	1.43/3.04
Isolation	1.16***	1.10/1.23	1.10**	1.03/1.18
Alcohol use (ref. abstainers)				
Occasional drinking	1.09	0.89/1.33	0.78	0.59/1.04
Heavy drinking	1.30	0.79/2.13	1.91	0.75/4.84
Negative affect	1.04***	1.03/1.04	1.04***	1.03/1.04
Positive affect	1.02	0.99/1.00	1.00	0.99/1.00
Disability	1.03***	1.02/1.03	1.02***	1.05/1.02

Analyses were controlled by country

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

Table 7- Factors associated with 12-month suicidal attempts by age groups

Variables	18-64 year		≥ 65 years	
	OR	95% CI	OR	95% CI
Male	0.73*	0.54/0.99	0.60	0.36/1.01
Age	0.97***	0.96/0.99	1.00	0.97/1.03
Education (ref. more than secondary)				
Less than primary	0.93	0.59/1.47	1.14	0.51/2.56
Primary completed	1.28	0.81/2.00	0.81	0.32/2.03
Secondary completed	1.15	0.73/1.82	0.87	0.29/2.64
Marital status (ref. widowed/separated/single)	0.77	0.56/1.07	0.98	0.59/1.61
High household income (ref. 1 st , 2 nd , 3 rd quintiles)	1.00	0.74/1.36	1.08	0.67/1.72
Food deprivation (ref. no)	2.22***	1.60/3.08	1.69*	1.00/2.85
Number of chronic health conditions (ref. none)				
One	1.86***	1.22/2.84	1.60	0.60/4.26
Two	2.62***	1.64/4.17	1.93	0.74/5.10
More than two	4.61***	2.87/7.40	2.69*	1.02/7.03
Isolation	1.13*	1.01/1.26	1.12	0.96/1.31
Alcohol use (ref. abstainers)				
Occasional drinking	1.29	0.90/1.86	1.28	0.69/2.36
Heavy drinking	0.81	0.29/2.28	2.02	0.27/15.19
Negative affect	1.03***	1.02/1.04	1.04***	1.02/1.04
Positive affect	0.99	0.99/1.00	1.00	0.99/1.01
Disability	1.02***	1.02/1.03	1.02***	1.01/1.03

Analyses were controlled by country

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$