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Hotspots and Trends of Adolescent Cyberbullying: A Review Using the Bibliometric Approach on Citespace

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Abstract

Cyberbullying has become a major adolescent issue worldwide. This paper used CiteSpace to analyze the articles on adolescent cyberbullying in the WoS core database from 1986 to 2019. The results provide an overview of the field of adolescent cyberbullying, including the changes in publications on an annual basis; the most influential countries, institutions, authors, and journals; as well as analysis of keyword co-occurrence, and highly cited references in the field. Knowledge maps were obtained in order to understand the hotspots and to infer the research trends in the field. This paper hopes to serve as a reference for future research on cyberbullying.

Keywords

Cyberbullying, Adolescent, Hotspots, Trends, Bibliometric Analysis, Citespace

1. Introduction

The National Center for Education Statistics (2016) estimates that one-fifth of students nationwide are bullied at school each year. With the increasingly pervasive use of electronic devices, cyberbullying, a type of bullying performed through electronic devices (Hinduja & Patchin, 2008), has become a major youth problem worldwide. For example, the prevalence of cyberbullying among US adolescents at school ranges from 15% - 41% (Selkie et al., 2016). Over 78% of Asturias (Spain) adolescents reported being cyberbullied (Álvarez-García et al., 2015). A survey of high school students in Greece found that approximately 62% of the high school students surveyed experienced cyberbullying (Gkiomisi et al.,

2017). The danger of cyberbullying is the negative impact that it has on individuals, including low self-esteem, anxiety, depression, suicidal ideation, and even suicidal behaviors (Extremera et al., 2018).

The recent research reported has tended to focus on some issues related to cyberbullying including its various definitions, negative effects, risk factors, interventions, etc. (Field, 2018). Wang et al. (2019) discussed fathers' and mothers' moral disengagement were examined as the two moderators of the adverse effect of childhood maltreatment on adolescents' moral disengagement and cyberbullying perpetration. Baldry et al. (2019) also focused on parents' monitoring, supervising or evencontrolling what their children do online. They believed what the parents do would enable them to see and whether they are involved in some way in cyberbullying. Wiguna et al. (2018) conducted a study aiming to elaborate and identify the association between cyberbullying experience and high-risk behaviour outcomes based on gender differences among adolescents in Indonesia. However, there have been few literature reviews of adolescent cyberbullying. Therefore, this paper uses visualized bibliometric analysis to provide a comprehensive analysis of the research status, hotspots and trends in the adolescent cyberbullying research, with the aim of providing a reference for future research in this field.

This study was to describe the basic situation of adolescent cyberbullying and to explore the research hotspots and trends of adolescent cyberbullying. Thus, the research questions were proposed to identify the frontiers of adolescent cyberbullying. The research questions are:

RQ1: What are the personality traits of cyberbullies?

RQ2: Compared with traditional bullying, what are the characteristics of cyberbullying?

RQ3: What are the most studied risk factors of adolescent cyberbullying?

RQ4: What is the impact of cyberbullying on the victim's mental health?

RQ5: What are the protective factors, prevention, and intervention measures of cyberbullying?

2. Method

This study combined a quantitative method with qualitative analysis to explore the research hotspots and trends of adolescent cyberbullying. The tool of CiteSpace was used to analyze the articles on adolescent cyberbullying. Besides, the bibliometric analysis and content analysis was utilized to analyze the number of related articles published each year, the most influential countries, institutions, etc. in the field, and used visualized analysis to explore their relationship with each other, to reflect the current research status. Meanwhile, it also used visualized analysis to draw a keyword co-occurrence view, a cluster view, and a timeline view, and used the literature analytical method for cited references. It can help us understand the research hotspots, and infer the research trends in the field.

2.1. Data Collection

The data sources were the Web of Science (WOS) core collection database. The data retrieval strategy included the following: TS = ((High school* OR Middle school* OR secondary school* OR senior high school* OR senior middle school* OR junior high school* OR junior middle school* OR teenager* OR adolescent*) SAME (cyberbully* OR cyber*bull*)), document type: Article, language: English, and timespan: 1986-2019 (retrieved date: 14 March 2020). In total, 1004 articles were retrieved. To ensure accuracy of the data, the titles and abstracts of all of the articles were individually reviewed, and irrelevant articles were removed. Finally, 859 valid articles were obtained.

2.2. Research Tool

The analysis was performed using CiteSpace. CiteSpace software is invented by Chaomei Chen (Drexel University, Philadelphia, PA, USA), which is a Java application and freely available. The tool can combine data mining algorithms, bibliometrics and Information visualization in an interactive visualization tool (Chen, 2006). The visualization knowledge maps created by CiteSpace software mainly consist of nodes and links. The nodes represent analysis elements, such as author, institution, country, keyword, cited reference, etc. The lines between two nodes represent a cooperation, a co-occurrence or a co-citation relationship. The colors of nodes and lines represent different years. The sizes of nodes represent the frequency of occurrence or citation. Analyzing the co-occurrence network maps of institutions, countries, authors, keywords, and co-cited networks of cited journals, cited authors, cited references can help researchers intuitively know the intellectual base, development track, research hotspots and trends in a specific field (Chen, 2005).

3. Results

3.1. Analysis of Publication Outputs

From Figure 1, the research on adolescent cyberbullying exhibited an upward annual trend which can be divided into three separate stages.

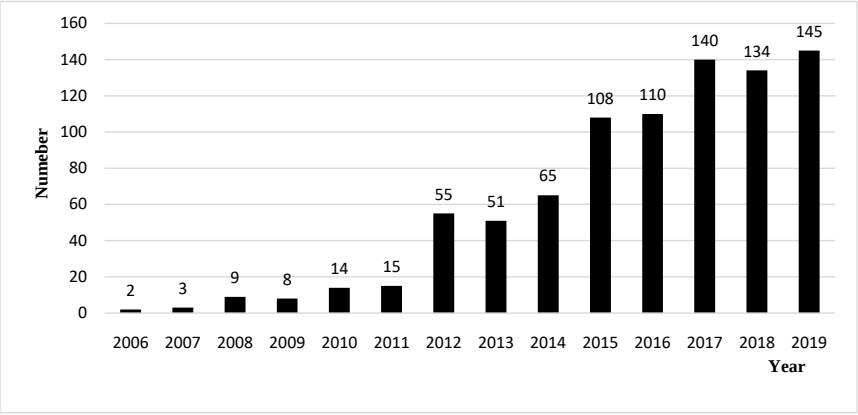

Figure 1. The number of publications.

Initial development stage (2006-2011): The number of publications was small and there was no apparent upward trend. Articles in each year did not exceed 15, and the average number of articles per year was 8.5.

Slow development stage (2012-2014): The number of publications exhibited a very slow upward trend. The average number of articles per year was 57, which was seven times more than the previous stage. The adolescent cyberbullying field was continuing to develop, with more in-depth research, and new hotspots emerging.

Rapid development stage (2015-2019): The number of publications continued to increase at a noticeable rate, the average number of articles per year was 127.4. The number of articles reached a peak of 145 in 2019, and it is likely to continue to grow in the future. It can be seen that the scope of research on adolescent cyberbullying has continued to expand, and researchers in the field have continued to emerge, with the field entering a stage of vigorous development.

3.2. Analysis of Countries and Institutions

The top 41 countries are primarily distributed across six continents. As shown in Table 1, the United States and Spain contributed the most, with the total number of articles published by these two countries accounting for about 50% of the total number of articles. Germany (0.91) has the highest centrality and has a partnership with many countries such as England, Sweden, and Switzerland. It suggests that the United States, Spain, China, and Germany are the main forces of research in this field. Map of the country co-authorship network can be seen in Figure 2.

As shown in Table 2, University of Antwerp with 28 articles is the institution producing the most research in this field. Masaryk University, University of Córdoba and University of Seville each published more than 20 articles. This shows that all of these institutions are influential in the field.

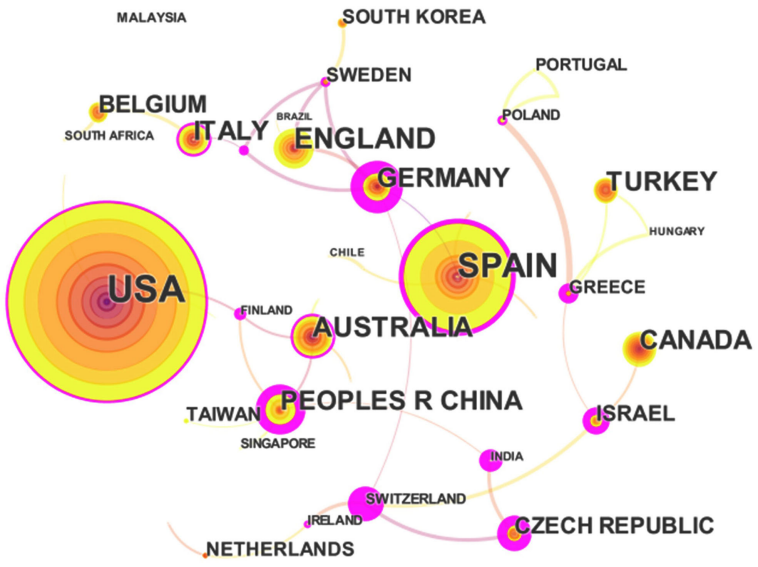

Figure 2. Map of the country co-authorship network.

Table 1. Top 18 countries.

Rank	Countries	Count	Centrality	Rank	Countries	Count	Centrality
1	USA	256	0.18	10	BELGIUM	31	0.09
2	SPAIN	138	0.35	11	CZECYH REPUBLIC	25	0.73
3	ENGLAND	62	0.09	12	ISRAEL	21	0.55
4	AUSTRALIA	58	0.18	13	TAIWAN	16	0
5	CANADA	0	0	14	NETHERLANDS	16	0.09
6	ITALY	0.18	0.18	15	SWEDEN	16	0.1
7	PEOPLES R CHINA	43	0.68	16	SOUTH KOREA	15	0
8	GERMANY	42	0.91	17	GREECE	14	0.43
9	TURKEY	41	0	18	PORTUGAL	10	0

Table 2. Top 10 publishing institutes.

Rank	Institutions	Count	Centrality
1	University of Antwerp	28	0.01
2	Masarvk University	23	0
3	University of Córdoba	22	0.02
4	University of Seville	21	0.01
5	University of Florence	14	0
6	University of the Basque Country	13	0
7	University of Arizona	12	0
8	Ghent University	12	0.01
9	University of Wisconsin System	11	0
10	Perinsylvania State University	10	0

As seen in Figure 3, although there are many small co-authorship networks, they are less closely connected with each other. Moreover, the research institutions are relatively scattered, and a cohesive research team has not yet been formed.

3.3. Analysis of Co-Cited Journals

From Table 3, the top three co-cited journals are the Journal of Adolescent Health, Computers in Human Behavior, and the Journal of Child Psychology and Psychiatry, which means that they are among the most important sources of citations for the published articles. Besides, School Psychology International has the highest centrality. The results reveal the characteristics of the strong interdisciplinary nature of adolescent cyberbullying research. It involves not only education, but also behavioral science, sociology, and psychology. Thus, the research on adolescent cyberbullying has a wide range of discipline distribution characteristics. Map of the journal co-cited network can be seen from Figure 4.

3.4. Analysis of Co-Cited Journals

Table 4 shows the top nine authors who have published articles related to adolescent cyberbullying. They are active and professional authors. Vandebosch is

the most prolific, with 25 articles. She has been conducting research on cyberbullying, and has published internationally in journals such as "Aggressive Behavior," "Cyberpsychology and Behavior," and so on. In addition, Ortegaruiz and Wright each published more than 15 articles. They have made contributions to the development of research on adolescent cyberbullying.

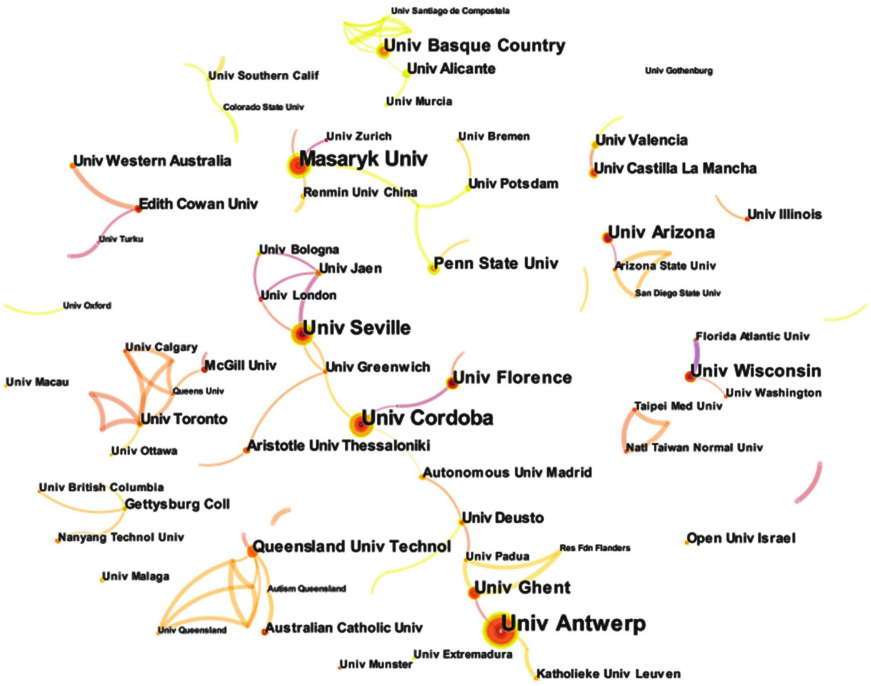

Figure 3. Map of the institution co-authorship network.

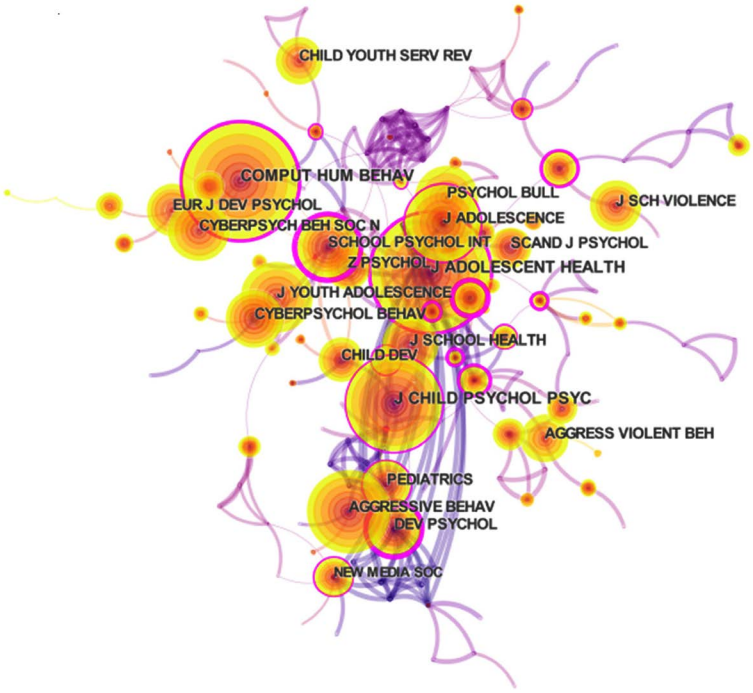

Figure 4. Map of the journal co-cited network.

Table 3. Top 10 co-cited journals.

Rank	Cited journals	Count	Centrality
1	Journal of Adolescent Health	657	0.23
2	Computer in Human Behavior	630	0.2
3	Journal of Child Psychology And Psychiatry	535	0.18
4	Aggressive Behavior	468	0.05
5	Journal of Adolescent	436	0.12
6	Journal of Youth and adolescent	410	0
7	Psychological Bulletin	357	0.02
8	School Psychology International	353	0.41
9	Cyberpsychology & Behavior	349	0.07
10	Cyberpsychology Behavior and Social Networking	336	0

Table 4. Top nine authors.

Rank	Authors	Count	Centrality
1	Vandebosh, H.	25	0.02
2	Ortegaruiz, R.	16	0.02
3	Wright, M., F.	15	0.01
4	Rey, R.D.	13	0.01
5	Menesini, E.	11	0.01
6	Nocentini, A.	9	0.01
7	Cross, D.	9	0
8	Cleemput, K.V.	9	0.01
9	Poels, K.	9	0

Figure 5 shows that the cooperation network is comprised of two larger sub-networks as well as a number of smaller isolated sub-networks. Although the number of co-authorship sub-networks is relatively large, their distribution is relatively loose. For example, there is a small cooperation network of Cleemput et al. There is also a research team led by Vandebosch. Through the cooperation between Cleemput and Vandebosch, the two cooperative networks were connected to establish a larger network. Similarly, Wright et al. form a relatively complex cooperative team.

As Table 5 shows, Kowalski ranks the first with 505 citations. Her current research focuses on bullying and cyberbullying among youth and adults. Smith ranks second with 481 citations. He is currently particularly interested in coun-

try differences and cross-cultural comparisons of cyberbullying. The third most influential author is Ybarra. She has published extensively in the areas of youth violence, particularly Internet harassment and other types of online victimization. Map of the author co-cited network can be seen from Figure 6.

The publication outputs, countries and institutions, co-cited journals, authors and co-cited authors were analyzed to obtain an overview of the research of adolescent cyberbullying.

Table 5. Top 10 co-cited authors.

Rank	Authors	Count	Centrality
1	Kowalski, R. M.	505	0.06
2	Smith, P. K.	481	0.11
3	Ybarra, M. L.	431	0.03
4	Hinduja, S.	429	0.08
5	Olweus, D.	418	0.06
6	Patchin, J. W.	320	0
7	Slonje, R.	302	0.11
8	Tokunaga, R S.	301	0.02
9	Li, Q.	300	0.18
10	Juvonen, J.	222	0.13

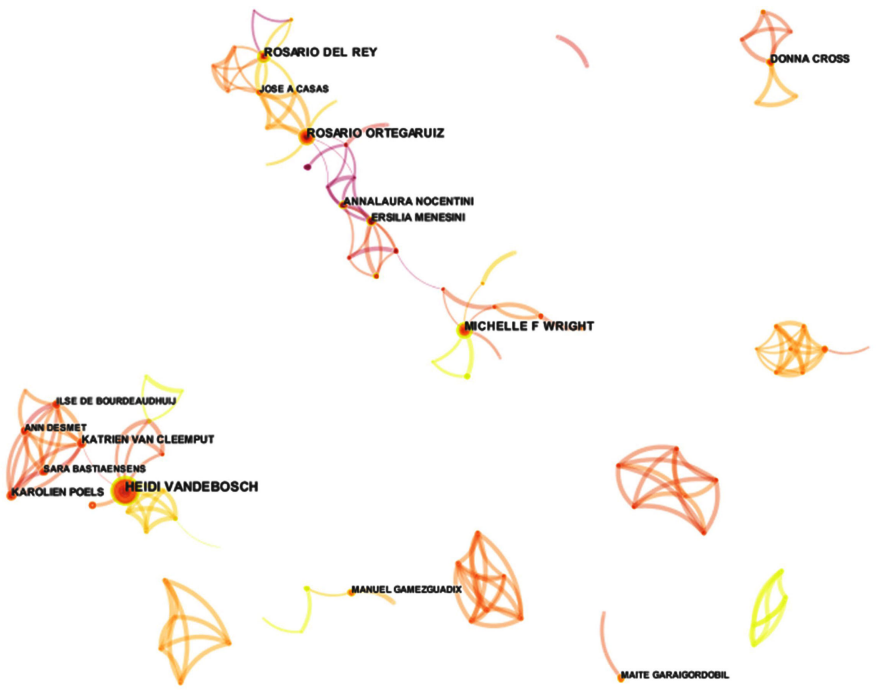

Figure 5. Map of the author co-authorship network.

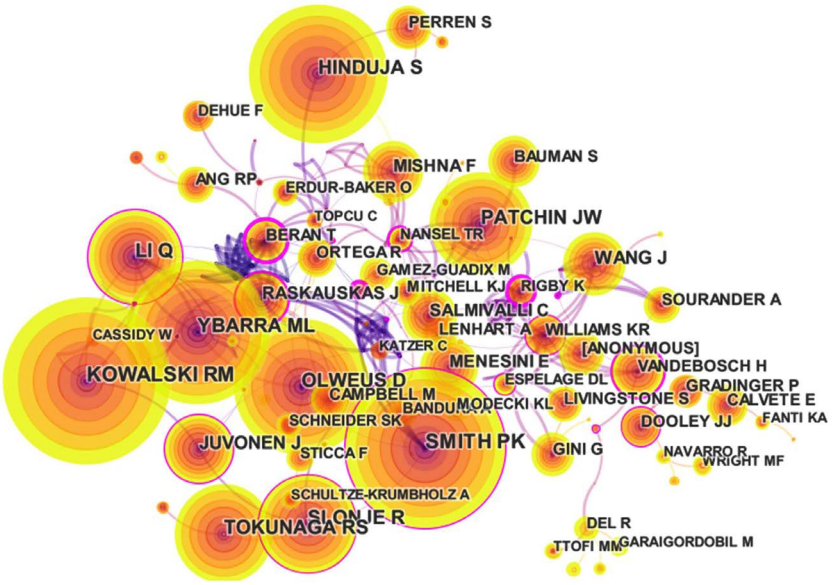

Figure 6. Map of the author co-cited network.

4. Discussion

Analysis of keywords co-occurrence can help to identify current research hotspots and future trends. The keyword co-occurrence network consists of 157 nodes and 194 links (Figure 7). Generally, keyword citations with higher frequency have greater influence, and keywords with a centrality value exceeding 0.1 have more influence (Fang et al., 2017). As shown in Table 6, apart from the research question words "cyberbullying" and "adolescent," in terms of the frequency and centrality of keywords, the important keywords are "cyber victimization," "gender," "bystander," "internet," and so on.

4.1. Cluster View Analysis of Keyword Co-Occurrence

On the basis of keyword co-occurrence analysis, the LLR algorithm was used for clustering, and 15 clusters were formed. This paper focuses on the analysis of the first 12 clusters with relatively large numbers of nodes and a large amount of information. As shown in Figure 7 and Figure 8, the Modularity Q value is 0.810 (>0.3), indicating that the structure of the map is remarkable. The Mean Silhouette is 0.829 (>0.7), which shows that the clustering is both efficient and convincing. The 12 clusters were divided into five research questions.

RQ 1: What personality traits are related to cyberbullies? (#5 personality and #10 aggression)

The unique personality traits of cyberbullies include violence (Roland & Galloway, 2004), lower empathy (Doane et al., 2014), psychosomatic complaints (Ozden & Icellioglu, 2014) and lacking emotional regulation (Garaigordobil, 2015).

Aftab (2008) summarizes cyberbullies into five typical types. 1) The Vengeful Angel takes revenge on those who have harmed them or others. 2) They do not consider themselves as cyberbullies, but as protectors of themselves or others. 3)

The Power Hungry and Revenge of the Nerds have similar motivations and reactions. They want to control others with fear and are proud of what they are doing. These two types are the most dangerous. 4) The Mean Girls cyberbully others just because they are bored and want to entertain themselves. They want to get attention online by bullying others. 5) The Inadvertent do not deliberately attack others, but respond subconsciously. When they realize that their actions hurt other people, they will feel sad. The opinion that the personality traits of cyberbullies are divided into five typical types is recognized by most scholars (Fegenbush & Olivier, 2009; Nelson & Ekeanyanwu, 2014).

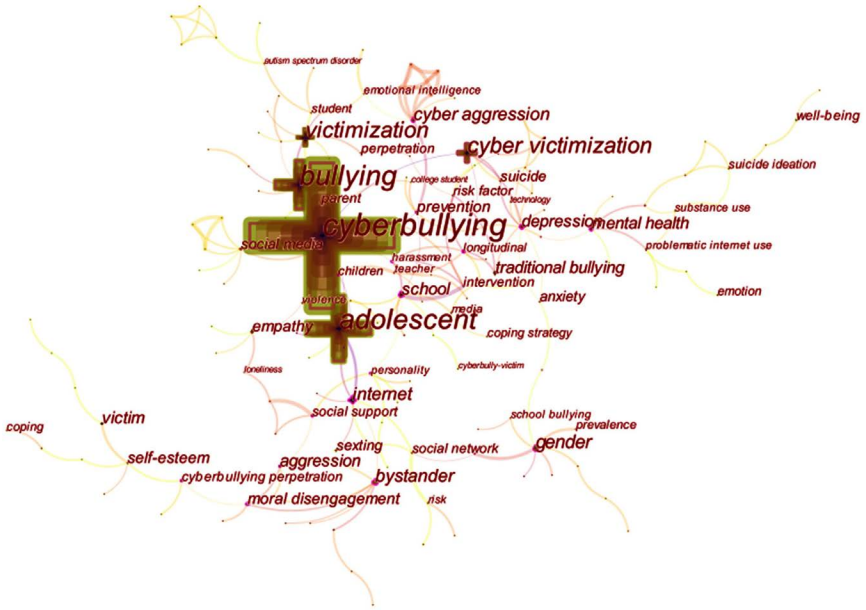

Figure 7. Map of the keyword co-occurrence network.

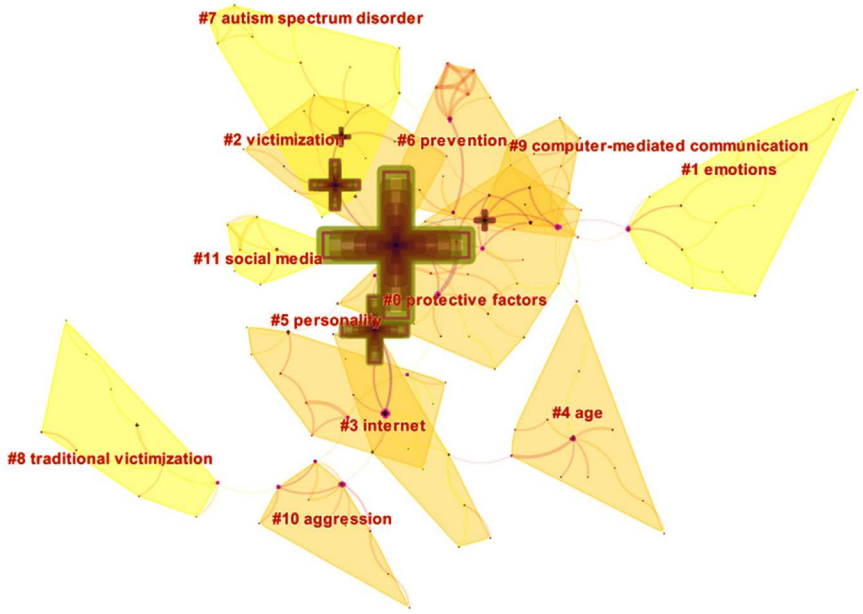

Figure 8. Map of the keyword co-occurrence cluster view.

Table 6. Top 20 keywords.

Rank	Keywords	Count	Centrality	Rank	Keywords	Count	Centrality
1	cyberbullying	575	0.39	11	depression	24	0.41
2	adolescent	270	0.29	12	victim	23	0.07
3	bullying	214	0.21	13	mental health	23	0.37
4	cyber victimization	84	0.51	14	Traditional bullying	23	0.02
5	victimization	75	0.11	15	school	23	0.41
6	gender	36	0.22	16	empathy	20	0.07
7	bystander	33	0.36	17	self-esteem	20	0.19
8	internet	33	0.52	18	moral disengagement	19	0.28
9	cyber aggression	26	0.22	19	prevention	17	0.37
10	aggression	24	0.21	20	suicide	15	0.05

RQ 2: What are the differences between cyberbullying and traditional bullying? (#2 victimization and #8 tradition victimization)

With the development of communication technology, traditional bullying at school has moved to the Internet, and cyberbullying has emerged. Smith et al. (2009) defined cyberbullying as frequent and long-term aggressive behavior by some students who intentionally use electronic devices to target weaker peers. Although bullying and cyberbullying are similar in terms of their intentional, repeated, and harmful nature, most researchers suggest that cyberbullying victimization is more serious than traditional victimization (Wiguna et al., 2018). Cyberbullied students have reported being 3.4 times more likely to have attempted suicide than non-bullied students, compared with traditionally bullied young people who were only 1.6 times more likely to attempt suicide (Field, 2018).

Based on the recent literature on cyberbullying and traditional bullying, the following differences are summarized. The first difference is the anonymity of cyberspace. Cyberbullies' behavior can be difficult to identify in cyberbullying, but in traditional bullying this is easier. It is likely to make the cyberbullies' behavior worse as they are not afraid of punishment. Secondly, the accessibility of victims differs. Cyberbullying can take place on a number of media and in different forms. It can happen anywhere and at any time, compared with traditional bullying which usually occurs face to face. In addition, cyberbullies and cyber bystanders cannot directly observe the victims' response in cyberspace, which impairs chances of empathy and remorse on the part of the cyberbullies, and increases the possibility of cyberbullying. Thirdly, cyberbullying spreads quickly. Because cyberspace is quicker, more comprehensive, almost unstoppable and unavoidable, cyberbullying plays out in front of anyone with access to the Internet. It can also be difficult to remove the cyberbullies' posts that have been uploaded online, which can cause long-term harm to the cybervictims.

RQ 3: What are the risk factors of adolescent cyberbullying? (#3 Internet, #4

age, #9 computer-mediated communication, and #11 social media)

Researchers have identified significant risk factors of adolescent cyberbullying from different perspectives. Balakrishnan (2015) examined the roles of gender, age and Internet frequency in cyberbullying incidences. According to demographics and psychology, Campbell et al. (2017) divided the risk factors into peer influence, gender and age, education, social economic status, and ethnicity, self-esteem, depression and suicide, empathy, Internet addiction, and self-image. In summary, among the above risk factors, gender, age and frequency of electronic device use are frequently studied. However, there is considerable controversy about their research, as discussed below.

Some researchers have found that girls are more likely to become cybervictims (Beckman et al., 2013). Some researchers believe that girls are more likely to participate in cyberbullying than boys (Tanrikulu & Campbell, 2015). However, some studies found no significant differences between gender and cyberbullying (Balakrishnan, 2015). Similarly, there are some contradictory findings in the research on the relationship between age and cyberbullying. Many studies have reported no significant correlation between age and cyberbullying (Smith et al., 2006). Balakrishnan (2015) stated that although there were no overall significant differences between age and cyberbullying, younger participants were found to engage more in cyberbullying than older participants. On the contrary, a study of 210 adolescents aged 12- to 15-year-olds in Australia found that older students bullied younger students (Robson & Witenerg, 2013).

At present, there is no consensus on the impact of gender and age of cyberbullying. However, regarding the frequency of electronic device use, many researchers generally believe that the higher the frequency of their use, the greater the probability of cyberbullying (Festl et al., 2013). A study by Madden et al. (2013) found that 95% of teens had access to the Internet, 78% had a mobile phone, 47% owned a smartphone and 23% had a tablet computer. The statistics show that the widespread use of electronic devices is common among adolescents. In addition to intense use, it is no surprise that social networking sites, blogs, and forums, among various social media providing users with frequent interactions, may become fertile ground for cyberbullying. Ybarra and Mitchell (2008) found that cybervictims used social media more frequently and spent more time online than non-involved students.

RQ 4: What mental health problems do cybervictims suffer from? (#1 emotions and #7 autism spectrum disorder)

NICHD research studies show that the bullies, the victims, and those who are both bully and victim, have a higher risk of depression (Eunice Kennedy Shriver National Institute of Child Health and Human Development, 2010). According to the previous literature, cybervictims were the most frequently researched (68%), cyberbullies were second (50%) and cyberbystanders were the least studied (12%) (Garett et al., 2016). Although cyberbullies and cybervictims all have certain mental health problems, this paper mainly analyzes the mental health problems of cybervictims.

The emerging evidence shows that unlike traditional bullying, the cybervictims have a higher risk of depression than the traditional victims (Eunice Kennedy Shriver National Institute of Child Health and Human Development, 2012). Raskauskas and Stolz (2007) found that 93% of cybervictims were negatively affected by emotions including sadness, hopelessness, depression, and anxiety. A survey shows that 15% of cybervictims reported suicide attempts compared to 5% of those who were not cyberbullied (Messias et al., 2014). Mental health problems have plagued the victims; they may start from anger, sadness, depression, and eventually result in suicide.

RQ 5: How do protective factors prevent and intervene in the measures of adolescent cyberbullying? (#0 protective factors and #6 prevention)

At present, research on the protective factors of cyberbullying is still in a relatively early stage (Izabela et al., 2018). Izabela et al. (2018) defined the protective factor as any variable that could protect adolescents from cyberbullying, and classified protective factors into communities, schools, families, peers and individuals. Protective factors such as high social emotional competencies (Zych et al., 2017), positive school climate (Fedewa & Ahn, 2011), parental supervision and monitoring (Kowalski et al., 2014), and a low frequency of technology use (Chen et al., 2017) are the strongest protectors against cyberbullying.

Fewer empirical studies have focused on effective prevention and intervention measures to combat cyberbullying (Snakenborg et al., 2011). In the future, multivariate studies are needed to identify profiles of risk factors for cyberbullying and can then form prevention measures. Generally speaking, methods to deal with cyberbullying can be divided into three categories: 1) relevant laws, rules, and policies are formulated to regulate the use of electronic devices and prevent cyberbullying; 2) courses, lectures and programs related to cyberbullying teach students to recognize the dangers of cyberbullying and to know how to deal with it; 3) teachers (parents) are trained to make them aware that they need to spend more time communicating with students (children), and create a positive atmosphere (Hong et al., 2014). Additionally, they can master some skills through training, and know how to help students (children) deal with it appropriately when cyberbullying occurs.

4.2. Timeline View Analysis of Keyword Co-Occurrence

The timeline view of keyword co-occurrence illustrates the connections and trends of each hotspot in 12 types of thematic clusters between 2006 and 2019.

In **Figure 9**, high-frequency keywords appeared mostly before 2010. The clusters with high-frequency keywords are as follows: "#2 victimization," "#3 Internet" and "#9 computer-mediated communication." The cluster "#2 victimization" appeared around 2006, and was the earliest timeline. The cluster "#3 Internet" not only has high-frequency keywords on the timeline, but the questions have been studied until the present, indicating that research on the Internet is still popular. Besides, the clusters "#0 protective factors," "#1 emotions," "#4

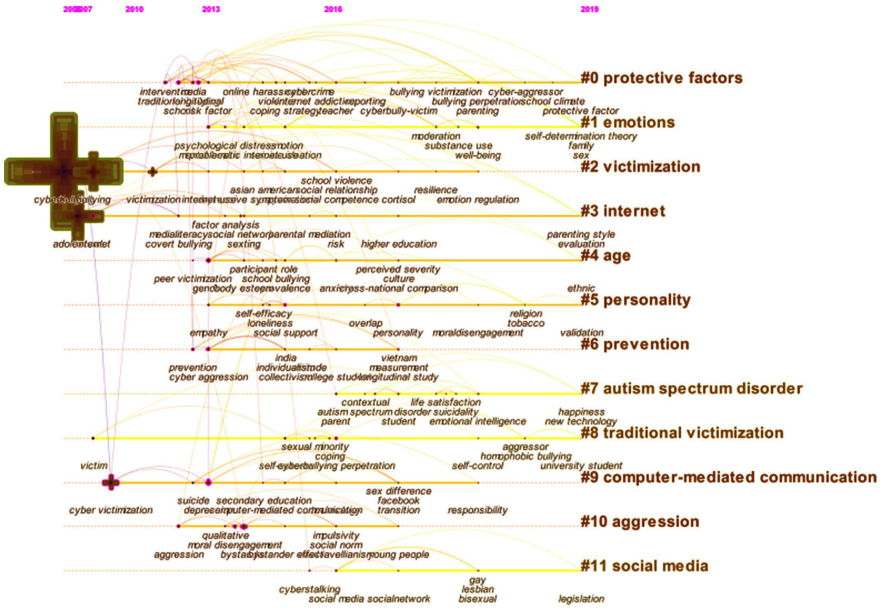

Figure 9. Map of the timeline view.

age," "#5 personality," "#7 autism spectrum disorder," "#8 tradition victimization" and "#11 social media" are still being studied, indicating that these research questions have potential for development in the future. The keywords in the cluster "#0 protective factors" are "risk factors," "media," "violence," etc., which shows that risk factors research has been carried out since cyberbullying first emerged.

Therefore, combining the timeline view with the classification of cluster analysis above, we can conclude that risk factors of adolescent cyberbullying and mental health problems of cybervictims were the research trends between 2006 and 2019.

4.3. Analysis of Co-Cited References

As shown in Table 7, "R1" published by Tokunaga ranks first in co-cited frequency. As of 14 March, 2020, this article had been cited 263 times. Based on the results of the quantitative research, this article summarizes a number of areas of concern in the cyberbullying research, and suggests ways in which future research can address these problems (Tokunaga, 2010). "R2" published by Kowalski et al. ranks second. The article provides a critical review and meta-analysis of the existing cyberbullying research. Kowalski et al. (2014) proposed the general aggression model as a theoretical framework for understanding this phenomenon. The two most co-cited articles are critical review and comprehensive analysis of cyberbullying research. "R4," "R9" and "R10" mainly contrast the similarities and differences of cyberbullying and traditional bullying, and the mental health problems associated with cyberbullying. Among the 10 articles, there are three written by Kowalski as the first author. Additionally, Dr. Kowalski ranks the first with 505 citations in the author co-cited network,

indicating that she has made important contributions to the development of research in the field. Map of the reference co-cited network can be seen from Figure 10.

Cluster view analysis and timeline view analysis of keyword co-occurrence and analysis of co-cited references were conducted in the study. It helped identify current research hotspots and future trends of the research of adolescent cyberbullying.

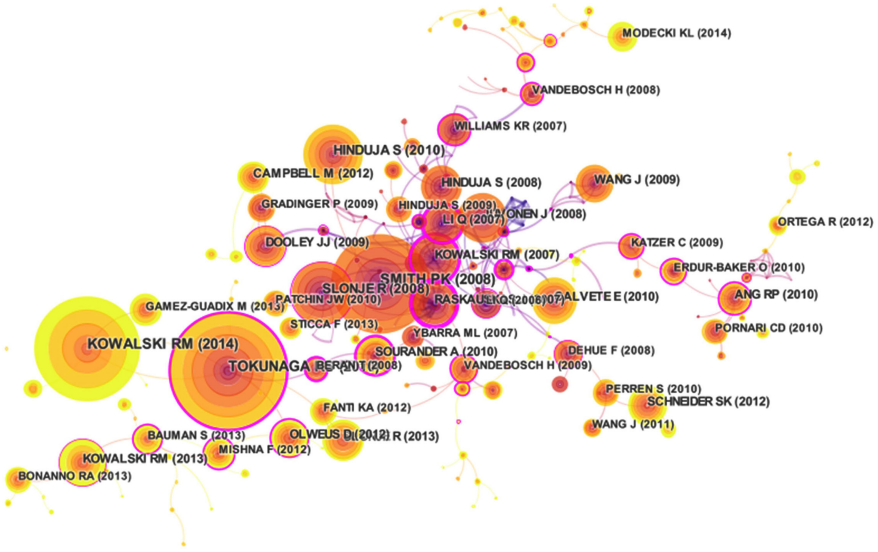

Figure 10. Map of the reference co-cited network.

Table 7. Top 10 co-cited references.

Rank	Count	Centrality	Year	Title	Authors
1	263	0.44	2010	Following you home from school: a criticalreview and synthesis of research on cyberbullying victimization (R1)	Tokunaga, R. S.
2	238	0.05	2014	Bullying in the digital age: a critical review and meta-analysis of cyberbullying research among youth (R2)	Kowalski, R. M., Giumetti, G. W., Schroeder, A. N., & Lattanner, M. R., Smith, P.K.
3	230	0.03	2018	Cybertullying: its nature and impact in secondary school pupil (R3)	Mahdavi, J., Carvalho, M., Fisher, S., & Russell, s, Tippett, N.
4	145	0.11	2008	Cybertbullying another main type of bullying (R4)	Slonje, R., & Smith, P.K.
5	139	0	2010	Bullying, cyberbullying, and suicide (R5)	Hinduja, s., & Patchin, I. w.
6	116	0.02	2008	Extending the school grounds? bullying experiences in cyberspace (R6)	Juvonen, J., & Gross, E. F
7	108	0.02	2010	Cyberbullying in adolescents? modalities and aggressors' profile (R7)	Calvete, E., Onue, I., Estévez, A., Villardon, & LPadilla, p.
8	107	0.61	2007	Electronic bullyving among middle school students (R8)	Kowalski, R. M., & imber, S. F.
9	107	0.1	2013	Psychological, physical, and academic correlates of cyberbullying and traditional bullying (R9)	Kowalski, R. M., & Limber, S. E.
10	100	0.88	2077	Involvement in traditional and electronic bullying among adolescents (R10)	Raskauskas, J., & Stoltz, A. D.

5. Conclusion

CiteSpace was used in this study to analyze the previous articles on adolescent cyberbullying. The results show the changes in publications on an annual basis, the most influential countries, institutions, authors, and journals, keyword co-occurrence, and highly cited references in the field. Knowledge maps were obtained in order to understand the hotspots and to infer the research trends in the field.

Through analysis of publication outputs, the research on adolescent cyberbullying is now at a vigorous development stage. It is important to explain cyberbullying based on the personality traits of cyberbullies. This study found that most scholars agree with Aftab's opinion that cyberbullies can be divided into five typical types. Some researchers have identified significant risk factors of adolescent cyberbullying from different perspectives. However, this study identified profiles of protective factors for cyberbullying and can then form prevention measures in the future. Particularly, this study found that high social emotional competencies, a positive school climate, parental supervision and monitoring, positive peer influence, and a low frequency of technology use are the strongest protectors against cyberbullying.

5.1. Implications

Analysis of authors and co-cited authors showed that Vandebosch, Ortegaruiz, and Wright are the most prolific authors, while Kowalski, Smith and Ybarra are the most cited. Although there are some influential leaders, research teams and research institutions in this field, the existing research teams are relatively small in scale, and the connections between the teams are not close. In the long term, it will not be conducive to long-term sustainable development of research on adolescent cyberbullying. Therefore, strengthening cooperation between researchers, and then promoting research team contact, and finally striving to form a more mature research community are recommended.

Through analysis of co-cited journals, it was found that the Journal of Adolescent Health, Computers in Human Behavior, and the Journal of Child Psychology and Psychiatry are the most cited journals. School Psychology International has the highest centrality. The results reveal the characteristics of the strong interdisciplinary nature of adolescent cyberbullying research. It involves not only education, but also behavioral science, sociology, and psychology.

5.2. Limitations and Future Study

Through timeline analysis, the clusters "#0 protective factors" and "#8 tradition victimization" show that these research questions have potential for development in the future. The cluster "#3 Internet" indicates that research on the Internet is still popular. Therefore, combining the timeline view with the classification of cluster analysis above, it can be concluded that risk factors and mental health problems were the research trends between 2006 and 2019. Future study

may include more variables related to cyberbullying from different perspectives.

Through analysis of co-cited references, "Following you home from school: a critical review and synthesis of research on cyberbullying victimization" and "Bullying in the digital age: a critical review and meta-analysis of cyberbullying research among youth" are critical reviews and provide comprehensive analysis of the cyberbullying research. In addition, the heterogeneity of research methods, the lack of longitudinal research, thus, researchers can pay attention to longitudinal research methods to strengthen the research on cyberbullying in the future.

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Author Contributions

This work is the result of the collaboration of all authors. All authors have equally contributed, reviewed, and improved the manuscript. All authors have revised and approved the final manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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