



Definitions and incidence rates of self-harm and suicide attempts in Europe: A scoping review

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ABSTRACT

Introduction: European countries use various terminologies for self-harm and attempted suicide, which are sometimes used interchangeably. This complicates cross-country comparisons of incidence rates. This scoping review aimed to examine the definitions used and the possibilities to identify and compare incidence rates of self-harm and attempted suicide in Europe.

Methods: A literature search was conducted in Embase, Medline and PsycINFO for studies published from 1990 to 2021, followed by grey literature searches. Data were collected for total populations originating from health care institutions or registries. Results were presented in tabular form supplemented by a qualitative summary by area. **Results:** A total of 3160 articles were screened, resulting in 43 studies included from databases and further 29 studies from other sources. Most studies used the term 'suicide attempt' rather than 'self-harm' and reported person-based rates with annual incidence rates from age 15+. None of the rates were considered comparable due to different reporting traditions related to classification codes and statistical approaches.

Conclusion: The present extensive literature on self-harm and attempted suicide cannot be used to compare findings between countries because of the high degree of heterogeneity among studies. International agreement on definitions and registration practices is needed to improve knowledge and understanding of suicidal behaviour.

1. Introduction

Self-harm and suicide attempts are serious and harmful behaviours that occur all over the world (Lim et al., 2019). They are most prevalent in age groups 15–34 years (Schmidtke et al., 1996) and can be a precursor of suicide (Björkenstam et al., 2021). However, it is difficult to compare estimated incidence rates of suicide attempts across European countries because of the wide divergence in terminologies and definitions.

Definitions, classifications, and nomenclature of suicidal behaviour have been discussed in the literature in search of a common international terminology (Butler and Malone, 2013; Goodfellow et al., 2018, 2019, 2020). This has proved to be difficult, and initiatives to identify and define coherent terms are ongoing. The World Health Organization

(WHO) defines suicide attempt as 'an act with a non-fatal outcome, in which an individual deliberately initiates a non-habitual behaviour that without intervention from others will cause self-harm, or deliberately ingests a substance in excess of the prescribed or generally recognized therapeutic dosage, and which is aimed at realizing changes which the subject desired via the actual or expected physical consequences' (Bille-Brahe, 1998, p. 3; World Health Organization, 1986a). However, a survey among experts in the field from 63 countries found that a suicide attempt is most often perceived as an act with the intention to die, which reflects an incongruity between the official WHO definition and perception of professionals working in suicide prevention (De Leo et al., 2021).

Other terminologies have been considered over time. A large WHO/EURO multicentre study used the term 'parasuicide' instead of 'suicide attempt' when the intention to die was low. However, difficulties with

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assessing the intention to die led to elimination of the term in favour of 'suicide attempt' in subsequent WHO studies (Schmidtke et al., 2004). To circumvent the question of intention, some countries use the broader term 'self-harm' instead of 'suicide attempt'. Self-harm is often used in combination with other words such as 'deliberate' or 'intentional' but also 'non-suicidal' self-harm (NSSH), which then excludes intentional suicide attempts from its definition. Another commonly used term is 'non-suicidal self-injury' (NSSI), which refers only to visible self-injuries of the body and excludes self-poisoning (Brunner et al., 2021; Mellesdal, 2018). Other terms like 'self-mutilation' or 'aborted suicide' have also been used inconsistently as synonyms, underlining the need for a general agreement (Mellesdal, 2018). In this paper, the terms 'self-harm' and 'suicide attempt' are primarily used as they are most commonly used at authorized locations such as hospitals and emergency rooms.

Data on self-harm and suicide attempts can be obtained through both surveys and medical records, but these result in different and incomparable findings. Surveys with self-registered data can reach many people in the population but have the disadvantages of low reliability and recall bias. Medical records are much more precise and reliable, but they only count those in need of hospital care (Qin and Mehlum, 2020; World Health Organization, 2014). Another challenge is that registration codes used in hospitals seem complex and have changed over time. Several classification systems were developed to improve data comparability across countries and are used in different areas of the health care sector, such as the International Classification of Diseases (ICD) for psychiatric hospitals, the International Classification of Primary Health Care (ICPC), and the International Classification of External Causes of Injury (ICECI)/NOMESCO Classification of External Causes of Injury (NCECI) used for emergency departments (World Health Organization, 2022). To get the full picture of suicidal behaviour, all these classifications would ideally need to be included when measuring the total incidence.

Calculation of the incidence of attempted suicides adds further complexity as statistical data usually vary between numbers admitted to hospital, annual number of patients, or incidence only of first-ever attempts, making rates difficult to compare (De Leo et al., 2006). Based on data from the WHO multicentre study, the average person-based rate per 100,000 for attempted suicide was 136 in males and 186 for females in Europe between 1989 and 1992 (Schmidtke et al., 1996). This estimate is obsolete and requires updating.

1.1. Rationale for the study

Despite great efforts from the WHO multicentre study to ensure monitoring of suicide attempts in 19 countries since the early 1990s, it remains unclear how registration practices differ across European countries today (Schmidtke et al., 2004). In 2014 the WHO recommended a surveillance system for suicide and suicide attempts to enable more effective suicide prevention initiatives (World Health Organization, 2014).

The aim of this scoping review was to illustrate the various definitions and codes used in healthcare-treated cases of self-harm and attempted suicide, and the incidence rates of these events. It is hoped that the review will improve the understanding of the registration practices in European countries and inspire more comparable data collection and publication methods for incidence rates.

1.2. Primary objective

To examine the definitions used for self-harm and attempted suicide in European countries since 1990.

1.3. Secondary objective

To examine whether it would be possible to identify and compare the incidence rates of self-harm and suicide attempts based on the currently

used definitions and registration practices.

2. Methods

2.1. Protocol and registration

This scoping review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines (Tricco et al., 2018). A scoping review protocol was published beforehand and is available on Open Science Framework (Jakobsen et al., 2022).

2.2. Eligibility criteria

The conceptual model was based on the study objective regarding incidence rates and was characterized as the mnemonic CoCoPop, i.e. where CONdition, CONtext, and POPulation guided the inclusion and exclusion criteria (Munn et al., 2015).

Condition: Self-harm or suicide attempt should be recorded in either the main or sub-diagnosis with codes such as ICD-10: X60–X84, or the reason for contact should be listed as being self-harm or suicide attempt. Studies on completed suicides were excluded (in contrast to those on attempted suicides with survival).

Context: Data from European countries published after 1990 as no review has been published on hospital-treated suicide attempt rates in Europe since the WHO/EURO multicentre study on parasuicide in hospitals conducted from 1989 to 1999. In the present study, Europe refers only to the countries located on the European continent. Languages other than Danish or English were included if it appeared reasonable to translate and extract data. As a minor deviation from the protocol, studies that included several countries or overlapping data were excluded but made available in Appendix 1. This was done to ensure proper reporting without double-counting of rates.

Population: We included only self-harm or suicide attempts that were registered at authorized locations such as hospitals, emergency rooms, and outpatient clinics for acute contacts (clinical data). Studies that examined drug therapies (randomized controlled trials) or associations with specific diseases or groups (e.g., cancer patients, military personnel, or ethnicity) were excluded, as were cross-sectional surveys with self-reported or life-time prevalence estimates. We included all age groups given that the phenomenon occurs at all ages, although very few attempts seem to occur below the age of 10 years. Studies that report only certain age groups (e.g., children/adolescents or specific age bands) were excluded but made available in Appendix 1.

2.3. Information sources

We conducted the literature search across three electronic databases: Embase (Ovid), Medline (Ovid), and PsycInfo (Ovid). The literature search covered publication dates from January 1990 to current time (November 3, 2021). In cases of uncertainty about the material or data, authors of the studies were contacted. We searched the reference lists of included studies to identify additional studies or more recent data. Many incidence rates were also available through websites of national authorities, so we developed an additional search strategy for use in Google.

2.4. Search

A search string was formulated with help from a research librarian and an information specialist. Searches included a combination of terms related to the following words: Self-harm*, self-injur*, suicid* adj3 attempt*, parasuicid*, suicid* behavi*, rate, incidence, trend*, epidemiolog*. The full search strategy for the Ovid interface and Google search is available in Appendix 2, and further description of the strategy used is included in the published protocol (Jakobsen et al., 2022).

2.5. Selection process

Two reviewers (SGJ and TN) independently screened titles and abstracts to determine the eligibility of studies. Discrepancies were discussed by the review team when selecting articles for the analysis, until consensus was met. Articles excluded due to unclear data are listed in [Appendix 1](#). As an example, this could be when the population size and crude numbers of a condition were provided, but no rates were calculated. Only one reviewer (SGJ) screened for grey literature.

2.6. Data charting process

A tabular pilot form was created in Word and independently tested by two reviewers to ensure that the correct data were extracted from the literature. First, both reviewers extracted data from six selected studies and checked for any discrepancies that could be resolved. Due to time constraints, the first reviewer then extracted all the data, while the second reviewer checked a random sample of the extracted data ($N = 15$). Since the agreement was high, we considered this procedure satisfactory. A third author was ready to help resolve any continued discrepancies but was not needed at any point. When necessary, study authors were contacted to confirm uncertainties in data ($N = 7$). A final PRISMA flow chart diagram was created to summarize the process of identification of study records.

2.7. Data items

The following variables were extracted:

Publication data: Title, author, year of publication, origin of data.

Population: Sample size, age and sex composition.

Condition: Definition or codes used.

Context: Country of study, years of data collection.

Outcome: Incidence rate per 100,000 persons. Rates can be either person-based or event-based. A person-based rate is the number of persons with self-harm/attempted suicide events while an event-based rate is the number of self-harm/attempted suicide events that allows multiple events in the same person. Additional outcomes could be crude numbers of suicide attempts or self-harm if the size of the background population was available. As a minor change to the protocol, we only included incidence rates so as to investigate whether data comparisons would be possible.

It was also important to note whether the rates were standardized and whether mortality data were substantiated with information from death certificates. Suicide attempts sometimes have a fatal outcome after hospitalization and could therefore be censored from the incidence rate sample. This adjustment was reported if available.

2.8. Critical appraisal

Critical appraisal was planned and included in the protocol to assess the trustworthiness and relevance of published studies. During the process, it became clear that no Critical Appraisal Tool (CAT) exists regarding incidence studies ([Munn et al., 2020](#)). With inspiration from the CAT for cohort studies, one single question was instead used as a guideline for evaluating the methodological quality of included studies, but this had little impact on the final reported results. The question used was 'Were the outcomes measured in a valid and reliable way?' and is included in [Table 2](#) in [Appendix 3](#).

2.9. Synthesis of results

Data were presented in a tabular form accompanied by a qualitative summary. Studies were grouped by geographic area and time of study. The order of the mentioned studies was inspired by work from Schmidtke and colleagues: Northern Europe, Central Europe, Eastern Europe, and Southern Europe ([Schmidtke et al., 2004](#)). Data were presented in chronological order within the specific country. Mapping of age groups in a scatter plot was planned but not implemented due to the

large amount of data with incomparable values; this could have biased the conclusion.

In relation to between-study comparisons of estimates, many studies showed incidence rates over time as graphs without exact estimates while others reported many incidence rates (e.g., up to 36 different rates) by age and sex for different years, making it difficult to summarize the rates in a table. To better exploit the data provided in graphs, we used a WebPlotDigitizer ([Ankit Rohatgi, 2021](#)). Some of the reported data are uncertain, therefore, and are written in *italics* in the full table of results ([Appendix 3](#)). If several rates were available, e.g., both person-based and event-based, the person-based incidence rate was used unless more comprehensive details were available for the event-based rate (e.g., the availability of event rates by year or for both sexes compared to only one average person-based rate). The type of record (published article, book, etc.) is described in the full table in [Appendix 3](#). A smaller summary table is provided here for easier overview ([Table 1](#)).

3. Results

3.1. Brief description of included studies

As shown in [Fig. 1](#), a total of 5236 articles were found from the three electronic databases, resulting in 3160 citations after duplicates were removed. After title and abstract screening, 248 full-text articles were sought for retrieval. Only 173 of these were accessible for scrutiny, however, because many articles were in local journals that were unavailable online. Of the 173 studies, 130 were excluded as they did not fit the eligibility criteria.

The 72 included studies reported on data from 26 European countries. Most study records ($n = 40$) were from Central Europe, which was represented by 11 countries. More than half of the studies ($n = 38$) included data prior to 2005 while only ten studies included data from after 2015.

3.2. Synthesis of results

3.2.1. Definitions used and data reporting in the various studies

Most studies used the term 'suicide attempt' ($n = 41$), but 'self-harm' was used in 24 studies, mainly in the English-speaking countries Ireland and England (19/24). Studies in Norway, Denmark, Belgium, Switzerland, and Poland also used that term in more recent times, while an Icelandic study used both self-harm and suicide attempt. Only five studies used the term 'parasuicide', all conducted in the 1990s. Finally, one study used the term 'non-fatal suicide acts' ([Table 1](#)).

Most studies reported on data from hospitals ($n = 61$, including 21 studies with registry data originating from hospitals), whereas eight studies were based on data from general practice, most commonly in Central Europe. A few studies also used statistics from the police ($n = 2$) or insurance data ($n = 1$) ([Table 1](#)).

Not all studies mentioned how the condition was registered, i.e., which codes were used, but 23 clearly mentioned International Classification of Diseases (ICD) codes, while Scandinavian countries also included codes from The Nordic Medico-Statistical Committee (NOMESCO) in emergency departments, mostly referred to as NCECI (NOMESCO Classification of External Causes of Injury). One Dutch study mentioned a General Practitioner code as P77 from the International Classification of Primary Care (ICPC), one English study included Hospital Episode Statistics (HES) code 30, and another study from all of UK included 'Read codes' ([Table 1](#)).

Fifty of the studies used a person-based incidence rate, and 15 of these also mentioned event-based rates. Only 17 studies used event-based rates alone ([Table 1](#)).

The population included for the calculation were most often aged 15 years or over ($n = 45$). The other studies included data from various other age groups being above 0, 10, 12 or 18 years ($n = 20$) or failed to provide this information ([Table 1](#)).

Table 1

Incidence rates (IRs) by country, year of study, and lowest age group: results from 72 articles included in a systematic review of self-harm and suicide attempts in European countries.

Country of study -Source of data	Year of study data	Age group	IR total Avg/start-end	IR ♂	IR ♀	Person-based or event-based	Definition and codes
<i>Northern Europe</i>							
Finland							
-Hospital	1989–1997	15+	278–266	330–280	237–255	Person	Suicide attempt, ICD-9
-Registry	1996–2003	12+	44			Person	Serious suicide attempt, ICD-10
Norway							
-Hospital	1984–1995	15+	121	90	149	Person	Parasuicide
-Registry	1992	15+		178	176	Person*	Parasuicide, NCECI
-Hospital + GP	1989–1999	15+		147–77	210–134	Person	Non-fatal suicide acts, ICD-10
-Registry	2008–2013	10+	121	109	133	Person	Deliberate self-harm, ICD-10 + NCECI
Sweden							
-Hospital	1989–1995	15+	103	78	129	Person	Parasuicide, ICD-9
-Hospital	1989–1998	18+		169–60	299–120	Person	Suicide attempt, ICD-9
-Hospital	1991–1994	15+	185	130	237	Event	Suicide attempt, ICD-9
-Registry	1987–2020	15+	124–87	111–71	137–105	Person	Suicide attempt, ICD-9 & 10
Denmark							
-Hospital	1989–1998	15+	211–146			Person*	Suicide attempt
-Hospital	2002	15+	325	238	408	Event	Suicide attempt, ICD + NCECI
-Registry	1994–2011	10+		87	131	Event	Deliberate self-harm, ICD10 +NCECI*
-Registry	1990–2018	15+	235–85	224–63	245–107	Event	Suicide attempt, ICD-10 + NCECI
Iceland							
-Hospital	2003–2012	0+	320–307			Event	Suicide att/self-harm, ICD-10 + NCECI
Greenland							
-Police	2011–2019	15+	104–202			Event	Suicide attempt
<i>Central Europe</i>							
Ireland							
-Hospital	1995–1997	15+		163	190	Person	Suicide attempt, ICD-10
-Registry	2002–2004	15+	204	172	237	Person	Deliberate self-harm
-Registry	2003–2009	10+	198	173	224	Person	Deliberate self-harm, ICD-10
-Registry	2009–2011	15+	286	273	300	Person	Deliberate self-harm
-Registry	2007–2012	15+	431	407	456	Person	Deliberate self-harm
-Registry	2012–2017	10+	325	327	324	Person	Self-harm, ICD-10
-Hospital	2002–2019	10+	202–206	167–187	202–226	Person	Self-harm, ICD-10
North Ireland							
-Registry	2012–2019	10+	334–351	336–342	334–362	Person	Self-harm, ICD-10
England & Wales							
-Hospital	1989–1999	15+	338	293	383	Person*	Suicide attempt
England							
-Hospital	1992–1993	10+	174			Person	Parasuicide, ICD-9
-Hospital	1990–1997	15+		247–372	272–459	Person*	Deliberate self-harm
-Hospital	1981–2000	15+	204s	167	241	Event*	Deliberate self-harm
-Registry	1990–2000	15+	332–341	280–260	384–422	Person	Deliberate self-harm
-Registry	1995–2000	0+	140–143			Event*	Deliberate self-harm, ICD-10
-Registry	2000–2001	15+		285	342	Person	Self-harm
-Registry*	2001–2005	15+		267	382	Person	Self-harm, ICD-10
-Registry*	2000–2007	15+	442–382	339–257	435–409	Person*	Non-fatal self-harm
-Registry	1996–2010	15+	391–334	362	441	Person*	Self-harm
-Registry	2000–2012	15+				Person	Self-harm
-Registry*	2003–2012	0+	501			Event	Self-harm, ICD-10 + HES
-Registry*	2013	10+	598			Person	Self-harm
UK							
-GP	2001–2013	15+		123	179	Person*	Self-harm, read codes
Belgium							
-Hospital	1987–1998	15+		397–219	444–308	Person	Suicide attempt
-GP	1990–1991	10+	130	97	162	Event	Suicide attempt
-GP	1993–2008	N/A	N/A-74	67–52	131–95	Event	Suicide attempt
-Hospital	1987–2013	15+	423–233	398–331	445–295	Person	Self-harm
-Insurance	2011–2013	N/A	48			Person	Suicide attempt
-Hospital	2002–2019	N/A	172–145	133–123	214–169	Person	Suicide attempt
Austria							
-Hospital	1989–1998	15+		87–148	108–149	Person*	Suicide attempt
France							
-Hospital*	1989–1998	15+		129–258	248–488	Person	Suicide attempt
-GP	1999–2001	N/A	105			Event	Suicide attempt
-GP	2000–2020	N/A	127–63			Event	Suicide attempt
Netherlands							
-Hospital + GP	1989–1992	15+	111–107	85	139	Person*	Suicide attempt
-GP	1983–2003	N/A	41	18–9	36–19	N/A	Suicide (attempt)
-GP	1989–2013	15+		48–35	81–40	Person	Suicide (attempt), ICPC
-GP	1990–2018	10+	50–40			Event	Suicide (attempt)

(continued on next page)

Table 1 (continued)

Country of study -Source of data	Year of study data	Age group	IR total Avg/start-end	IR ♂	IR ♀	Person-based or event-based	Definition and codes
Germany							
-Hospital + GP	1989–1999	15+		72–90	100–116	Person	Suicide attempt, ICD-9
Poland							
-Registry	2016	N/A	54	78	31	Person*	Intentional self-harm, ICD-10
Switzerland							
-Hospital	2003–2006	15+	130	95	161	Person*	Suicide attempt
-Hospital	2016–2017	18+	171	158	185	Person*	Self-harm
<i>Eastern Europe</i>							
Estonia							
-Hospital	1996–1999	15+	151	173	133	Person*	Suicide attempt, ICD-9
Latvia							
-Hospital	1999	15+	149	156	144	Event	Suicide attempt
Slovenia							
-Hospital	1995–1998	15+		83	84	Event	Suicide attempt
Yugoslavia							
-Hospital	1995–1999	0+	43–58			Event	Suicide attempt
Serbia							
-Hospital	1990–2010	15+	20			Person	Suicide attempt
Montenegro							
-Hospital	2012–2016	18+	64–84	59–79	99–77	N/A	Suicide attempt
Hungary							
-Hospital	1989–2000	15+		90	222	Event	Suicide attempt
<i>Southern Europe</i>							
Spain							
-Hospital	1989–1999	15+		58–67	95–83	Person	Suicide attempt
-Hospital	1992–1996	15+	62/104	42/85	81/122	N/A	Parasuicide
-Hospital	2008–2009	15+	99	72	126	Person	Suicide attempt
Italy							
-Hospital + GP	1989–1999	15+	87–56	65–45	107–65	Event	Suicide attempt
-Hospital	2002–2006	15+	94	84	102	Person	Suicide attempt
-Police	1983–2007	10+		6	6	N/A	Severe suicide attempt
-Hospital	2006–2010	18+	36	43	28	Event	Suicide attempt
Greece							
-Hospital	2000	15+	56	86	26	Person	Suicide attempt
-Hospital	2000–2012	15+	53	32	73	Person	Suicide attempt

IR: Incidence Rate, ICD: International Classification of Disease, ICPC: International Classification of Primary Care, GP: General Practice, HES: Hospital Episode Statistics, NCECI: NOMESCO Classification of External Causes of Injury, *:Further information on rates in [Appendix 3](#).

The statistical approaches differed between studies. For the specific methods of rate calculation, 21 studies used Poisson regression to include 95% confidence intervals, while 19 studies calculated age-standardized rates, and six studies used a 3-year moving average. Another seven studies used extrapolation or an estimation factor for their calculations ([Appendix 3](#)).

Nearly one-third of the studies mentioned some way of cleaning their data (23 of 72), i.e., updating or validating the data such as when there was a subsequent fatal outcome or if the cases were non-residents, but this could also include the removal of duplicates in registrations or the exclusion of accidents and cases involving alcohol ([Appendix 3](#)).

3.2.2. An overview of incidence rates and an attempt at between-country comparisons

As shown above, definitions and other parameters varied greatly between studies, so it was not possible to perform a meta-analysis or even present some easily understandable summary of results. For this reason, we have provided a narrative analysis by geographical region, aided by specific information in [Table 1](#).

3.2.2.1. Northern Europe.

Six countries were represented in northern Europe: Finland, Norway, Sweden, Denmark, Iceland, and Greenland. Of the 16 records included from these countries, 10 of them clearly referred to WHO's definition of suicide attempt.

The highest total incidence rate per 100,000 persons (IR) by event was in Denmark in 2002 (325 suicide attempts per 100,000 persons) ([Hvid and Wang, 2005](#)). This study was considered less valid, however, as data were only collected from one hospital for three months. The lowest event rate was also in Denmark in 2018 (IR 85) and was based on registry data ([Center for Suicide Research, 2022](#)).

Finland had the highest person-based IR for parasuicide at 278 in 1989 ([Ostamo and Lonnqvist, 2001](#)) while another Finnish study found 44 serious suicide attempts per 100,000 people between 1996 and 2003 ([Haukka et al., 2008](#)). In Sweden, the lowest person-based rate was registered in 2020 (IR 87), a decline from 124 in 1987 ([Hadlaczkzy, 2022](#)). While the rate declined over time in most of the countries, it rose in Greenland from 104 in 2011 to 202 in 2019 ([Jakobsen, 2021](#)).

Two studies, one Norwegian and one Danish, looked at deliberate self-harm from ICD-10 codes and other codes (NCECI), which the Danish study termed 'probable self-harm' and the Norwegian study termed 'likely deliberate self-harm'. The extra codes changed the average Danish IR from ♂87 ♀131 to ♂180 ♀251 in the period 1994–2011 ([Reuter Morthorst et al., 2016](#)). Both the Danish and Norwegian studies included people aged 10 years and over, resulting in lower estimates than the studies including 15 years and over. The two studies used codes differently, and person versus event, so they were not directly comparable, but the rate in Norway was on average ♂109 ♀133 for the period 2008–2013 ([Qin and Mehlum, 2020](#)).

3.2.2.2. Central Europe.

Data in Central Europe came from 11 countries: Ireland, England, Wales, Scotland, Northern Ireland, Belgium, Austria, France, Netherlands, Germany, and Switzerland. This gave a sum of 40 study records.

The highest total event rate on self-harm was in England in 2003–2012 with an average of 501 per 100,000 by all age groups above 0 years ([Clements et al., 2016](#)). This study used ICD-10 and specific HES (Hospital Episode Statistics) coding, which might have increased the rate compared to the other studies in the area. Another English study used data from the period 1995–2000 and also used HES data but only looked at ICD-10; in this case, the rate was only 143 in the year 2000

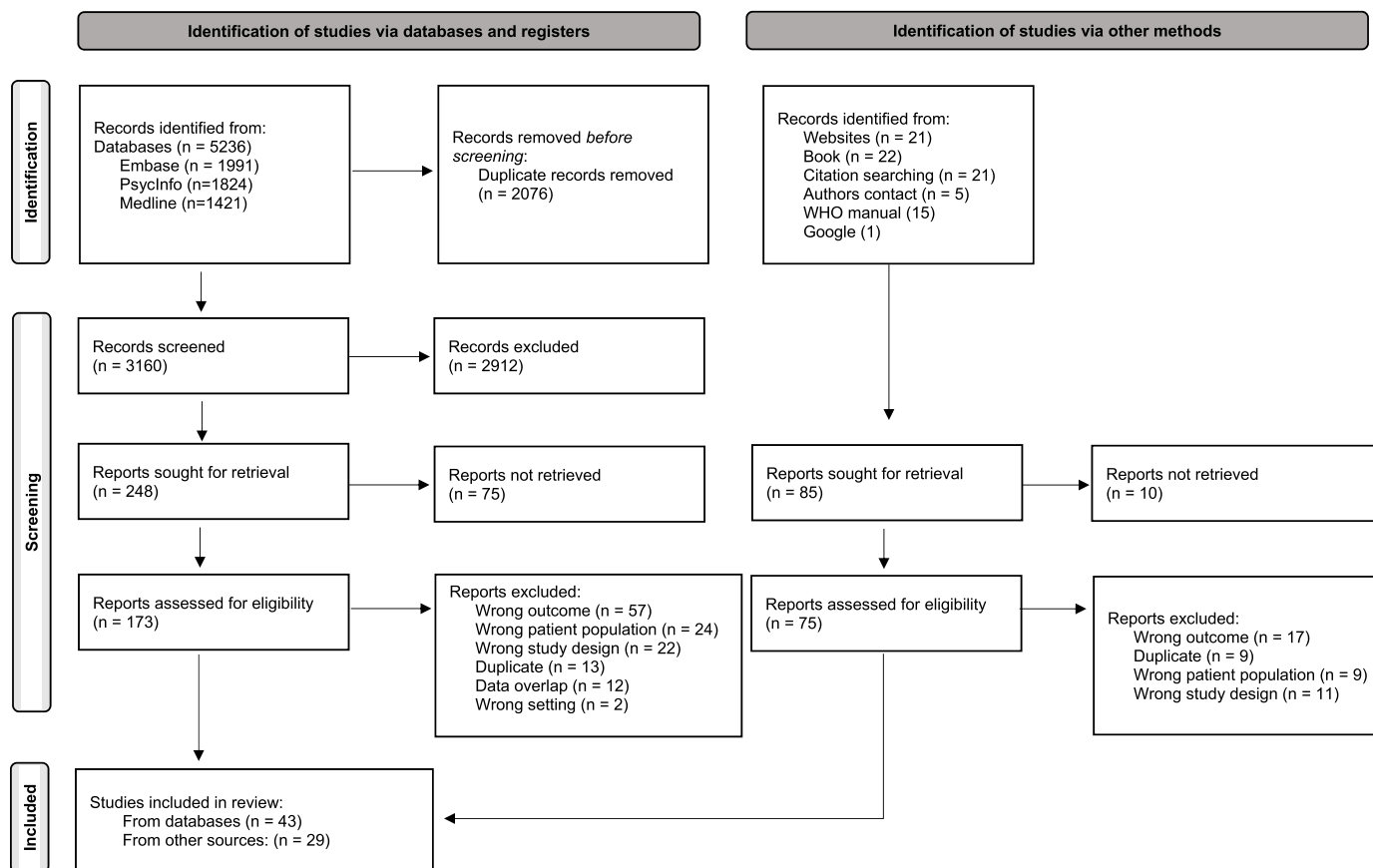


Fig. 1. Flow-chart of 72 included studies included in a systematic review on self-harm and suicide attempts.

(Wilkinson et al., 2002).

The highest person-based rate was also in England, at 598 in 2013 (Tsiachristas et al., 2020). The rates of self-harm have been rising in England, shown by 174 in the period 1992–1993 increasing to 382 in 2007 (Bergen et al., 2010). The registry rate in Ireland ranged from 198 to 431 between 2002 and 2019, with IR 206 in 2019 (Joyce et al., 2020). The most recent rate in Northern Ireland was 351 in 2019/2020 (Public Health Agency, 2022).

Poland had the lowest person-based self-harm rate of 54 in 2016 (Statistics Poland, 2021). The rate in Switzerland was 171 in 2016–2017 (18+ years) (Ostertag et al., 2019) and that in Belgium was 233 in 2013 (Vancayseele et al., 2016). The rate of suicide attempts in Belgium was 145 in 2019 and covered a much larger area than the earlier study on self-harm (Vancayseele et al., 2020).

Some studies in Belgium, France, Netherlands, and UK included data from general practice only. In Belgium, the event rate of suicide attempts was 130 in 1990–1991 (Van Casteren et al., 1993) and 74 in 2008 (Boffin et al., 2011). In France, it was 105 in the period 1999–2001 (Le Pont et al., 2004) and 63 in 2020 (Réseau Sentinelles, 2022). The rate was more stable in the Netherlands, on average 41 in the period 1983–2003 (Marquet et al., 2005) and registered at 40 in 2018 (Donker, 2019)—although there were uncertainties of whether suicide and suicide attempts were separated out in the Dutch general practice data. In the UK, the person-based general practice self-harm rate (specifically self-poisoning and self-injuries) was ♂123 ♀179 in the period 2001–2013 (Carr et al., 2016).

3.2.2.3. Eastern Europe. Seven countries were represented in Eastern Europe: Estonia, Latvia, Slovenia, Yugoslavia (now Serbia & Montenegro), and Hungary. Each country was represented by one study.

All the countries looked at suicide attempts, and most of the studies

included data from the 1990s. The most recent study was in Montenegro, where the suicide attempt rate among persons aged 18 years and over had risen from 64 to 84 between 2012 and 2016 (Stevovic and Vodopic, 2017). Estonia had a registered person-based IR of 151 from 1996 to 1999 (Värmik et al., 2004) while Serbia in 1990–2010 had 20 cases per 100,000. The IR in Latvia was 149 in 1999 (Rancic et al., 2012).

3.2.2.4. Southern Europe. Three countries were represented in Southern Europe: Spain, Italy, and Greece. A total of nine study records were included.

All the countries used the phrase ‘suicide attempt’ (or parasuicide), and one study in Italy used ‘severe suicide attempts’ registered by the police. This Italian rate was very low with only 6 per 100,000 for males and females (10+) (Preti, 2012), which might reflect underreporting compared to data from hospitals. In general, the rates were low in the southern countries. Another Italian study had an event IR of 36 for the period 2006–2010 (person aged 18 years and over) (Poma et al., 2013). In Greece, the person IR was 53 for the period 2000–2012 (Fountoulakis et al., 2015) while in Spain, the rate was 99 for the period 2008–2009 (15+) (Jimenez-Trevino et al., 2012).

3.2.2.5. All countries since 2015. While the sections above present data on a geographical basis, a more chronological summary of the most recently published incidence rates for self-harm and suicide attempts is presented here, as only ten studies included data after 2015.

In 2020, the person-based IR in Sweden was 87, while France had an event-based rate of 63 (age N/A).

In 2019, the person-based IR was 351 (age 10+) in Northern Ireland, 206 in Ireland (10+), and 145 in Belgium (age N/A). In Greenland the event-based IR was 202 with data originating from the police.

In 2018, Denmark had an event-based IR of 85 while the Netherlands had an IR of 40 from general practice (age 10+).

In 2017, Switzerland had a person-based rate of 171 (age 18+).

In 2016, the person-based IR in Poland was 54, and the IR in Montenegro was 84 but with no clear indication on person or event-based estimates.

4. Discussion

4.1. Summary of evidence

This is the first systematic scoping review that has examined registration practices and incidence rates for self-harm and attempted suicide in Europe based on data published since 1990. Our results clearly illustrate the variations in the definitions and methods used for calculating incidence rates of self-harm and suicide attempts. As these variations make it difficult to summarize and compare data across studies, countries, and time periods, we provided a narrative overview of the results of 72 included studies. This overview also showed the difficulty of identifying patterns and understanding potential effects of interventional programmes.

Our findings are in line with those of previous studies that found wide variations between studies and countries in the definitions and methods used for reporting incidences of self-harm and suicide attempts. In 1986, a WHO working group reviewed the epidemiology of parasuicide and found inconsistent results from the four included countries (Stiles et al., 1993; World Health Organization, 1986b). These inconsistencies were confirmed in 2001 (Welch, 2001).

Although we did not formally assess the quality of the studies reviewed, several methodological aspects should be mentioned. First, incidence rates were mostly person-based or event-based, and only one study used first-ever attempts. The incidence rates based on events were considerably higher than those based on persons as people who attempt suicide several times are only counted once per time period in person-based rates. A disadvantage of event-based rates is that it can be difficult to ascertain how the data were handled. Some studies removed registrations within 0–1 days of a previous registration, while others removed registration duplicates within the same hospital admission regardless of the time interval. A disadvantage of event-based rates could be that an event occurring within a short time and during hospitalization would be difficult to retrieve information on as a re-attempt. Although the risk of missing values should be relatively low, it is a factor that should be considered, and future studies should provide both person-based and event-based rates: The person-based rate is useful for determining the proportion of people who are not thriving, while the event-based rate is more useful in relation to the pressure on the health care system.

Second, even incidence rates that have been similarly calculated should not be compared uncritically. The age of the background population used for the calculation of rates also plays a role. If all persons from age 0+ years are included, the incidence rate will be much lower than that for persons aged 15+ years only as self-harm occurs typically after 14–15 years of age. Incidence rates based on persons aged 15+ years are therefore more precise. This approach was used in two-thirds of the included studies, but a few studies only used the population up to 65 years old, which again should be considered when comparing data.

Third, variation in terminology will affect the incidence estimates. It could be assumed that self-harm and suicide attempts are very different (De Leo et al., 2021), but the definitions and codes used in the included studies suggest them to be similar. The ICD-10 code from WHO is currently 'Intentional self-harm', but while WHO has a well-known definition of a suicide attempt, there is no officially recognized definition of self-harm. In the NOMESCO classification (NCECI), intentional self-harm is defined as: '*the deliberate use of physical or other force against oneself with the intent to cause harm or injury*' (NOMESCO, 2007, p. 17). This definition was not referred to in any of the included studies,

however. As habitual non-suicidal self-harm is associated with less lethal methods and absent suicide ideation compared to intentional suicide attempt (Klonsky et al., 2014), some argue that the two terms should be differentiated so as to improve the true prevalence estimate as well as treatment options in these separate types of psychopathology (Butler and Malone, 2013). This is surely a complex challenge, as the boundaries between the behaviours can be blurred in clinical practice and individuals can suddenly switch between self-harm and suicide attempt (James and Stewart, 2018). Therefore, discussions about definitions, terminology and coding practices are still highly relevant.

Fourth, the inclusion of several different codes prevents direct comparison of rates between countries. A few studies included ICD codes for injuries with undetermined intentions (Y10–Y34) but did not explain the rationale for this. Most countries used ICD-10 codes X60–X84, so their rates are more easily compared. A new ICD-11 code set was introduced in January 2022 (World Health Organization, 2022), again changing the code set, but new extension codes were also added, for example to include more information on intention. This could be a chance for improving registration practices in the near future, which will hopefully even out some of the geographic differences in classification codes.

4.2. Strengths and limitations

This scoping review was systematic and had a clear research question as well as a thorough, transparent, and reproducible process for the search strategy, article selection, data extraction, and data analysis. Furthermore, we included sources written in different languages to ensure literature from a variety of European countries as attempted suicide rates are not always published internationally or in English. Unfortunately, many of the non-English studies were not accessible online, but as they typically had small study samples and so were more likely to yield imprecise estimates, we do not believe that their inclusion would have changed the results considerably.

MeSH and Emtree terms were not used in the systematic search as they produced too much data. Terms like 'prevalence' and 'statistics' were omitted after preliminary tests showed that they led to thousands of irrelevant records. While some relevant studies might have used the term 'prevalence' instead of 'incidence' and were thus incorrectly excluded from the review, our overall impression was that 'prevalence' was mainly used in cross-sectional surveys with self-reported estimates.

The included studies varied in their reporting about the data source and the calculated incidence rates. Some studies had insufficient or disorganized method descriptions, making the information difficult to retrieve. The column of calculations (e.g. person vs. event, statistical analysis) in Appendix 3 is probably the most likely to be affected.

Due to resource constraints, only one reviewer extracted data from the records, while the second reviewer checked a random sample of the final outcome table. No changes were made in a sample of 15 studies that were double-checked by both reviewers, so we assume that study results were reliably extracted.

5. Conclusions

The results of this systematic scoping review are in line with previous studies indicating heterogeneity in definitions and reporting of self-harm and attempted suicide across studies and countries. These inconsistencies make it impossible to generate comparable data between countries and over time for research and public health purposes. A consensus process is urgently needed to obtain agreement on definitions and methods for data reporting in various sectors and between countries.

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Declaration of competing interest

The institutions and funders had no roles in the development of the review. The authors declare no competing interests.

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Appendix A. Supplementary data

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