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## A BIBLIOMETRIC STUDY ON THE ASSOCIATIONS BETWEEN LONELINESS AND FAMILY COMMUNICATION

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### Abstract:

This study presents a comprehensive bibliometric analysis of scholarly research examining the associations between loneliness and family communication from 2020 to 2025. Drawing on data retrieved from the Scopus database and analyzed using VOSviewer, the study maps the evolution, thematic trends, and geographic distribution of academic output in this field. Findings indicate a sustained growth in publications, with a pronounced focus on the psychological and social dimensions of loneliness, particularly among children and adolescents. The analysis reveals that effective family communication functions as a protective factor against loneliness by fostering emotional support, relational closeness, and a sense of belonging. Conversely, poor family communication is linked to heightened levels of loneliness and associated maladaptive behaviors such as problematic internet use and vulnerability to cyberbullying. The most influential studies emphasize the mental health implications of social isolation, especially in the context of the COVID-19 pandemic. While China, the United States, and the United Kingdom lead in publication volume, citation data suggest high-impact contributions from several European countries. Keyword and co-authorship analyses highlight an emerging focus on youth well-being, caregiver roles, and limited international collaboration. These findings underscore the critical role of familial interactions in addressing loneliness and inform future interdisciplinary research and intervention strategies.

**Keywords:**

Loneliness, Family Communication, Bibliometric, Mapping Trends

**Introduction**

Loneliness is a complex emotional state characterized by a perceived gap between desired and actual social relationships. It is increasingly recognized as a significant public health issue due to its association with various mental and physical health problems. Family communication plays a crucial role in shaping individuals' social experiences and emotional well-being. This study aims to explore the associations between loneliness and family communication, highlighting the importance of effective family interactions in mitigating feelings of loneliness.

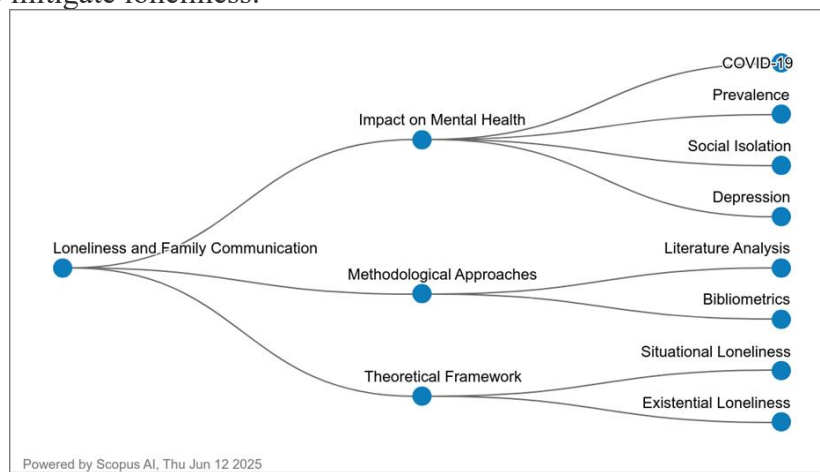
Previous research has established a negative association between family environments that support open communication and experiences of loneliness. Specifically, studies have found that young adults who perceive their family interactions as open and communicative report significantly lower levels of loneliness. These findings suggest that effective family communication may function as a protective factor against loneliness, potentially by fostering emotional support, enhancing relational closeness, and promoting a sense of belonging within the family system (Segrin et al., 2012).

Consequently, it has also been found that poor family communication is a significant predictor of problematic internet use (PIU) and loneliness among adolescents. Adolescents experiencing poor family communication are more likely to develop PIU, which in turn exacerbates feelings of loneliness (Zhang et al., 2024). The quality of family communication can moderate the relationship between computer-mediated communication (CMC) and loneliness. High-quality family communication can mitigate the loneliness associated with frequent use of CMC among adolescents (Favotto et al., 2019).

Family communication plays a mediating role in the relationship between problematic internet use and loneliness. Effective family communication can reduce the negative impact of PIU on loneliness by providing emotional support and fostering better social interactions. [8] In alignment with these findings, parental loneliness and family communication patterns significantly influence young adults' loneliness. Parental loneliness and a history of being bullied are predictors of loneliness in young adults, with family communication acting as a mediating factor (Segrin et al., 2012). Attachment styles within the family, such as attachment anxiety and avoidance, are linked to perceptions of communication accommodation and loneliness. Both parents' and children's attachment styles can influence their perceptions of family communication, which in turn affects their loneliness levels (Bernhold & Giles, 2022).

Different communication modalities (e.g. face-to-face, telephone, online) have varying impacts on loneliness. Frequent face-to-face and online communication are associated with lower levels of loneliness, emphasizing the importance of maintaining diverse communication channels within the family (Tanaka et al., 2024). During the COVID-19 pandemic, remote communication with family members did not significantly reduce loneliness, whereas communication with friends did. This suggests that the quality and context of family communication are crucial in mitigating loneliness (Arakawa et al., 2023). Adolescents' feelings of loneliness are influenced by family communication quality. High-quality family

communication can buffer the negative effects of daily CMC use on loneliness, highlighting the importance of maintaining strong family bonds during adolescence. Family communication also mediates the relationship between cyberbullying victimization and loneliness (Favotto et al., 2019). Adolescents who experience avoidant communication with their parents are more likely to feel lonely and become victims of cyberbullying (Larrañaga et al., 2016). Henceforth, the literature consistently highlights the significant role of family communication in influencing loneliness across different age groups. Effective family communication can serve as a protective factor against loneliness, while poor communication can exacerbate feelings of isolation. Future research should continue to explore the mechanisms through which family communication impacts loneliness and develop interventions aimed at improving family interactions to mitigate loneliness.



**Figure 1: Concept Map Of Research Trends In Loneliness And Family Communication**

## Research Question

- i. What is the influence and subject area productivity of research on loneliness and family communication?
- ii. What are the top 10 most cited articles in this field?
- iii. Which are the top 10 countries based on the number of publications?
- iv. What are the most frequently occurring keywords related to this topic?
- v. What are the patterns of co-authorship based on international collaboration between countries?

## Methodology

Bibliometric analysis involves the organized and systematic gathering, arrangement, and interpretation of bibliographic data from academic publications (Alves et al., 2021; Assyakur & Rosa, 2022; Verbeek et al., 2002). Initially, this approach centers on descriptive statistics, including the number of publications, leading authors, and source journals (Wu & Wu, 2017). However, more sophisticated techniques, such as co-citation and co-occurrence analyses, are now frequently employed to reveal underlying trends and relationships within the literature. A thorough literature review is critical, requiring careful keyword selection, repeated searches, and meticulous data cleaning to ensure the compilation of a robust and representative collection of references (Fahimnia et al., 2015). Given the significance of theoretical relevance, this research focused on high-impact publications, as these works provide essential perspectives on the growth and organization of the research area.

To guarantee the reliability of the data, the Scopus database was chosen as the main indexing platform due to its comprehensive subject coverage and dependable indexing (Al-Khoury et al., 2022 ; di Stefano et al., 2010; Khiste & Paithankar, 2017). Only peer-reviewed journal articles and conference papers were included, with non-scholarly sources such as books and lecture note deliberately omitted to maintain academic standards in the analysis (Gu et al., 2019). Data collection spanned from 2020 to June 2025, in line with the aim of identifying the latest and most influential trends in loneliness and family communication research.

### Data Search Strategy

Study employed a screening sequence to determine the search terms for article retrieval. Study was initiated by querying Scopus database with online TITLE (loneliness AND [family OR parents OR children] ) AND PUBYEAR > 2019 AND PUBYEAR < 2026), thereby assembling 321 articles. This string was carefully constructed to retrieve documents where the title includes keywords directly relevant to the loneliness and family communication, such as *loneliness*, *family*, *parent*, and *children*. The use of Boolean operators (AND, OR) ensures that only articles at the intersection of these themes are included, while the PUBYEAR filter restricts the analysis to publications from 2020 to 2025—thus capturing both contemporary and emerging trends over a 5-year span.

To ensure relevance and quality, clear inclusion and exclusion criteria were established. The analysis included documents written in English only, to maintain consistency in linguistic interpretation and accessibility of content. Only research articles and conference papers were considered, as these represent original research and scholarly contributions; other formats such as book chapters, reviews, and books were excluded due to variations in peer review standards and content focus. Moreover, the source type was limited to journals and conference proceedings, omitting books and book series to focus on more citable and formally indexed publications. This approach enhances the reliability of the bibliometric indicators (e.g., citations, co-authorship, co-occurrence) and ensures that the analysis reflects peer-reviewed, research-driven discourse in the domain of loneliness and family communication.

<b>Scopus</b>	<b>TITLE ( loneliness AND [family OR parents OR children] ) AND PUBYEAR &gt; 2019 AND PUBYEAR &lt; 2026</b>
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**Table 1: The Search String.**

<b>Criterion</b>	<b>Inclusion</b>	<b>Exclusion</b>
<b>Time line</b>	2020 – 2025	< 2020
<b>Document type</b>	Article, conference, paper	Book, Review, Book chapter
<b>Source type</b>	Journal, Conference Proceeding	Book, Book series

**Table 2: The Selection Criterion Is Searching**

## Data Analysis

VOSviewer is a widely adopted bibliometric analysis tool, created by Nees Jan van Eck and Ludo Waltman at Leiden University in the Netherlands (van Eck & Waltman, 2010, 2017). Known for its intuitive interface and robust functionality, the software is extensively used for the visualization and analysis of scientific literature. It specializes in producing network visualizations, clustering similar items, and generating density maps, making it a versatile platform for examining co-authorship patterns, co-citation relationships, and keyword co-occurrence networks. Its interactive and continually updated interface allows researchers to efficiently explore large bibliometric datasets. With its capacity to compute bibliometric metrics, support various data formats, and customize visualizations, VOSviewer serves as a powerful resource for scholars aiming to explore and interpret complex research landscapes.

A notable strength of VOSviewer lies in its ability to convert complex bibliometric datasets into visually accessible maps and network structures. The software's focus on network-based visualization enables it to efficiently identify clusters, examine keyword relationships, and develop insightful density maps. Both novice and seasoned researchers benefit from its user-centric design, which simplifies the process of mapping academic contributions and thematic patterns. Continued enhancements to the software ensure it remains at the forefront of bibliometric analysis, offering advanced metrics and visual tools. Its adaptability to various bibliometric formats, including co-authorship and citation networks, solidifies its role as an essential platform for comprehensive research mapping and thematic exploration.

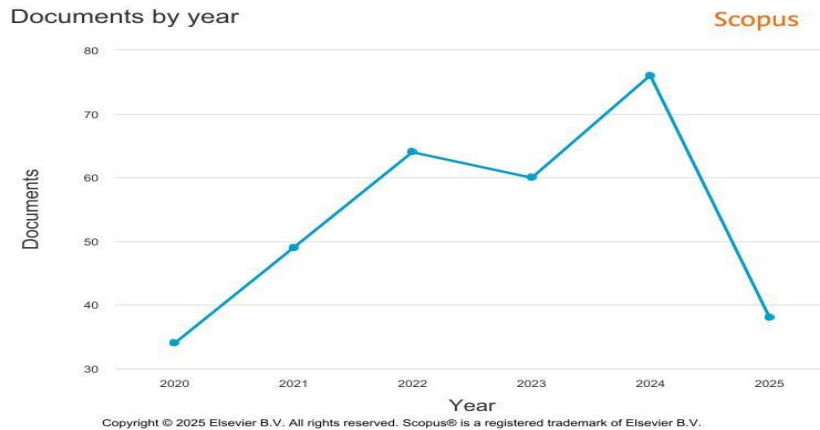
For this study, bibliometric data were extracted from the Scopus database, covering publication details such as title, author, journal, year, citation count, and keywords in PlainText format from 2020 to June 2025. The analysis was conducted using VOSviewer version 1.6.20. Using the software's clustering and mapping features, visualizations were generated to represent patterns within the data. Unlike traditional Multidimensional Scaling (MDS), VOSviewer places items in a low-dimensional space such that their distances accurately reflect similarity levels (van Eck & Waltman, 2010), a method similarly acknowledged by (Appio et al., 2014). While MDS emphasizes cosine and Jaccard similarity indices, VOSviewer employs an alternative normalization method for co-occurrence frequency known as association strength ( $AS_{ij}$ ), calculated as (van Eck & Waltman, 2017):

$$AS_{ij} = \frac{C_{ij}}{w_i w_j}$$

where  $C_{ij}$  represents the observed co-occurrence and  $w_i, w_j$  are the total occurrences of terms  $i$  and  $j$ . This approach reflects the proportion between observed and statistically expected co-occurrences under the assumption of independence (Van Eck & Waltman, 2007)

## Findings

### *What Are The Research Trends In Loneliness And Family Communication Studies Based On The Annual Distribution Of Publications From 2020 To 2025?*



**Figure 2: Graph Of The Level Of Research Development On Loneliness And Family Communication Studies**

Year	Number of Documents
2025	38
2024	76
2023	60
2022	64
2021	49
2020	34

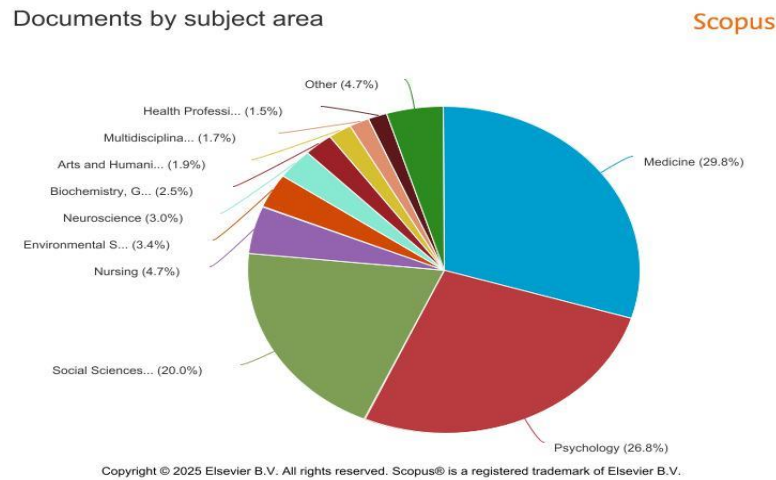
**Table 3: The Development Of Research On Loneliness And Family Communication Studies**

The data presented in Figure 2 and Table 3 illustrates the progression of scholarly interest in the intersection of loneliness and family communication over the past six years. A general upward trend is observable, indicating growing academic attention to this area of study. Between 2020 and 2024, the number of published documents increased markedly, rising from 34 in 2020 to a peak of 76 in 2024. This growth suggests an expanding recognition of the importance of familial dynamics in understanding and addressing loneliness. Although there is a slight decline in 2025, with 38 documents recorded to date, it is likely attributable to the incomplete data for the current year rather than a substantive reduction in research activity. The most significant year-on-year increase occurred between 2020 and 2021, with a 44% rise in publications, followed by a steady growth pattern through 2024. This sustained increase may reflect broader societal concerns around mental health and social isolation, particularly in the context of the COVID-19 pandemic, which likely intensified both scholarly and public interest in these themes. Overall, the data underscores a consistent and growing academic engagement



with the relationship between loneliness and family communication, highlighting it as a pertinent and evolving field of inquiry.

### ***What Are The Research Trends In Research On Loneliness And Family Communication Studies According To The Subject Area?***



**Figure 3: Percentage Distribution Of Loneliness And Family Communication Publications By Subject Area**

Subject Area	Number of Research	Percentage (%)
Medicine	158	49.22
Psychology	142	44.24
Social Sciences	106	33.02
Nursing	25	7.79
Environmental Science	18	5.61
Neuroscience	16	4.98
Biochemistry, Genetics and Molecular Biology	13	4.05
Arts and Humanities	10	3.12
Multidisciplinary	9	2.80
Health Professions	8	2.49

**Table 4: Percentage Of Research On Loneliness And Family Communication By Subject Area**

The data presented outlines the distribution of research output across various academic subject areas, highlighting Medicine as the most dominant field with 157 studies, accounting for 29.8% of the total. This is followed by Psychology (140 studies; 26.6%) and Social Science (106

studies; 20.2%), together comprising over three-quarters of the total research. These findings suggest a strong emphasis on health-related and behavioral sciences, potentially reflecting societal needs and funding priorities directed towards improving public health, mental well-being, and social systems. The prominence of these fields may also be attributed to their interdisciplinary nature and their ability to generate impact, evidence-based insights relevant to contemporary global challenges.

In contrast, disciplines such as Nursing (4.6%), Environment (3.4%), Neuroscience (3.0%), and Biochemistry (2.5%) are less represented, while Art and Humanities, Multidisciplinary, and Health Professional studies collectively make up less than 5% of the total. The relatively low representation of these areas could indicate either limited research funding or fewer published outputs compared to the dominant fields. However, their inclusion underscores the diversity of scholarly inquiry and the importance of integrative approaches. These trends may offer valuable insights for policymakers, academic institutions, and funding bodies when considering strategic investments in research to ensure a balanced and inclusive advancement of knowledge.

#### *What Are The Most Cited Articles?*

Authors	Title	Year	Source title	Cited by
Loades M.E.; Chatburn E.; Higson-Sweeney N.; Reynolds S.; Shafran R.; Brigden A.; Linney C.; McManus M.N.; Borwick C.; Crawley E. (Loades et al., 2020)	Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19	2020	Journal of the American Academy of Child and Adolescent Psychiatry	1857
Hards E.; Loades M.E.; Higson-Sweeney N.; Shafran R.; Serafimova T.; Brigden A.; Reynolds S.; Crawley E.; Chatburn E.; Linney C.; McManus M.; Borwick C. (Hards et al., 2022)	Loneliness and mental health in children and adolescents with pre-existing mental health problems: A rapid systematic review	2022	British Journal of Clinical Psychology	99
Cao Q.; Xu X.; Xiang H.; Yang Y.; Peng P.; Xu S. (Cao et al., 2020)	Bullying victimization and suicidal ideation among Chinese left-behind children: Mediating effect of loneliness and moderating effect of gender	2020	Children and Youth Services Review	43
Cole A.; Bond C.; Qualter P.; Maes M. (Cole et al., 2021)	A systematic review of the development and psychometric properties of	2021	International Journal of Environmental Research	31



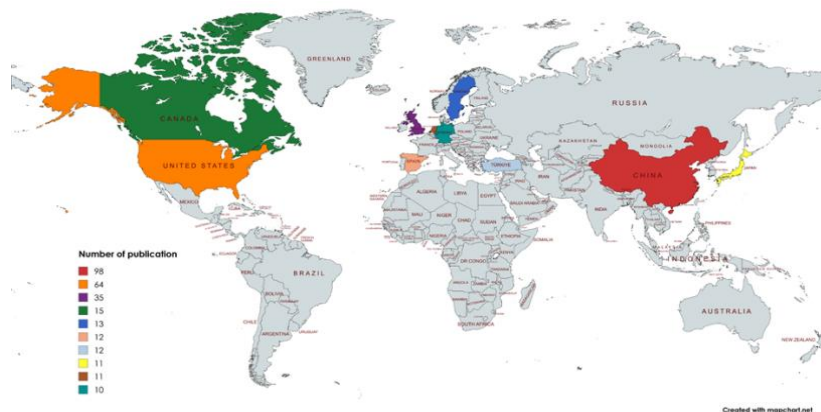
	loneliness measures for children and adolescents		and Public Health	
Wang Q.; Zhang Y.; Liu X. (Wang et al., 2021)	Perceived discrimination, loneliness, and non-suicidal self-injury in Chinese migrant children: The moderating roles of parent-child cohesion and gender	2021	Journal of Social and Personal Relationships	22
Musetti A.; Grazia V.; Manari T.; Terrone G.; Corsano P. (Musetti et al., 2021)	Linking childhood emotional neglect to adolescents' parent-related loneliness: Self-other differentiation and emotional detachment from parents as mediators	2021	Child Abuse and Neglect	20
Song J.; Ma C.; Ruan Y. (Song et al., 2021)	Left-Behind Children's Grandparent-Child and Parent-Child Relationships and Loneliness: A Multivariable Mediation Model	2021	Family Relations	18
Sachs A.L.; Coringrato E.; Sprague N.; Turbyfill A.; Tillema S.; Litt J. (Sachs et al., 2022)	Rationale, Feasibility, and Acceptability of the Meeting in Nature Together (MINT) Program: A Novel Nature-Based Social Intervention for Loneliness Reduction with Teen Parents and Their Peers	2022	International Journal of Environmental Research and Public Health	14
Kayaoğlu K.; Okanlı A.; Budak F.K.; Aslanoğlu E. (Kayaoğlu et al., 2022)	The correlation between loneliness and substance use proclivity in child and adolescent substance users	2022	Journal of Substance Use	11
Ali A.M.; Alkhamees A.A.; Hallit S.; Al-Dwaikat T.N.; Khatatbeh H.; Al-Dossary S.A. (Ali et al., 2024)	The Depression Anxiety Stress Scale 8: investigating its cutoff scores in relevance to loneliness and burnout among dementia family caregivers	2024	Scientific Reports	8

The citation data reveal that the most influential scholarly contributions concerning loneliness and mental health among children and adolescents are predominantly systematic reviews and empirical studies addressing the psychosocial impacts of isolation, particularly in the context of COVID-19. The most highly cited work by Loades et al. (2020), with 1,857 citations, provides a rapid systematic review of the effects of social isolation and loneliness on young people's mental health during the pandemic, reflecting its substantial impact on both academic

research and policy discourse. Similarly, Hards et al. (2022), with 99 citations, further explores loneliness in youth with pre-existing mental health conditions, emphasizing the compounding effect of isolation in vulnerable populations. Cao et al. (2020), cited 43 times, investigates the relationship between bullying, loneliness, and suicidal ideation among Chinese left-behind children, highlighting the mediating role of loneliness in adverse mental health outcomes.

Subsequent studies maintain a strong focus on measurement, family dynamics, and social determinants of loneliness. Cole et al. (2021), with 31 citations, systematically evaluates the psychometric validity of loneliness scales for children and adolescents, indicating a growing concern for methodological rigor in loneliness research. Wang et al. (2021) and Musetti et al. (2021), cited 22 and 20 times respectively, examine the moderating and mediating roles of family cohesion and emotional neglect in shaping loneliness experiences. Song et al. (2021) (18 citations) expands on this by modeling multigenerational family relationships among left-behind children. The remaining articles by Sachs et al. (2022), Kayaoğlu et al. (2022), and Ali et al. (2024), though less cited, address emerging areas such as nature-based interventions, substance use, and caregiver stress, each contributing to a nuanced and interdisciplinary understanding of loneliness across diverse youth and caregiving populations.

#### *What Are The Most Countries In Publication?*



**Figure 4: Country-Wise Distribution And Leading Contributors Of Publications In The Field Of Loneliness And Family Communication**

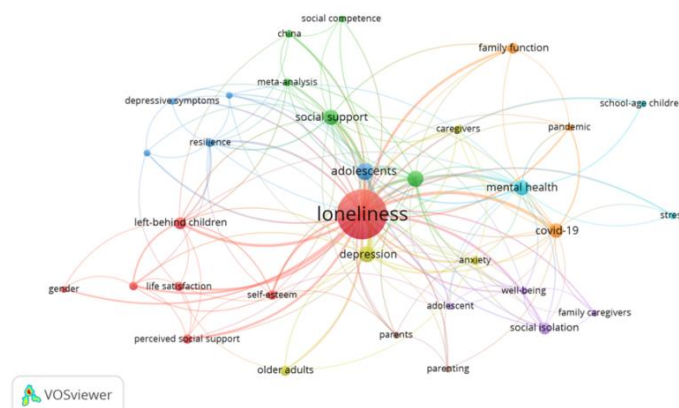
Country	Number of Publication	Percentage (%)
China	98	34.88
United States	64	22.78
United Kingdom	35	12.46
Canada	15	5.34
Sweden	13	4.63
Spain	12	4.27
Turkey	12	4.27
Japan	11	3.91
Netherlands	11	3.91
Germany	10	3.56

**Table 6: Most Top 10 Cited Authors**

The distribution of scholarly publications among the top ten most cited countries in the dataset reveals a clear dominance by a few leading nations in the global research landscape. China emerges as the foremost contributor, accounting for 98 publications, which represents 34.88% of the total. This substantial share highlights China's significant investment in and emphasis on academic research. The United States follows with 64 publications (22.78%), maintaining its longstanding role as a central player in the global research community. The United Kingdom ranks third with 35 publications (12.46%), underscoring its continued influence despite its smaller population compared to China and the U.S. Together, these three countries contribute nearly 70% of the total publications, illustrating a high degree of concentration in global research output.

The remaining countries contribute more modestly to the total, yet still represent important nodes in the international research network. Canada (5.34%), Sweden (4.63%), Spain and Turkey (each 4.27%), Japan and the Netherlands (each 3.91%), and Germany (3.56%) round out the top ten. While each of these countries accounts for less than 6% individually, their presence indicates a geographically diverse contribution to scholarly discourse. The relatively close percentages among these nations suggest a competitive but collaborative global research environment. Overall, these data highlight both the concentration of academic influence in a few key countries and the broader international engagement in scholarly publication.

### ***What Are The Popular Keywords Related To The Study?***

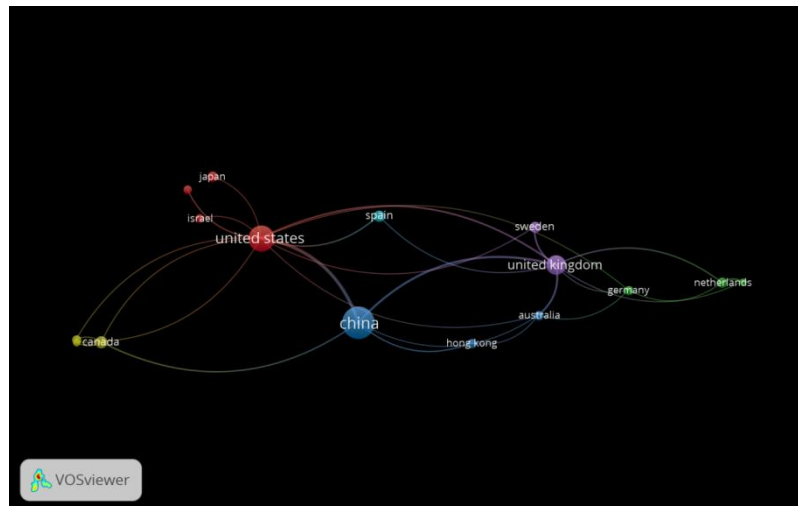


**Figure 5: Network Visualization Map Of Keywords' Co-Occurrence**

The keyword co-occurrence analysis generated through VOSviewer offers a comprehensive overview of the research landscape on loneliness and its associated psychosocial constructs. The term *loneliness* emerged as the most prominent keyword, with 237 occurrences and the highest total link strength of 298, indicating its central position within the literature. Other frequently co-occurring terms include *depression* (26 occurrences, 61 link strength), *children* (27, 59), *adolescents* (28, 53), and *mental health* (24, 47), reflecting a strong research focus on the emotional and psychological experiences of young populations. These findings suggest that loneliness is predominantly examined within the broader context of youth mental health, particularly in relation to internalizing symptoms such as depression, anxiety, and the effects of social isolation. The data underscore the increasing academic interest in understanding the mental health implications of loneliness among children and adolescents, especially in recent years.

In addition to individual psychological variables, family-related keywords also appeared, albeit with lower frequencies, pointing to a developing area of inquiry concerning familial influence on loneliness. Terms such as *family function* (12 occurrences, 18 link strength), *caregivers* (7, 12), *family caregivers* (5, 9), *parenting* (5, 8), and *parents* (5, 11) highlight the emerging recognition of the role of family dynamics in shaping experiences of loneliness. Moreover, the presence of *perceived social support* (9, 15) and *resilience* (8, 25) suggests that interpersonal and systemic factors may serve as mediators or moderators in the relationship between loneliness and mental health outcomes. Contextual keywords such as *COVID-19 pandemic* (21, 44) and *social isolation* (14, 28) further reveal the impact of global crises on social connectivity and familial relationships. Additionally, terms like *China* and *migrant elderly following children* point to culturally specific research contexts, emphasizing the geographic diversity and sociocultural nuances in loneliness research. Collectively, the co-occurrence findings support a multidimensional understanding of loneliness, with strong links to youth mental health and a growing emphasis on family communication and social support systems.

### ***What Is Co-Authorship Based On Countries' Collaboration?***



**Figure 6: Network Visualization Map Of Country Collaboration**

The country-level bibliometric analysis generated through VOSviewer provides a detailed perspective on the geographic distribution and scholarly influence of research on loneliness and family communication. China leads in publication volume with 97 documents, followed by the United States (64) and the United Kingdom (35). Notably, the United Kingdom, despite its lower output, demonstrates significant scholarly impact, with a total citation count of 2,205, suggesting that its contributions are both foundational and widely referenced in the field. Similarly, Canada and Spain, with fewer publications (15 and 12 respectively), exhibit relatively high citation counts (225 and 490), indicating that their research outputs, though limited in number, are of substantial academic value. These patterns reflect a dual trend within the literature: high-output nations driving research productivity and select countries contributing highly influential, often-cited studies.

In terms of collaborative networks, total link strength metrics reveal the United States as the most interconnected country (25), underscoring its central role in international research partnerships. In contrast, China, despite its high publication output, has a lower total link strength (20), indicating a more domestically focused research agenda. Countries such as Australia, the Netherlands, and Canada demonstrate moderate collaborative engagement, suggesting regionally concentrated research ties. Meanwhile, nations like Belgium, Germany, and Sweden, though contributing fewer publications, maintain modest collaborative links. Overall, the relatively low link strength scores across most countries highlight a limited degree of international cooperation in this research domain. Enhancing global research collaborations—particularly by integrating high-impact yet less connected countries—could enrich the field with broader cultural perspectives, thereby deepening the understanding of how family communication influences loneliness across diverse social and cultural contexts.

## Conclusion

The objective of this study was to examine the bibliometric characteristics of research concerning the associations between loneliness and family communication. This included assessing the annual publication trends from 2020 to 2025, identifying productive subject areas, recognizing the most frequently cited publications, listing the leading contributing countries, analyzing commonly used keywords, and evaluating international collaboration through co-authorship networks. The analysis aimed to provide a systematic overview of how this research domain has evolved, where it is concentrated geographically and academically, and how it may develop in the future.

Findings show that scholarly attention toward loneliness and family communication has grown consistently, peaking in 2024. Medicine, psychology, and social sciences dominate the subject areas, indicating a strong interdisciplinary focus on health and behavior. Most cited works focus on the effects of social isolation on youth mental health, particularly in the context of global crises. China, the United States, and the United Kingdom are the top publishing countries, while citation impact remains especially high for certain European countries. Keyword analysis reveals a strong focus on youth, mental health, and emotional well-being, with family-related terms gaining increasing prominence. Co-authorship patterns suggest a need for stronger international collaboration, as many countries still show limited partnership in cross-border studies.

The results contribute to a deeper understanding of how loneliness is studied through the lens of family interaction, providing a foundation for future inquiry and intervention planning. These insights can support stakeholders in health, education, and social services to shape evidence-based approaches addressing loneliness within family systems. Limitations include the reliance on indexed databases, which may exclude relevant but less-visible publications. Future research can expand on this by integrating more regional studies and emphasizing cross-cultural collaboration. Overall, the bibliometric approach used in this study demonstrates its value in identifying key dynamics and gaps in the literature, helping to guide further development in this increasingly important field.



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