Review article

Cyberaggression and cybervictimisation in adolescents: Bibliometric analysis in web of science

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ABSTRACT

Worldwide new trends of online cyberbullying are emerging that impact on health and are a factor in adolescent suicide. The objective of this study is to know the development of scientific production and to compare the current trends that encompass the concepts of cyberaggression in young people (CAY) and cybervictimisation in young people (CVY). The methodology used in this study was descriptive with a bibliometric analysis on CAY with 481 documents and CVY with 1087 documents, in addition to a co-word analysis of both terms from the years 2017–2021. These data were extracted from the Web of Science database and network maps were made using VOSviewer software. The results show that the terms CAY and CVY were born in 2006 and have had a different evolutionary progression in the scientific literature until 2021, in addition, the area of psychology stands out with more research on other areas, developed countries are the ones that carry out more studies of CAY and CVY and that the term "suicide" is the most prominent term since 2018 from the CVY. Finally, a discussion and conclusion of the results was made, which can serve as a turning point for future lines of research.

1. Introduction

Traditional (offline) and cyber (online) bullying victimisation, is one of the most prominent social concerns of adolescents and translates into serious negative health consequences worldwide [1]. Moreover, technologies and social networks are booming and have brought about important changes, both in the way we interact with our environment and in people's behaviour [2], they are also an indispensable element for humans, including adolescents. UNICEF [3] highlights that more than a third of young people in 30 countries have been victims of online bullying, and 1 in 5 have missed school due to cyberbullying. The NGO Save the Children [4] considers cyberbullying, even in perpetrators, to be one of the most important risk factors for suicidal behaviour and multiplies the probability of suicide among minors by 2.55 times. The psychologist Urra [5], goes one step further and states that cyberbullying, intimidation or abuse through technology have entered our homes, in our most intimate areas, and are the biggest cause of suicide among adolescents.

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1.1. Studies on cyberbullying among young people

Although research in the scientific literature on cyberbullying began less than two decades ago and has grown exponentially over the last few years worldwide [6], both in developed and Western countries, especially among school-aged youth [7,8]. There is not much research on the types of cyberbullying among adolescents, either as victim or aggressor, with low educational attainment in low and medium income countries and with disadvantaged socio-cultural backgrounds in developing countries [9].

Digital life in young people poses new dilemmas [10] and cyberbullying is a concern in the adolescent phase and is linked to negative health outcomes [11] such as depression, inattention, internet use for social communications or relationships [12]. Adolescents are at an age where they bully others and may also witness cyberbullying, because they find it fun and it makes them popular and powerful [13], with the component of anonymity or even, ignorance can have damaging effects on cybervictims [14].

There is currently no universal concept of cyberbullying that has been widely researched and discussed, creating a problem in grouping the literature on the subject, commonly associated with the term cyberaggression, due to its aggressive component [12]. Its concept encompasses intentional and repeated aggression, carried out by an individual or a group of people using negative, harmful or abusive language or harassment, using technological devices and media, against a target who cannot easily defend themselves [14]. In addition, it can have an impact on adolescents' mental health, self-esteem, emotions and academic performance [15]. Scientists and professionals should be aware of this phenomenon, because traditional aggression and cyberaggressions are serious and global problems [16], and it is an event that presents multiple that have spread around the world with negative implications for victims [17] of bullying or cyberbullying, especially among the youngest, including cyberviewers, who are the witnesses of cyberaggressors [12].

1.2. Cybercrime trends among young people

After the Covid-19 pandemic, cases of cyberaggressions have increased [18,19] and are leading to the emergence of new crimes involving electronic devices [20]. The use of technological tools and media such as computers, laptops, video games, mobile phones or tablets [21], have become a common practice in today's society. Most young people have devices with an internet connection to interact, which leads to a widespread and prolonged use of technology [22], showing profiles with personal data, hobbies, tastes … These actions, sometimes irresponsible, entail risks [23] and are the object of ridicule due to appearances, theft of information and passwords and inappropriate publications [14]. Cyberaggression is linked to multiple factors such as personality traits, problematic behaviours and mental health [22], internet addiction with both psychological and physical symptoms, drug and alcohol use, depression [24,25], gender inequalities … [23]. and they themselves sometimes become cybervictims.

These situations lead to new criminal trends using technology, different from the traditional ones, which cybervictims suffer, both in their daily lives and in the educational environment [7], highlighting.

- Cyberbullying or cyberbullying is a form of bullying or harassment that is carried out through electronic means and is intended to harm the victims. Sometimes the term cyberbullying is used to refer to these terms [26].
- Doxing is the use of public social networks to reveal personal information about a person, with the aim of inviting public shaming for their speech or others [27].
- Flaming online is reacting hostilely or insultingly to posts or emails [24].
- Grooming is a process by which an adult gains access to adolescents to gain their trust and to sexually harass and/or abuse and to gain the secrecy of the adolescent or child to avoid disclosure [28].
- Happy slapping is a physical attack that is videotaped and subsequently disseminated through digital media [29].
- Phishing is the fraudulent attempt to obtain confidential information by masquerading as a trusted entity through electronic communication [30].
- Sexcasting is the production of images and videos with high erotic and pornographic content that, when misused by those who have access to them, can lead to problems such as sextortion, grooming or cyberbullying [31].
- Sexting defined as sending, forwarding or exchanging text messages with sexual content or photographs showing seminudity or nudity via mobile phone [23].
- Sextortion means extorting and threatening with the dissemination of photographs and films for sexual advantage through the use of technological means and tools [32].

All these phenomena of cyberaggression are a reality and a phenomenon of psychosocial development, caused by the mediatisation that increasingly shapes everyday practices and social relations [6]. It is important to prevent from an early age and in multiple fields where adolescents act as cyberaggressors or cyberbullies [33]. There are several roles within bullying, all of them with an important role (bully, bullied and bystander), and without which the group dynamics could not continue.

An essential field, due to the age of adolescents is the school, where educational plans should be implemented, in coordination with family studies [13,34]. To prevent these cyberbullying activities, the field of psychology also plays an important role, both in aggressors and victims, either by having disabilities, mental disorders [35], transgender violence, insults, harassment, dating revenge, emotional behaviours [36], which have long lasting physical, mental, educational and social consequences [37].

2. Justification and objectives

In recent years, few studies related to the problems and consequences generated by cyberbullying in young people have been

carried out in various fields of research [38–41]. This fact is contrasted in the WoS database, where only two manuscripts refer to bibliometric analyses of cyberbullying in young people [42,43]. The first one focused on cyberbullying in all ages [42]. The second one including only females with a qualitative systematic review [43]. Delving into other types of analysis on cyberbullying in general, we find two articles for all research areas and ages [44,45], an analysis focused on the field of psychology [46], the same for the school field [47], another document related to the economic social field [48] and, finally, a study focused on researchers in Spain [49].

The mechanisms and patterns of cyberaggression remain largely unexplored, as corroborated by the authors cited above, where no bibliometric or comparative analyses of cyberaggression (CAY) and cybervicitimisation (CVY) terms focusing on young adolescents are found in all research areas. Therefore, this study provides an overview of the evolution and trends of cyberbullying in young people from the perspective of the bullied and the bully [50]. It also allows researchers, policy makers and administrations to initiate studies and mechanisms to prevent and protect children and adolescents from this global problem. This circumstance provides guidance to the scientific community wishing to study and develop research related to cybercrime in young people.

For this reason, the main objective of this research is to learn about the development of scientific production and current trends encompassing the concepts CAY and CVY. In this way, to open up different research fields to current realities. From this, two further objectives emerge.

- Objective 1: To compare the scientific output and literary production on cyberaggression and cybervictimisation in young people (year of publication, language, type of papers, organisations, authors, sources of provenance, countries and citation).
- Objective 2: To analyse the evolution of the most influential topics and keywords of cyberaggression and cybervictimisation in young people over the last five years in the scientific literature on cyberaggression and cybervictimisation in young people.

3. Methodology

3.1. Research design

To carry out this study, research has been designed based on a descriptive and quantitative bibliometric methodology. Initially, through a method of analytical monitoring and documentary quantification that acquires a relevant role in the field of research to classify and identify the scientific production and evolution of the subject of the study, CAY and CVY. Moreover, it allows the development of search, registration and prediction actions in the scientific literature. During this study, a PRISMA protocol has been applied to collect scientific production and different inclusion criteria in the variables that show the results obtained.

In addition, VOSviewer software was used to create bibliometric networks, which is used in the scientific field to create maps based on network data. This programme has allowed keyword networks to be established from scientific papers related to CAY and CVY, analysing and extracting a co-occurrence report from all of them. Thus, it is possible to predict issues that could be considered in future lines of research.

3.2. Procedure and data analysis

This research analyses and compares the evolution of the scientific production of the terms CAY and CVY, based on the scientific literature collected in the main collection of the Web of Science (WoS) [51], which is also a reference database that includes publications from the Journal Citation Reports (JCR) [52]. It follows a methodology based on scientific mapping, that is to say, the graphical representation of science through the use of relational information [53], taking the following bibliometric values as a reference: h-index, g-index, hg-index and q2-index. The analysis of this scientific production of quality and impact has been chosen in order to know the trajectory and importance in the scientific community. The reason for using bibliometrics is to be able to statistically and sociometrically analyse the scientific literature [54].

The study has followed a strict protocol divided into several phases in order to reduce biases in the study for its analysis [55]. In April 2022, articles containing CAY and CVY were searched separately in the (WoS) from all fields of its main collection (Science Citation Index Expanded, Social Science Citation Index, Art & Humanities Citation Index, Conference Proceedings Citation Index-Sciences, Conference Proceedings Citation Index-Social Science & Humanities, Book Citation Index-Science, Book Citation Index-Social Sciences & Humanities, Emerging Sources Citation Index, Current Chemical Reactions and Index Chemist), since it is a repository with a large number of high impact scientific productions that allows exporting its publications [42,47], specifically by delimiting the subject, which includes the title, abstract, authors' keywords and keywords.

For objective 1 of the study, the terms CAY and CVY were filtered in detail in the WoS database. For this purpose, inclusion criteria were used in the search because terms with the same meaning were found. Depending on the manuscripts, terms can be found in different written forms, such as the term "cyberaggression" which was also found written as "cyber aggression" or "cyber-aggression", also with cybervictimisation. Another grouping was carried out with the term "adolescent", which was found with other synonyms (youth, teen …) and their plurals, for which the identification "or" was used between the terms to retrieve documents containing at least one of the terms, and in addition, the asterisk (*) was used to represent any group of characters. After performing the searches, the WoS download of each of them was carried out in a plain text file, both with the complete record and with the references cited.

Subsequently, the PRISMA flowchart [56] was taken into consideration to transparently document the study using inclusion and exclusion criteria (Fig. 1). In this process, the Vosviewer programme was used to find studies with no dates, no authors, duplicates or excluded for other reasons. The time period was delimited between January 1, 1998, the date of Google's birth [57], and December 31, 2021. The year 2022 was not included, as it had not ended at the time of the study. In the final filtering, a total of 481 documents were

found that included the terms CAY and 1087 documents that contained the term CVY.

For objective 2, we added as an inclusion criterion, to delimit two searches in time with both terms, one from 1998 to 2016 and another with the last 5 years, from 2017 to 2021. To generate the density maps, the following process has been established for each of the years; select co-occurrence as the type of analysis, together with a complete count and unit of analysis and all keywords.

Furthermore, other inclusion criteria were also established in objective 1 to determine the performance of the scientific output. Table 1 shows the total data extracted from WoS for both CAY and CVY. The following inclusion criteria were established in relation to citations (x > 5), research areas (x > 10), document types (x > 6), categories (x > 5), publishers (x > 10), journals (x > 10), authors (x > 10), languages (x > 7) and countries (x > 10). The most relevant data are included in the results section.

VOSviewer was used to create the bibliometric network and density maps to answer objective 2, in all cases analysing the CAY and CVY fields, both in their historical evolution and in the last five years, separately and in the different years (Fig. 1). First, bibliometric keyword networks were created with a co-occurrence map, using the WoS plain text file containing the complete records and bibliographic references.

A table delimited "Thesaurus" file was used to extract the most reliable networks in VOSviewer. A Thesaurus file for CAY and CVY was used as exclusion criteria, which replaced and grouped terms that were repeated or similar and, depending on the scientific paper or country, spelled differently. As an example, to extract the term "cyberaggression", similar terms such as "cyber aggression" and "cyber-aggression" were grouped together. Two Thesaurus files were created, the first with a total of 36 terms for CAY and the second with 72 for CVY, both for the creation of the network maps with most relevant and concurrent keywords from 1998 to 2021, as well as for the density maps of most concurrent terms in the titles and abstracts of CAY and CVY in the last 5 years.

The structural and dynamic development, starting from a longitudinal axis, was created with the VOSviewer software, following the marked steps (Fig. 2).

To extract the network map for the years 1998–2021, the keywords from the CAY and CVY documents were used. However, for the extraction of the density maps of the last 5 years, we used the terms from the title and abstract fields of each year from 2017 to 2021 and for each topic of CAY and CVY. In this last action, the exclusion criterion used in the WoS search for the term CAY was that the terms "cyber-victimisation" or "cybervictimisation" did not appear. Similarly, in the WoS search for CVY, documents containing the terms "cyber-aggression" or "cyberaggression" were excluded. Both exclusions were made to delimit terms specific to each of the CAY and CVY fields.

4. Analysis and results

4.1. Performance and scientific production

The first publications begin in 2006, specifically referring only to the term CVY, a total of 1087 documents have been published throughout its evolution. However, the term CAY, with 481 documents throughout its evolution, appears for the first time in the scientific literature in 2007. Since then, the two terms have evolved differently.
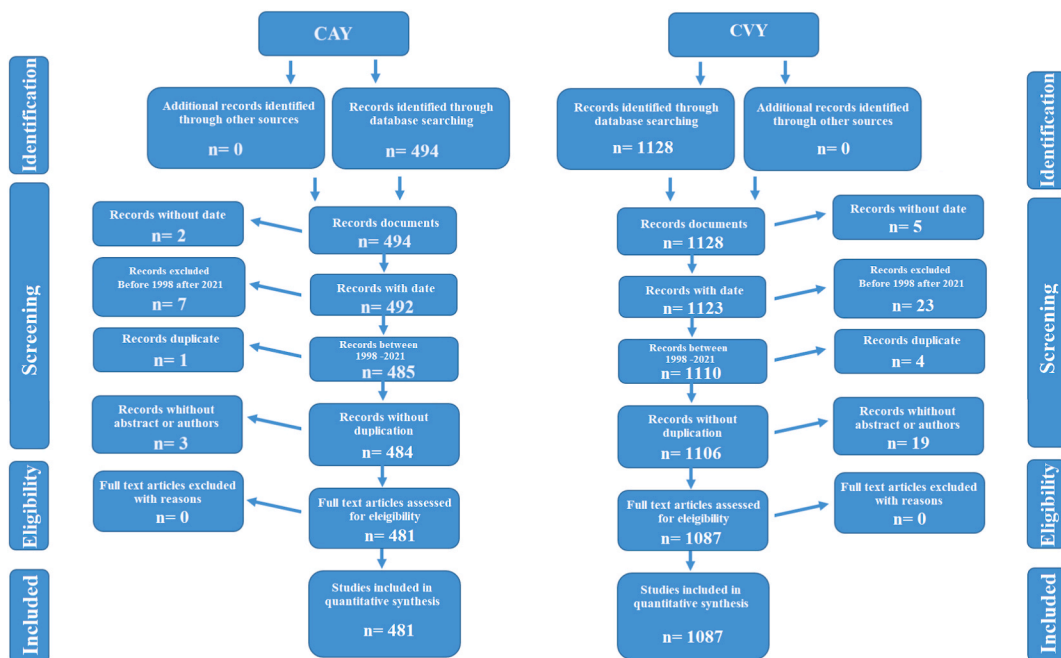

Fig. 1. PRISMA flowchart.

Table 1
Production indicators and inclusion criteria.

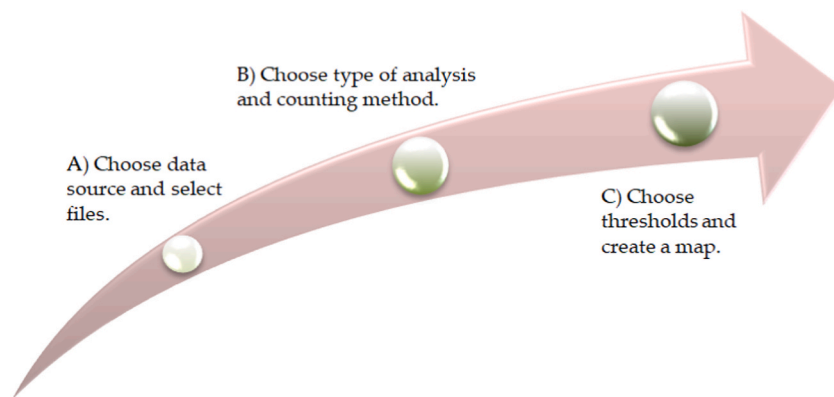| Indicators	CAY Criteria	CVY Criteria
Year of publication	1998–2021	1998–2021
Citation	The five most cited documents	The three five cited documents
Research areas	x = 35	x = 45
Document type	x = 6	x = 10
Categories	x = 55	x = 66
Editorial	x = 93	x = 149
Journals	x = 232	x = 410
Authors	x = 1122	x = 2605
Languages	x = 7	x = 10
Countries	x = 54	x = 72

Fig. 2. Network map creation steps in VOSviewer. A) Choose data source and select files: In this phase the database was selected for each of the CAY and CVY date ranges. The raw text file of the data source from WoS was chosen. B) Choose type of analysis and counting method: Subsequently, the type of co-occurrence analysis of the unit was selected using a full count and adding a Thesaurus file that allowed to unify synonyms or same terms written in different ways. C) Choose thresholds and create a map: A minimum number of 5 occurrences and, subsequently, the number of co-occurrence links shown in the network and density maps were chosen. Verification of keyword selection and the creation of the map and its download were then carried out.
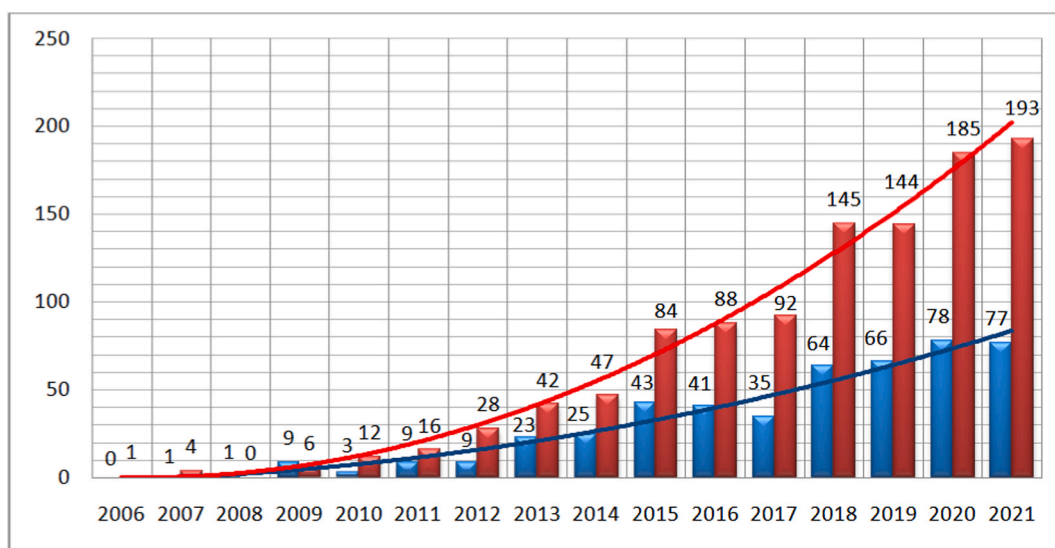

Fig. 3. Evolution of the scientific production of CAY and CVY. **Note:** Blue Lines polinomial = CAY and Red Lines polinomial = CVY.

The CAY term offers an increase in scientific productions and in the polynomial line but not always with progressive increases (Fig. 3). With a stagnation of articles between 2009 and 2013, since then there has been an increase in the number of documents, although with a slight decrease in 2016, 2017 and 2021. However, the term CVY, with the exception of the first years from 2006 to 2008 and the year 2019, observed a constant evolution each year, highlighting the year 2018 with an increase of 53 documents, in reference to the previous year, also the year 2020 of the pandemic caused by COVID-19, obtained an increase of 41 documents in reference to the year 2019 (Fig. 4).

The reference documents of the scientific community to develop CAY and CVY studies are "Cyberbullying: its nature and impact in secondary school pupils" with a total of 1430 citations in CAY and "Bullying in the Digital Age: A Critical Review and Meta-Analysis of Cyberbullying Research Among Youth" with a total of 1044 citations in CVY. We highlight that some articles include both terms and are repeated (Table 2).

The most prominent author on both topics, out of a total of 1122 entries in CAY and 2605 entries in CVY, is Wright (Table 3). A comparison of the 10 most influential authors shows that 5 appear in both fields.

The main research area sources are psychology in CAY with 302 documents and with 598 in CVY (Table 4). In both cases, family studies and criminology and penology are the most prominent, occupying the top 3. The area of education, as it deals with young people, appears in 4th position in CAY and in 5th position in CVY.

Table 5 shows the publishers with the largest contributions in the field of research on the topic. Elsevier with a total of 96 papers in CAY among 93 publishers and, in addition, with 253 manuscripts in CVY from a total of 149 publishers. The rest of the publishers have different numbers of papers according to the topics.

The research journal that publishes the most on both topics is "Computers in human behavior" with a total of 39 papers among the 232 research journal entries in CVY and 66 papers in CVY (Table 6).

The language mainly used in the scientific literature for both topics is English (Table 7), followed by Spanish. The remaining languages have a low scientific output.

The country with the highest production is the United States out of a total of 54 countries publishing on CAY and 72 countries publishing on CVY, these data show the importance and extent of both topics around the world (Table 8). Spain is the country with the second highest number of studies on both topics, however, from 3rd place onwards, the countries exchange positions according to the field of research.

Table 9 shows the types of documents that most publish on the terms CAY and CVY. Research articles stand out. These results show that the review of articles focusing on CAY has been 25 articles over the last 15 years, however, there are 75 articles on CVY.

4.2. Network map and comparison of CAY and CVY terms

The VOSviewer software was used to perform the comparison of CAY keywords. A network map was extracted with 191 keywords with more than 5 occurrences from 1998 to 2015, with a total of 21 terms found (Fig. 5) and compared with 163 keywords on CVY with more than 5 occurrences from 1998 to 2021, extracting 21 terms found (Fig. 6).

Table 10 shows that the terms youth and victims are the keywords with the highest number of occurrences in both periods.

To compare the last five years, we used VOSviewer software and extracted a density map for each year (2017–2021) of CAY and CVY terms. We used the raw text file downloaded from the WoS database and selected in VOSviewer the terms from the title and

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
■CAY	1	3	-4	6	6	4	8	14	5	37	4	4	53	-1	41	8
■CVY	0	1	0	8	-6	6	0	14	1	18	-2	-6	29	2	8	-1
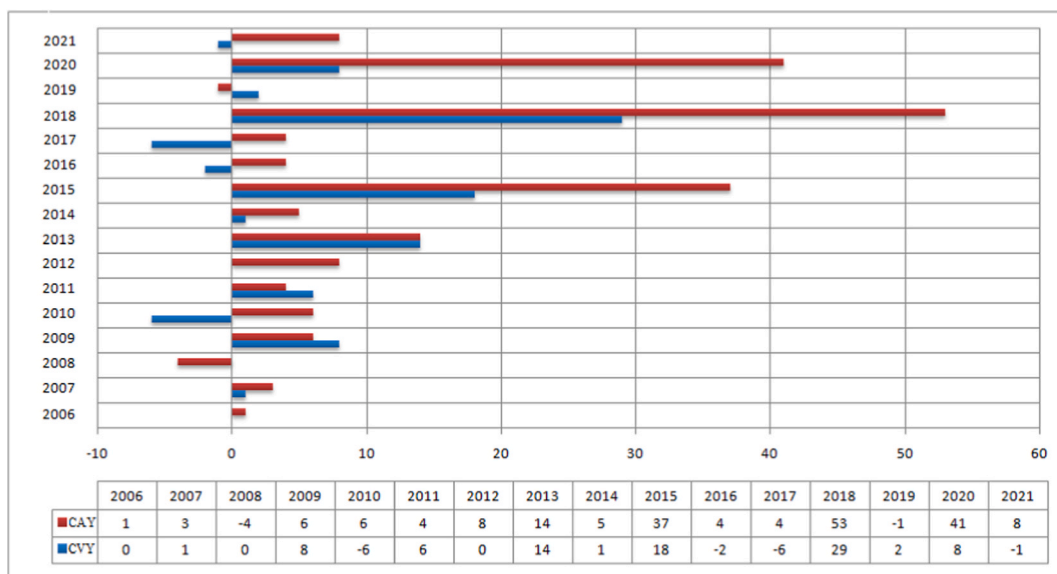
Fig. 4. Production of CAY and CVY papers by year.

Table 2
Most cited articles.

Documents (CAY)	Years	Cites
Cyberbullying: its nature and impact in secondary school pupils	2008	1430
Bullying in the Digital Age: A Critical Review and Meta-Analysis of Cyberbullying Research Among Youth	2014	1044
School Bullying Among Adolescents in the United States: Physical, Verbal, Relational, and Cyber	2009	990
Bullying prevalence across contexts: A meta-analysis measuring cyber and traditional bullying	2014	577
Psychological, Physical, and Academic Correlates of Cyberbullying and traditional bullying	2013	500
Documents (CVY)	Years	Cites
Bullying in the Digital Age: A Critical Review and Meta-Analysis of Cyberbullying Research Among Youth	2014	1044
School Bullying Among Adolescents in the United States: Physical, Verbal, Relational, and Cyber	2009	990
Bullying Prevalence Across Contexts: A Meta-analysis Measuring Cyber and Traditional Bullying	2014	577
Psychological, Physical, and Academic Correlates of Cyberbullying and traditional bullying	2013	500
School bullying: Development and some important challenges	2013	464

Table 3
Most influential authors.

Authors (CAY)	Records	Authors (CVY)	Records
Wright, M.F.	33	Wright, M.F.	37
Wach, S.	13	Ortega Ruíz, R.	21
Ortega Ruíz, R.	12	Wach, S.	18
Calvete, E	8	Yanagida, T	12
Lei, L.	8	Calvete, E	11
Vandebosch, H.	8	Delgado, B.	11
Álvarez, D.	7	Mishna, F.	11
Yanagida, T	7	Rey, L.	11
Nunez, J.C.	6	Buelga, S	10
Romera, E.M.	6	Cava, M.J.	10

Table 4
Research areas.

Areas (CAY)	Records	%	Areas (CVY)	Records	%
Psychology	302	62.78	Psychology	598	55.01
Family Studies	78	16.21	Family Studies	151	13.89
Criminolgy Penology	68	14.13	Criminolgy Penology	136	12.51
Education Educational Research	42	8.73	Public Environmental Occupational health	131	12.05
Public Environmental Occupational health	31	8.10	Education Educational Research	93	8.55
Social Work	35	7.27	Social work	93	7.63
Social Sciences other Topics	24	4.99	Psychiatry	83	5.42
Communication	23	4.78	Environmental Sciences Ecology	59	4.32
Environmental Sciences Ecology	22	4.57	Pediatrics	47	3.68
Psychiatry	21	4.36	Social Sciences other Topics	40	3.12

Table 5
Editors.

Editors (CAY)	Records	%	Editors (CVY)	Records	%
Elsevier	96	19.95	Elsevier	233	21.43
Sage	63	13.09	Springer Nature	134	12.32
Springer Nature	56	11.64	Sage	130	11.96
Wiley	41	8.52	Taylor & Francis	83	7.63
Taylor & Francis	32	6.65	Wiley	80	7.36
MDPI	24	4.99	MDPI	70	6.44
Frontiers Media SA	13	2,70	Mary Ann Liebert, Inc	30	2.76
Educ. Publishing Foundation	8	1.66	Frontiers Media Sa	28	2.57
Mary Ann Liebert, Inc.	8	1.66	Amer Psychological Assoc	13	1.19
Masarykova Univ, Fac Social studies	7	1.45	Oxford Univ Press	11	1.01

abstract fields of manuscripts containing co-occurrences (n > 10). Finally, the number of selected keywords (n > 15) was set according to the total strength of co-occurrence links with other keywords. Figs. 7–11 show the evolution and comparative network maps by CAY and CVY density for the years 2017, 2018, 2019, 2020 and 2021 respectively.

Table 11 shows the comparative evolution of terms and keywords with the highest co-occurrences extracted from the title and

Table 6
Research journals.

Journals (CAY)	Records	%	Journals (CVY)	Records	%
Computers in human behavior	39	8.10	Computers in human behavior	66	6.07
Journal of Interpersonal Violence	25	5.19	Inter. J. of Environ.l Res. Public Health	56	5.15
Inter. J. of Environ.l Res. Public Health	20	4.15	Journal of Interpersonal Violence	45	4.14
Aggressive Behavior	19	3.95	Children and young services review	39	3.58
Children and young services review	16	3.32	Cyberpsych. Behave. and social network.	29	2.66
Journal of youth and adolescence	14	2.91	Journal of youth and adolescence	28	2.57
Frontiers in psychology	11	2.28	Frontiers in psychology	21	1.93
Cyberpsych. Behave. and social network.	9	1.87	Aggressive behavior	19	1.74
Journal of adolescent health	8	1.66	Journal of adolescent health	19	1.74
Psychology of violence	7	1.45	Journal of adolescent	18	1.47

Table 7
Languages.

Languages (CAY)	Records	%	Languages (CVY)	Records	%
English	446	92.72	English	1109	93.74
Spanish	25	5.19	Spanish	45	4.14
Russian	3	0.62	Turkish	7	0.64
Croatian	3	0.62	German	6	0.55
Turkish	2	0.41	Croatian	4	0.36
French	1	0.20	French	2	0.18
Portuguese	1	0.20	Italian	2	0.18

Table 8
Countries.

Countries (CAY)	Records	%	Countries (CVY)	Records	%
USA	167	34.72	USA	363	33.39
Spain	87	18.08	Spain	180	16.55
China	42	8.73	Canada	86	7.92
Australia	33	6.86	China	79	7.26
Czech Republic	33	6.86	England	76	6.99
Canada	33	6.86	Australia	74	6.81
Turkey	21	4.36	Turkey	63	5.79
England	20	4.15	Italy	52	4.78
Germany	20	4.15	Germany	40	3.68
Italy	19	3.95	Czech Republic	38	3.49

Table 9
Types of documents.

Documents (CAY)	Records	%	Documents (CVY)	Records	%
Research articles	443	92.10	Research articles	982	90.34
Review articles	25	5.19	Review articles	75	6.90
Early access	18	3.74	Early access	41	3.77
Procedings Papers	12	2.49	Procedings Papers	20	1.84
Book Chapters	10	2.07	Book Chapters	18	1.65
Editorial Materials	1	0.20	Meeting abstracts	5	0.46

abstract fields of CAY and CVY documents by year, from 2017 to 2021.

5. Discussion

It is a fact that more and more adolescents around the world, from an early age, use electronic tools and devices connected to the internet for their daily tasks, such as doing homework, using social networks, shopping, chatting with people they know or do not know, watching videos, taking photos, sharing files and documents, and consulting information, as stated by Saleem et al. [7] and Doumas and Midgett [8]. Young people are often unaware of the risks of using the Internet and sharing personal data, either out of a state of mind or simple ignorance, as also noted by McLoughlin [10] and Yoo [11]. These circumstances are exploited by cyberaggressors, adults or other adolescents, for moral, financial, sexual or revengeful gain.

However, during the analysis process, the authors have encountered difficulties in filtering articles related to CAY and CVY due to
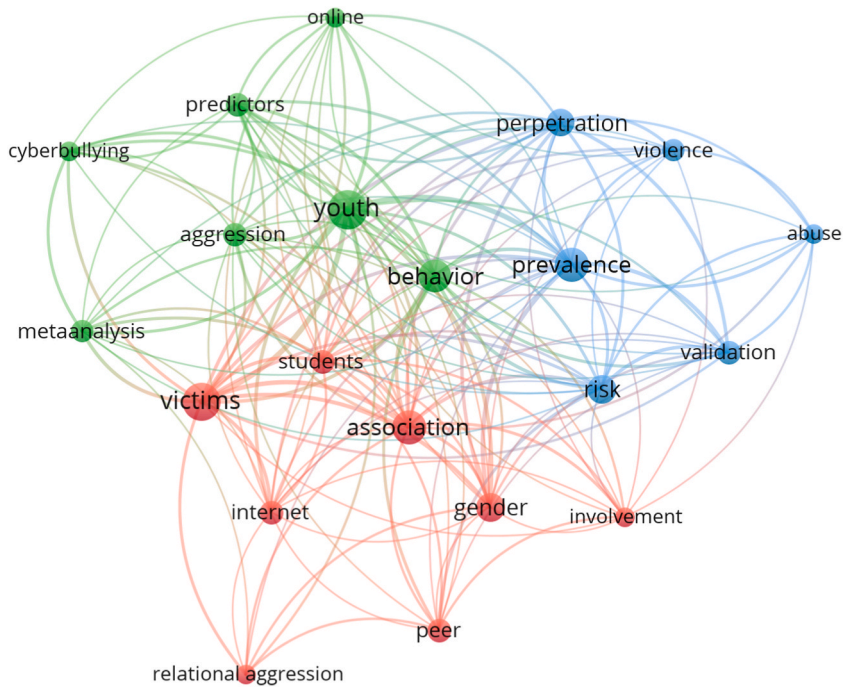
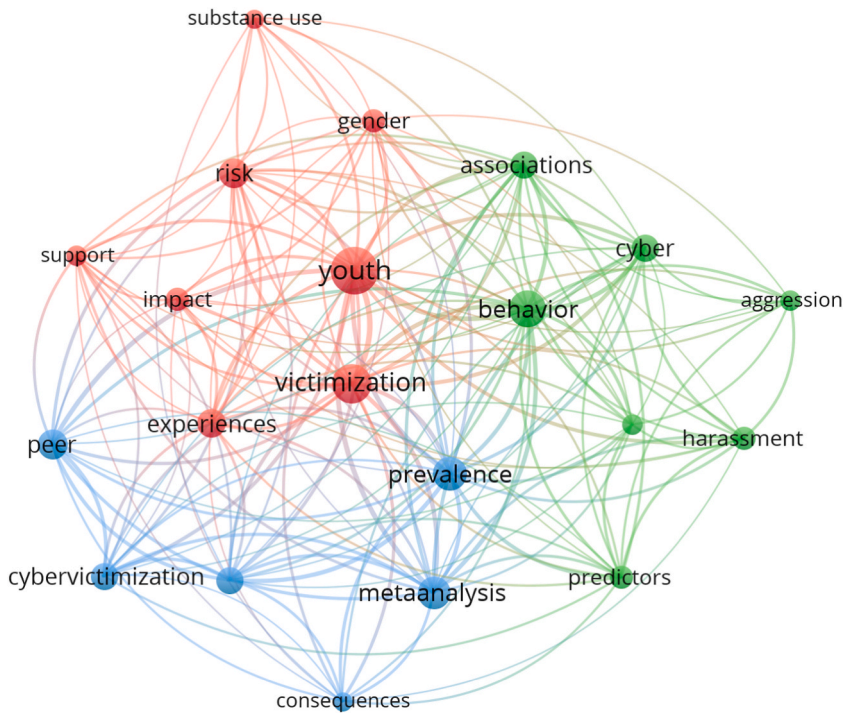**Fig. 5.** Keyword network map CAY from 1998 to 2021.

Fig. 6. Keyword network map CVY from 1998 to 2021.

the multitude of meanings in this field, for example, the term CAY written in different ways as cyberaggression, cyber aggression or cyber-aggression, even the way of addressing the term youth as youth, teen or adolescente, even in plural depending on the manuscript. Furthermore, there is inconsistency of findings across research, which could be due to methodological gaps in the existing literature, as stated in the study by Sciacca et al. [104].

Table 10
Comparison of CAY keywords and occurrences.

Keywords (CAY) 1998–2021	Ocurrences	Keywords (CVY) 1998–2021	Ocurrences
Youth	19	Youth	27
Victims	18	Victimisation	19
Prevalence	14	Behavior	17
Association	14	Prevalence	15
Behavior	13	Metaanalysis	14
Gender	10	Peer	12
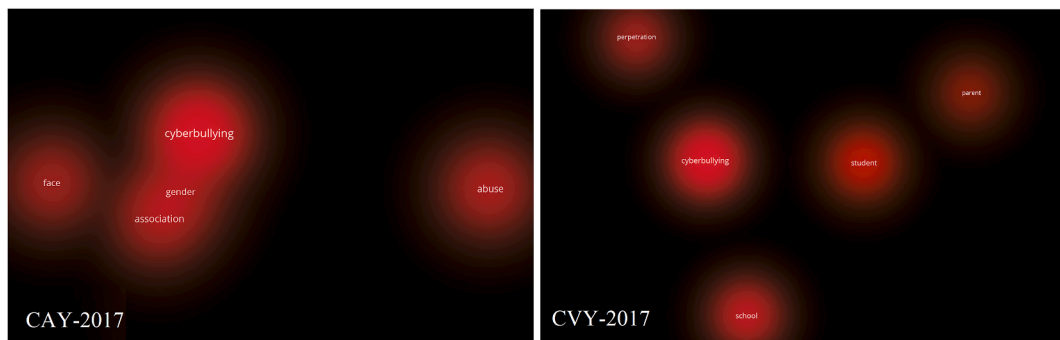
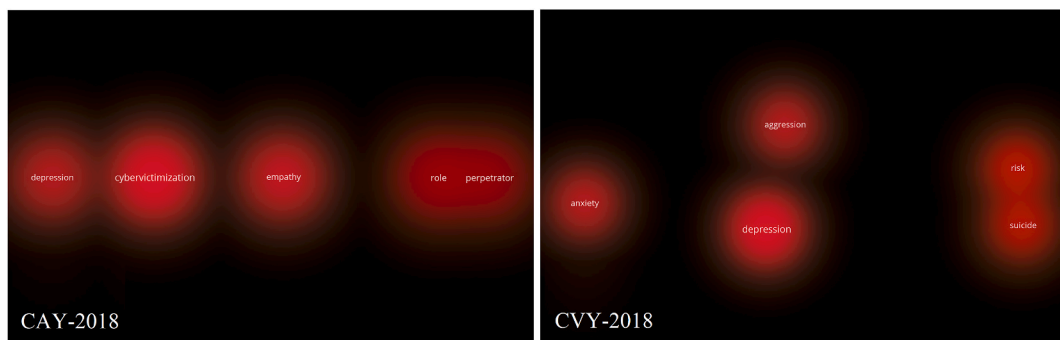**Fig. 7.** Density map 2017 of CAY and CVY.

Fig. 8. Density map 2018 of CAY and CVY.
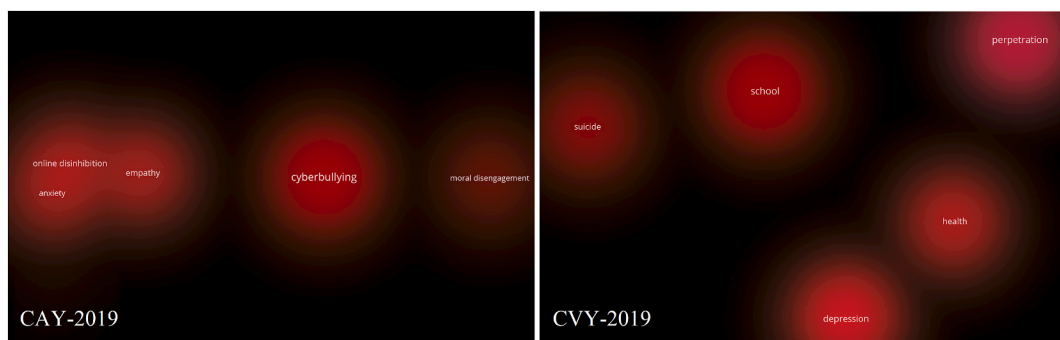

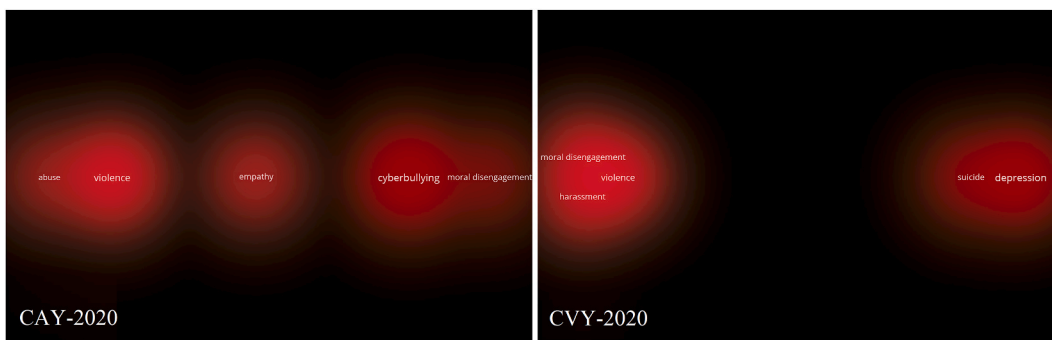**Fig. 9.** Density map 2019 of CAY and CVY.

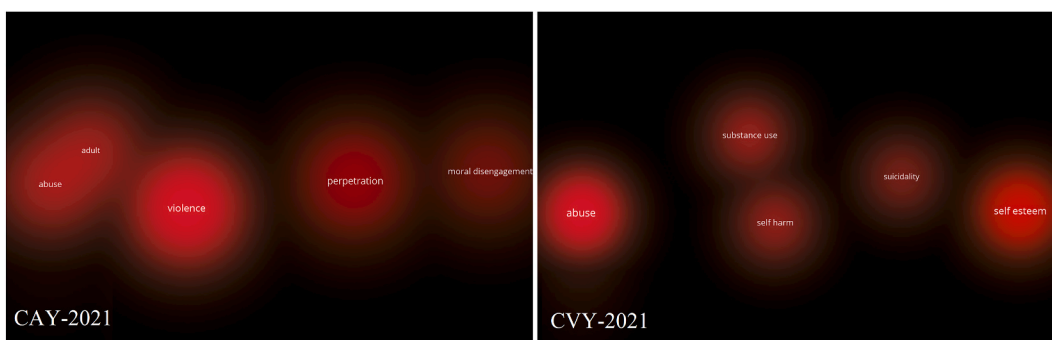**Fig. 10.** Density map 2020 of CAY and CVY.

Fig. 11. Density map 2021 of CAY and CVY.

Table 11
Comparison of terms with higher co-occurrences in CAY and CVY from 2017 to 2021.

CAY 2017 n = 34	Ocurrences	CVY 2017 n = 87	Ocurrences
Cyberbullying	48	Cyberbullying	123
Abuse	19	Student	67
Association	17	School	64
Face	15	Perpetration	38
Gender	13	Parent	28
CAY 2018 n = 67	Ocurrences	CVY 2018 n = 141	Ocurrences
Aggression	62	Depression	100
Role	31	Risk	53
Violence	27	Suicide	50
Perpetrator	25	Anxiety	46
Involvement	25	Aggression	45
CAY 2019 n = 63	Ocurrences	CVY 2019 n = 138	Ocurrences
Cyberbullying	86	School	80
Perpetration	48	Perpetration	70
effect	45	Depression	54
Online disengagement	22	Suicide	37
anxiety	19	Health	32
CAY 2020 n = 78	Ocurrences	CVY 2020 n = 177	Ocurrences
Youth	148	Depression	85
Cyberbullying	106	Violence	56
Violence	78	Suicide	42
Moral disengagement	36	Moral disengagement	37
Empathy	34	Harassment	36
CAY 2021 n = 73	Ocurrences	CVY 2021 n = 185	Ocurrences
Cyberbullying	104	Abuse	57
Violence	67	Self esteem	45
Victims	65	Self Harm	22
Perpetration	56	Substance use	19
Moral disengagement	23	Suicidality	18

In relation to objective 1; To compare the scientific output and literary production on cyberaggression and cybervictimisation in young people (year of publication, language, type of documents, organisations, authors, sources of provenance, countries and citation).

The results of the evolution of scientific production in the fields of CAY and CVY are highlighted in this study, where research on cyberbullying in young people is mostly focused on the victims. Considering the studies by Syed et al. [38], Malinski et al. [39], Francisco et al. [40] and Charamlapous [41], which consider that there is little research in the field of cyberbullying in young people, this study shows that research from the point of view of online bullies in young people is a field with fewer manuscripts in all the fields analysed, such as psychology, family studies or education. However, although cyberbullying is a complex problem that can have multiple causes according to Elipe et al. [15], it is important to address the underlying causes of online bullying in order to prevent and tackle the problem effectively from the point of view of the bully, the bullied and the bystander, looking at emotional and psychological problems, social peer pressure, lack of education, including lack of awareness of online bullying.

The results of the scientific production in CAY and CVY in this study show a growth in both fields, although more progressively and quantitatively in the CVY field supporting the studie of Strohmeier and Gradinger [6], where the confinement and the obligation to use the internet during the COVID-19 pandemic caused a considerable increase in publications of cybervictims in 2020 as seen in the results, as shown in the studies of Jain et al. [18], Zhang et al. [19] and Cho et al. [20]. It is difficult to consider cybercrime in young people as a global problem as a result of this study and especially in underdeveloped countries as supported by Chudal et al. [16] when out of the 194 countries in the world, there are 54 countries that have published on CAY and 72 on CVY, mostly developed countries as the results of the top ten countries with the most studies, especially the USA and Spain, establish. The results of this study are in line with the research of Saif and Purbasha [58,59], which reveals that cyberbullying comprises social, psychological and privacy invasion aspects of young women in developing countries.

In the results of the research area of CAY and CVY, the absence of the field of study of "education" among the first three areas stands out, as this is the age at which adolescents are found and where preventive plans should be made to eradicate both CAY and CVY, as described in the studies by Richard et al. [21], Wolak et al. In this age group and in the school context, specific bullying actions and programmes can be implemented to reduce cyberbullying and reduce health risks in young people, as stated by Aizenkot [17], Chen et al. [24] and Pearce et al. [14]. However, in the evolution of research areas, studies of families do appear, as indicated by the research of Mishna et al. [13], Zhang [19] and Bae [34], or from psychology as described by Iyanda [35] and Modecki et al. [36], supporting the results of this research and establishing, as Urra [5] points out, that aggression and victims in young people can take place in any environment, even in their own homes.

In relation to objective 2; To analyse the evolution of the most influential topics and keywords of cyberaggression and cybervictimisation in young people over the last five years in the scientific literature on cyberaggression and cybervictimisation in young people.

The evolution and transformation of technologies together with the dependence on the internet following the pandemic caused by COVID-19 has led to a change in scientific studies from 2017 to 2021. Firstly, the trends in the most prominent terms, depending on whether it is aggressor or victim, are different. Studies by Save the Children [4], Machackova [12] and González et al. [33] support the results of this research where perpetrators or cyberviewers are part of cyberaggressions, and can also become victims, being one of the terms that appears in this research.

In this sense, cyberbullying can have a particularly serious impact, since at the adolescent stage social relationships and self-image are very important and young people can feel isolated, ashamed, anxious, depressed and with low self-esteem, as Yoo [11] and Machackova [12] point out. If these emotions are not properly addressed and managed, they can lead to more serious mental health problems, including the risk of suicide, a word highlighted in the top 5 of this study since 2018 in the field of CVYs and supported by the studies of McLoughlin [10], Polanin [22] and Shawki et al. [25], which can be the origin of possible suicides as stated by Urra [5] and Balt et al. [1].

From the point of view of the CAY field, cyberbullying is the most repeated term in the last five years, therefore, it is considered that aggressors using the Internet have a connection with schools as stated in the studies by Xu and Trzaskawka [26] and Richard et al. [21], and it is also the main field where educational policies and families should intervene as a factor of prevention, with effective collaboration between administrations. It is clear that after the results of the most influential terms in recent years, a dilemma arises as to how to deal with CAY and CVY studies, as argued by Weinstein and James [9], however, trends in research among young people such as the terms sexting [23], flaming [24], doxing [27], happy slapping [29], phishing [30], grooming [60] do not appear in this study, with research giving greater priority to terms related to health and leaving these terms for adults.

6. Conclusion

The results of this study conclude that the lines of research on CAY and CVY is a global problem causing suicide deaths among young people in recent years. The term "suicide" from the point of view of CVY, together with "depression" and "substance use", are the most prominent in recent years. However, from the field of CAY, the term "moral disengagement" is the most prominent, although it should be studied in different countries depending on the socio-demographic and economic level, as they are mainly focused on the USA and Spain. Moreover, it offers a line of research that is not robust over time and the trends in this aspect are centred on the scientific branch of psychology.

For this reason, we consider it vitally important for the scientific community to unify criteria for terms in order to carry out effective research for other researchers, politicians or educators to protect children and young people from cyberbullying. Multiple meanings have been found for the same term that make it difficult to carry out in depth studies that should be universal, when this issue is considered a worldwide problem.

From the family and educational spheres, the latter being a little studied field as the results indicate, it is important to understand the behaviour of adolescents in cyberspace and with social networks, for which it is necessary not only to provide training for young people, but also for families and teachers, particularly in the most vulnerable environments. Educational policies should reconsider implementing cybersecurity and the risk of surfing the internet in the curriculum from an early age. In addition, training in social skills and empathy to enable reporting cyberbullying from the point of view of victims or bystanders.

In the field of psychology or health development in young people, it is important to know that anxiety, stress, self-harm, loneliness, truancy … in today's society, these terms are linked to cyberbullying and to take these health problems as an aspect that can lead to suicide, therefore, it is important to inform researchers, teachers, families, doctors or politicians about guidelines that can detect these facts.

Finally, the scientific papers of CAY and CVY analysed in this study are declined and focused more from the perspective of the victim. However, if the aim of politicians, administrations, educational centres … is to reduce and prevent health problems in cybervictims, the scientific community should address this field of research in an equitable manner between cyberaggressors and cybervictims, in order to detect behaviours and prevalence of cyberaggression and reduce the number of victims.

7. Limitations of the study and future lines of research

The limitations of this study are related to the WoS database used, and could be extended to other databases. The terms CAY and CVY have been found in multiple forms that have made the search and analysis difficult for the research team, having to filter multiple synonyms for each term. It is important to note that the time periods examined since 1998, in both fields, show large differences depending on the interval analysed. The dimensions have been selected by the researchers in order to provide consistent and valid results for the scientific community. The results of this analysis provide an update and a starting point of cyberbullying in young people from the WoS database.

As for the future lines of work offered by this study, it is interesting to know what the critical age of onset of cyberbullying is. For this, it is necessary to include studies that analyse the roles of CAY, CVY and cyberviewers. Another question is to find out the influence of the use of social networks with their typology and to investigate which are the main aggressions suffered by adolescents with validated questionnaires updated with the new trends in cyberbullying among young people, thus opening up new fields for the scientific community as a starting point.

8. Implications of the study

This study is the first work that analyses the terms cyberbullying from the point of view of the aggressor and the victims in adolescents, from an open perspective from all fields of research through a development of scientific production and mapping. This fact makes it possible to obtain and visualise results that give rise to theoretical and practical implications. From a theoretical point of view, this study contributes to the scientific community's research on CAY and CVY and evolutionary trends from the key words as the most emerging terms in the scientific literature. These data can serve as a starting point for future lines of research on cyberbullying in adolescents that require variables such as publishers, journals, citations, authors, countries or areas of research provided by the study. From a practical point of view, it offers relevant terms for different areas and fields such as psychology, social work, education or family studies, to take as a starting point with adolescents to prevent bullying situations and health problems, mainly in the victims.

Statement on data availability

Data will be made available upon request.

Additional information

No additional information is available for this paper.

CRediT authorship contribution statement

Ana Isabel Fernández Herrerías: Writing - original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Manuel Gabriel Jiménez Torres:** Writing - review & editing, Visualization, Validation, Supervision, Methodology. **Pablo Dúo Terrón:** Writing - review & editing, Writing - original draft, Visualization, Validation, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Antonio José Moreno Guerrero:** Writing - review & editing, Supervision, Software, Resources, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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