

PREVALENCE OF SUICIDALITY IN THE EUROPEAN GENERAL POPULATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

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ABSTRACT

Objective. To conduct a systematic review and meta-analysis of the prevalence and variability in suicidality in the general adult population of Europe between 2008 and 2017.

Methods. Studies containing original data on suicidality were identified in five electronic databases. Point, 12-month and lifetime prevalences were calculated for various types of suicidality. Pooled prevalence rates were calculated using a random effects model. Subgroup analysis and multivariate meta-regression were also performed.

Results. We identified 24 papers containing original data, which provided 97 prevalence rates for suicidality. The pooled point prevalence rate was 3.96% (2.37 – 5.56), pooled 12-month prevalence 2.9% (1.49 – 4.32), and pooled lifetime prevalence 5.55% (4.31 – 6.79). The subgroup analysis showed that lifetime prevalence figures for wishing to be dead and suicidal ideation were higher in areas with a population of less than 3,849 inhabitants and in Eastern Europe. Finally, the multivariate meta-regression showed differences with respect to the period and type of suicidality, lower and upper age thresholds, population size, and study area.

Conclusion. Our data showed that approximately 21% of European individuals have wished to be dead at some point during their lifetime. Studies like this are necessary to highlight the need for efforts to prevent and intervene in suicidality.

INTRODUCTION

Suicide is one of the main global causes of death. Globally there were an estimated 793,000 deaths by suicide in 2016, amounting to a global annual, age-standardised suicide rate of 10.5 per 100,000 population (World Health Organisation,

WHO, 2018). The WHO has reported that mortality rates in Europe ranged from 2.5 to 31.9 per 100,000 population in 2016.

There are indications that for every adult who dies by suicide there may be more than 20 others who attempt suicide (WHO, 2018). Suicidal ideation, suicide planning and attempted suicide are usually a prodrome of subsequent completed suicide (Cao et al., 2015). Suicidality (wishing to be dead, suicidal ideation, suicide planning and attempted suicide) is a serious public health and social problem that, unfortunately, does not seem to be improving (Amare et al., 2018; Kang et al., 2015; Nock et al., 2013). A previous systematic review (Nock et al., 2008) showed that across the world, the lifetime prevalence of suicidal ideation in adults ranged from 3.1-56%; the corresponding figures for suicide planning and suicide attempts were 0.9-19.5% and 0.4-5.1% respectively.

To our knowledge, there has been no meta-analysis of the epidemiology of suicidality in the general population of Europe in recent years. The conduct of meta-analyses that collect the prevalence information from different community epidemiological studies carried out in Europe on suicidality in the general population, as promoted by the WHO (World Mental Health Survey initiative), is of great relevance. The studies themselves are based on analyses of data from large and representative samples of the population and provide the necessary and fundamental information for adapting to different community settings. In this sense, meta-analysis studies confer an additional benefit, by providing important information on the quality of the studies, their variability and pooled data from the European community; moreover, their conclusions serve to guide the institutional, economic and social measures and resources needed for suicide prevention in different geographical areas. Therefore, we aimed to conduct a systematic review and meta-analysis of the prevalence of suicidality

in the general adult population of Europe from 2008 to 2017 and to analyse the variability in prevalence rates.

METHODS

Search Strategy

This meta-analysis is part of a wider study that also investigates risk factors for suicidality. For this reason, although this review deals with the prevalence of suicidality in Europe, we conducted a systematic search of electronic bibliographic indices of published research using the following broad search string: Title ('suicid*') AND Abstract ((prevalence OR epidemiolog*) OR ('risk factor*' OR 'associated factor*' OR 'correlated factor*')). We searched five electronic databases (Embase, Medline, Proquest's Psychology Database, PsycINFO and Scopus). The data source was literature published between January 1, 2008 and December 31, 2017.

This meta-analysis was based on the criteria set out in the PRISMA statement (Moher et al., 2009) (Annex S1).

This meta-analysis has been registered in PROSPERO (CRD42017075190).

Study Selection: Inclusion criteria

The following inclusion criteria were applied: (i) analysis of data from the general population (studies of specific populations, such as university students, inpatients or armed forces, were excluded); (ii) original research providing primary data; (iii) conducted in Europe; (iv) measured the prevalence of suicidality (wishing to be dead, suicidal ideation, suicide planning and attempted suicide). At this point we would like to emphasise that in this meta-analysis we use the term 'suicidality' to refer to any deliberate action that might have resulted in the individual's death, but did not; we exclude completed suicides; (v) covered a wide age range, i.e. adolescents to elderly

people; (vi) published between 2008 and 2017; (vii) full text available in English or Spanish.

Selection Process: Flow Diagram

The electronic search identified 18,287 potentially eligible studies. Removal of duplicates reduced this to 11,358, which were screened by two independent reviewers (PM, PH) who applied the inclusion criteria to the titles and abstracts. This resulted in selection of 75 papers which were read in full. This resulted in exclusion of a further 51 for the following reasons: contained only data of risk factors ($n = 2$) included completed suicide ($n = 2$); data not available ($n = 5$); did not deal with the general population ($n = 5$); not conducted in Europe ($n = 25$); duplicated data ($n = 10$); full text not available ($n = 2$). Disagreements about the eligibility of a study were resolved by consulting a third reviewer (BMK). Ultimately, a total of 24 papers on the prevalence of suicidality were included in the review (Figure 1).

Data Extraction

Information about certain variables was extracted from all studies included in the review. Details of the variables used to characterise the papers included in the review are available as Supporting Information in Table S1. We included the following variables:

1. Citation-level variables: article reference number (RN), first author, year of publication and country.
2. Meta-variables (methodological issues): design (cross-sectional or cohort/follow-up); sampling (random; stratified random; stratified multistage random; stratified multistage clustered random); age range (14 – 100); lower age (from 14 years years old; from 18 years old); upper age (with limit; without limit); diagnosis instrument (Beck Depression Inventory, BDI; Composite

International Diagnostic Interview, CIDI; Clinical Interview Schedule – Revised, CIS-R; Depression Screening, DESC; Patient Health Questionnaire, PHQ-9; Suicide Behaviors Questionnaire-Revised, SBQ-R; Structured Clinical Interview for DSM-5, SCID; Symptom Check List - Revised, SCL-90-R; Suicide Probability Scale, SPS; various questionnaires ad hoc included items developed by different authors); and type of interview (self-administered; interviewer-administered); region (Eastern; Northern; Southern; Western); quality rating (1-10) (Table S2).

3. Rate-level variables for prevalence: number of cases with suicidality numerator), population at risk (reported denominator; categorised starting from the median: up to 3,849; more than 3,849), and observation period (point (previous week, previous two weeks or previous month); 12-month; lifetime).

Outcome variables: 1: wishing to be dead, 2: suicidal ideation/thought/thinking, 3: suicide planning, 4: attempted suicide. Only two papers (Blüm et al., 2013; Economou et al., 2016) combined suicidal ideation and attempted suicide; these combined rates were included in category 2 (suicidal ideation).

The quality of the studies was assessed using a modified version of the quality criteria proposed by Saha et al. (2005). Each study was allocated a quality score depending on the following indicators: rate type, case ascertainment, information on rates (raw data, age and/or sex standardised (If age/sex standardised, method provided), and additional 'merits' (mention of inter-rater reliability and leakage). Scores on this quality index can range from 1 to 10 points (Table S2).

Data Analysis

Data were extracted using the Microsoft Excel program and classified into categories previously agreed upon by the researchers. All analysed data are presented as supporting information.

Prevalence rates were ordered using sequential filters. We calculated pooled prevalence rates using a random effects model that allowed weighting of studies. We also calculated pooled point, 12-month and lifetime prevalences for specific types of suicidality. In all cases prevalences were calculated by adjusting the relevant random effects model.

Subgroup analysis was performed to investigate the variation between studies, which was very high. Finally, a multivariate meta-regression was performed on a step-by-step elimination basis. To begin with all study variables were included in the model and those that did not reach a significance threshold ($p < .10$) were successively eliminated, as were those whose withdrawal did not substantially alter the coefficients of the rest of the predictors. The model was constrained to include the outcome variables (wishing to be dead, suicidal ideation, suicide planning, attempted suicide) and the observation period (point; 12-month; lifetime).

Visual inspection of a funnel plot was used to detect publication bias, along with the Egger test for detection of asymmetry.

RESULTS

We identified 24 papers containing original data on the prevalence of suicidality in Europe from 2008 to 2017 [1-24]. Key characteristics of the papers included in this review are provided in Table 1.

Of these papers, three were published in 2008 [7,15,23], two in 2009 [3,13], one in 2010 [17], one in 2011 [20], three in 2012 [2,10,11], five in 2013 [1,4,9,12,24], two in 2014 [18,19], three in 2015 [5,6,14], three in 2016 [8,21], and, finally, one in 2017

[16]. The distribution of countries in which research was carried was as follows, Belgium: two studies [6,12], Finland: one study [13], France: one study [12], Germany: four studies [4,11,15,17], Greece: two studies [8,9], Italy: one study [23], Latvia: one study [21], Spain: one study [18], Sweden: one study [14], the Netherlands: one study [24], Turkey: three studies [2,20,22], the UK: four studies [1,3,16,19], and, finally there were two multi-country studies [5,7]. The upper and lower age limits ranged from 14 to 100 years old. Two studies used a random sample [9,13], ten a stratified random sample [1,2,3,8,11,14,15,17,20,21], seven a stratified multistage random sample [4,5,6,7,10,16,24] and, finally, five used a stratified multistage clustered random sample [12,18,19,22,23]. Only three studies used a cohort/follow-up design [9,13,15], the remainder used a cross-sectional design. The instrument used to measure the suicidality varied; six studies used an ad hoc questionnaire developed by the study's authors [1,2,8,14,16,21] two used the BDI [7,13], seven the CIDI [5,6,10,18,19,23,24], one the CIS-R [3], one the DESC scale [11], two the PHQ-9 [15,17], two the SBQ-R [4,20], one the SCID [9], one the SCL-90-R [12], and, finally, one the SPS [22]. Only five studies used a self-administered questionnaire [4,7,12,13,14]. The quality rating of the 24 studies ranged from 5 [6,9,10,20,22] to 9 [15]; the mean was 6.33.

These 24 papers provided 97 prevalence rates for suicidality based on an estimated total of 20,554 potentially overlapping cases (Table 2). We found 17 point prevalence figures for suicidality (range: 0.01 - 13.40%), 16 twelve-month prevalence figures (range: 0.36 - 11.22%) and 64 lifetime prevalence figures (range: 0.55 - 23.00%). In addition, we found one point prevalence for wishing to be dead (1.53%) 12 point prevalence figures for suicidal ideation (range: 0.8 - 13.4%) and 4 point prevalence figures for attempted suicide (0.01 - 3.00%). We also obtained two 12-month prevalence figures for wishing to be dead (4.24 - 11.22%) seven 12-month

prevalence figures for suicidal ideation (range: 0.87 - 5.66%), two 12-month prevalence figures for suicide planning (range: 0.44 - 2.81%) and five 12-month prevalence figures for attempted suicide (range: 0.36 - 0.74%). Finally, we found 2 lifetime prevalence figures for wishing to be dead (17.96% and 23%) 24 lifetime prevalence figures for suicidal ideation (range: 2.67 - 20.44%), 15 lifetime prevalence figures for suicide planning (range: 0.67 - 4.49%) and 22 lifetime prevalence figures for attempted suicide (range: 0.55 - 5.04%). Scatter plots of the 97 prevalence figures are shown in Figures 2, 3 and 4.

The meta-analysis of point prevalence showed that the pooled prevalence for all suicidality was 3.96% (2.37 – 5.56). The pooled point prevalence for wishing to be dead was 1.53% (0.95 – 2.12), for suicidal ideation it was 5.28% (3.5 – 7.06), and for attempted suicide it was 0.63% (-0.09 – 1.36). The 12-month pooled prevalence for all suicidality was 2.9% (1.49 – 4.32). The pooled 12-month prevalence for wishing to be dead was 7.72% (0.80 – 14.56), for suicidal ideation it was 3.62% (2.24 – 4.99), for suicide planning it was 1.6 (-0.71 – 3.92) and for attempted suicide it was 0.57% (0.43 – 0.71%). Finally, the lifetime pooled prevalence for all suicidality was 5.55% (4.31 – 6.79). The pooled lifetime prevalence for wishing to be dead was 20.27% (15.35 – 25.19), for suicidal ideation it was 9.08% (7.22 – 10.94), for suicide planning it was 2.13 (1.56 – 2.69) and for attempted suicide it was 2.88% (2.15 – 3.60) (Table S3).

The subgroup analysis revealed differences in the prevalence of the different categories of suicidality. Wishing to be dead and suicidal ideation were more prevalent than suicide planning or attempted suicide ($p < .001$). Lifetime prevalence figures were higher than 12-month and point prevalence figures, when the latter were combined ($p = .02$). Finally, studies carried out in Eastern Europe provided the highest prevalence figures and those in Southern Europe the lowest; these differences were statistically

significant ($p < .001$). No statistically significant differences were found for the rest of the variables (Table S4).

The multivariate meta-regression showed that studies that measured wishing to be dead reported higher prevalence figures than those which measured suicidal ideation ($p = .013$), suicide planning ($p < .001$) and attempted suicide ($p < .001$). Similarly, this model showed that overall, point and 12-month prevalences were lower than lifetime prevalences ($p < .001$). Studies where the lower age limit was 18 years or more reported higher prevalence figures ($p = .013$). Studies which set an upper age threshold reported higher prevalence figures than those which did not ($p < .001$). In addition, studies of populations of more than 3,849 inhabitants obtained lower prevalence figures ($p = .03$). Finally, studies carried out in Eastern Europe obtained less prevalence figures than those obtained in Northern ($p = .025$) or Centre Europe ($p = .077$). This model explained 62.21% of the variability in prevalence of suicidality (Table 5).

Finally, Figures S3, S4, S5 and S6 show funnel plots of all prevalence figures, point prevalence, 12-month prevalence and lifetime prevalence respectively. The square root of prevalence is shown on the abscissa and the inverse of the standard deviation on the ordinate. Visual inspection suggests a publication bias and the Egger test of symmetry was significant for all prevalence figures ($z = 12.1438, p < .001$), point prevalence ($z = 8.7576, p < .001$), 12-month prevalence ($z = 5.8381, p < .001$) and lifetime prevalence ($z = 9.0499, p < .001$).

DISCUSSION

To the best of our knowledge, this is the first meta-analysis of the prevalence of suicidality at all ages, in the general population of Europe. Our review identified 24 papers on the prevalence of suicidality written in English and Spanish and published over a 10-year period (2008 – 2017). We have calculated pooled prevalences and

analysed the variance between countries and types of suicidality. Our model explained almost 63% of the observed variability in suicidality.

To our knowledge, there are no systematic reviews or meta-analyses of suicidality by continent—unlike with the more numerous studies of completed suicide—which would allow us to make global comparisons of our data. However, our data can be compared with other studies conducted in areas outside of Europe.

Both the analysis of subgroups and the multivariate meta-regression showed that prevalence varied according to the period over which it was calculated. It seems logical that the reported prevalence of suicidality will be higher if people are asked to report suicidality throughout their life rather than during the last year or last few weeks. We also found differences between types of suicidality. It is notable that the pooled point prevalence for wishing to be dead was very low compared with the prevalences of suicidal ideation, suicide planning and attempted suicide. This was due to the fact that this figure was obtained from a single study and we were not able to compare it with any others. In general, however, wishing to be dead and suicidal ideation were more prevalent than suicide planning or attempted suicide. These results are in line with those found by Cao et al. (2015), who reported that in China there were difference between the lifetime prevalence of suicidal ideation and attempted suicide, and with the results of Armitage et al. (2014), who found differences between the 12-month prevalence figures for suicidal ideation, suicide planning and attempted suicide in Malaysia, although in our sample prevalence figures for suicide planning and attempted suicide were similar. We have not found a meta-analysis or review comparing the prevalence of wishing to be dead with the prevalence of other types of suicidality.

The reported range of lifetime prevalence of suicidal ideation that we found is in line with the systematic review carried out by Malakouti et al. (2015) in the Eastern

Mediterranean region, but Nock et al. (2008) found a wider range (3.1 - 56%), perhaps because they examined studies from across the world. On the other hand, the lifetime prevalence of suicide planning in our sample was lower than reported by Malakouti et al. (2015) and Nock et al. (2008), but our results on lifetime prevalence of attempted suicide are in line with the reviews mentioned above (Malakouti et al., 2015; Nock et al., 2008) and a review of suicide in Africa (Mars, 2014). We found lower 12-month prevalence figures (suicidal ideation, suicide planning and attempted suicide) than the corresponding figures reported by Nock et al. (2008), again, this may be because Nock et al. examined studies from across the world and it may be that suicidality is more prevalent outside Europe. In summary, the prevalence figures we found were similar to, or lower than those found by other authors.

The subgroup analysis revealed other factors associated differences in prevalence of suicidality. Interestingly, we found that prevalence of suicidality did not vary according to whether it was measured via a self-administered or interviewer-administered instrument, which seems to conflict with evidence that embarrassing behaviours such as suicidality are reported at higher rates in self-administered questionnaires than via other methods. It should be noted, however, that Ducher et al. (2016) found a strong correlation between scores on self- and interviewer-administered versions of the Suicide Risk Assessment Scale of Ducher, which indicates that patients are willing and able to express their suicidal ideas if we invite them to do so. In any case, further data is needed to draw definite conclusions about the importance of how instruments are administered as we only obtained 8 prevalence figures based on self-administered questionnaires compared with 89 based on other-administered instruments. In addition, reported prevalence figures were lower in studies that analysed larger samples. Regarding prevalence rates across Europe, suicidality was more prevalent in

Eastern European countries (Bulgaria, Romania and Turkey) than in other regions, which can be due to economic variables (Fountoulakis et al., 2016). Landberg (2008) found that in these countries alcohol consumption was positively related to suicide rate. Another study found that social inclusion decreased suicide mortality in the elderly and that levels of social inclusion were lower in Eastern European countries (Yuryev et al., 2010). Milner et al. (2012) found that score on the globalisation index was positively associated with suicide rate in Eastern Europe, but not in Southern and Western Europe. Moreover, in our review suicidality was least prevalent in Southern Europe, which is in line with previous studies (Córdoba-Doña et al., 2014; Fountoulakis et al., 2016).

Finally, the multivariate meta-regression showed that prevalences were higher in studies that included people older than 18 years but not those aged between 14 and 18 years. This result seems to indicate that suicidality is less prevalent in European adolescents than European adults and is in line with a previous review (Bridge et al., 2006), which concluded that suicide was less prevalent in adolescence than in adulthood; it seems that this has not changed in recent years (Muehlenkamp et al., 2012), perhaps because of the protective effect of the family (Bridge et al., 2006; Law et al., 2013). However, it must be borne in mind that prevalence of suicidality may vary across the European continent, as shown by an earlier study carried out by Kokkevi et al. (2012). In addition, in studies in which there was a maximum age limit also reported higher prevalence figures, indicating that suicidality is less prevalent in elderly people than adults generally. It seems that in recent years suicide has increased in older adults (65 - 74 years), especially men, and has decreased in elderly people (more than 75 years old) (Hawton & van Heeringen, 2009; Pritchard & Hansen, 2005). In addition, we found that the greater the denominator population and the higher the quality of the study, the lower the prevalence of suicidality. We believe that these two elements could be related,

since increasing the sample size improves the quality of a study, and study quality was negatively related to the reported prevalence of suicidality. In this analysis we also found geographical differences in the prevalence of suicidality, which was less prevalence in Eastern Europe than in Northern and Centre Europe, being the lowest in Southern Europe, which is in line with previous literature (Lester, 2012). To sum up, we can conclude that suicidality was less prevalence in Southern Europe than in the rest of Europe, which can be due to economic variables, but mostly to climatic variables (Fountoulakis et al., 2016).

Limitations

There are some limitations to this meta-analysis that should be described.

- The main limitation of the paper is the different ways in which suicidality has been measured. Future studies should measure suicidality homogeneously to make studies more comparable.
- Another limitation of our study was the great variability in the methods used in the original studies. Especially important is the wide variety of instruments used to measure the suicidality. Different questions were used to evaluate suicidality. Nevertheless, our final model accounted for almost 63% of the variability found in prevalence.
- We did not include grey literature in our search, and for that reason we are aware that some studies may be missing from our meta-analysis. Nevertheless, the search was extensive, in terms of both the search and the number of databases included

- We excluded studies reported in studies other than English and Spanish. Currently, however, the most important studies in this field tend to be published in English.
- Finally, this meta-analysis focused only on the general population. If studies examining specific populations (e.g., homeless persons and institutionalised or incarcerated people) had been included we might have found higher prevalence figures, but prevalence statistics for specific populations should be considered separately, as not to overestimate the prevalence in the general population.

CONCLUSIONS AND PRACTICAL IMPLICATIONS

The limitations noted above notwithstanding, these data indicate that at some point in their lives approximately 20.27% of Europeans will wish to be dead, 9.08% will think about suicide, 2.13% will plan suicide and 2.88% will attempt suicide.

It is necessary to carry out more studies on the prevalence of suicidality measured using more similar methods, so that more accurate comparisons between studies can be carried out. This type of review can help to emphasise the need to make efforts to prevent and intervene in suicidality.

Additionally, it is necessary to develop more intervention to target variables known to be associated with suicidality, which the objective of preventing them and eradicating the health and social problem of suicide throughout the world.

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CONFLICT OF INTEREST

None

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