

# Bibliometric Study of Sexual Self-Care Education: A Review of Research Conducted Over the Past 30 Years

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Article type:  
Original Research

Article history:

Received 21 June 2025

Revised 06 October 2025

Accepted 09 October 2025

Published online 09 October 2025

## ABSTRACT

The aim of this study is to identify temporal developments, geographical expansion, influential contributors, and conceptual growth in the field of sexual self-care. This research applies a bibliometric analysis to studies published on sexual self-care. All scientific outputs indexed in the Scopus database between 1993 and 2023 were considered the statistical population of this study. The data were analyzed using VOSviewer software, version 1.6. By searching relevant keywords in Scopus, 1,186 documents referencing sexual self-care in their titles, keywords, or abstracts were identified. The highest number of publications in this field was indexed in 2023. White was recognized as the most prolific author with 12 articles, and the article by Wolf et al. (2009) was identified as the most frequently cited. The United States and the United Kingdom were also recognized as among the oldest and most highly cited countries in this area.

**Keywords:** sexual self-care, bibliometric analysis, Scopus database

## How to cite this article:

Hojjat, H., Samavi, A., Mousapour, N., & Ahmadi, F.Z. (2026). Bibliometric Study of Sexual Self-Care Education: A Review of Research Conducted Over the Past 30 Years. *Mental Health and Lifestyle Journal*, 4(1), 1-15. <https://doi.org/10.61838/mhlj.118>

## Introduction

Sexual health and self-care have become critical global public health priorities, particularly for children and adolescents, whose developmental needs and social vulnerabilities require educational interventions that are age-appropriate, culturally relevant, and evidence-based. Over the last three decades, research on sexual self-care education has expanded rapidly, influenced by increasing recognition that early, structured, and contextually sensitive education can promote healthy sexual development, reduce risky behaviors, and empower young people to make informed decisions (1-3). Despite these advances, sexual health education remains controversial and unevenly implemented across societies due to cultural resistance, structural barriers, and varying levels of institutional support (4-6).

The concept of sexual self-care—defined as the ability of individuals to protect and promote their sexual health through knowledge, attitudes, and behaviors—has gained prominence as part of broader self-care frameworks in health promotion (2, 7). Empowering families and teachers to support self-care practices is increasingly seen as essential for protecting children from exploitation and for promoting positive sexual identity formation (1, 8). Yet, in many contexts, sexual education remains fragmented and teacher-led programs face both structural and socio-cultural challenges that limit their effectiveness (9, 10).

Internationally, a wide range of educational models have been developed to respond to these challenges. School-based interventions remain the most widely tested and evaluated, given their potential to reach large populations of children and adolescents. For example, programs like those evaluated by Wolfe et al. showed that embedding relationship education within health curricula reduced physical dating violence and increased condom use among adolescents over time (11). Similarly, interventions in low-resource contexts, such as those studied in Tanzania by Ross et al., improved knowledge, attitudes, and some sexual behaviors among boys, though sustaining biological outcomes proved difficult (12).

Emerging evidence highlights the importance of pedagogical innovation in sexual health education. Traditional, teacher-centered instruction has been shown to face barriers such as lack of time in curricula, insufficient training, and discomfort among teachers (9, 10). This has motivated the development of peer-led and student-led approaches that enhance relevance and engagement. The RIPPLE trial in England found that pupil-led sex education was effective in shifting some sexual health outcomes, although it underscored the need for broader strategies and safe single-gender sessions (13). Similarly, Pound et al. synthesized youth perspectives and found that while students value sex education, they often feel that content is outdated or lacks sensitivity to their lived realities (14).

In parallel, digital and game-based learning platforms have introduced new possibilities for making sexual health education interactive and contextually meaningful. Serious games and digital simulations, such as those developed by Arnab et al., have been designed to increase engagement and facilitate difficult conversations about relationships and sexual behavior (15). Web-based interventions have also demonstrated potential to improve sexual intimacy and knowledge in populations with limited access to face-to-face programs (16-18). These innovations offer scalable and low-cost alternatives that can complement traditional curricula, especially where cultural norms limit open classroom discussions (19, 20).

Nevertheless, cultural sensitivity remains a cornerstone of effective sexual health education. In conservative societies, such as Iran, socio-cultural norms and taboos have been found to be more influential barriers than explicit religious prohibitions (4). Studies indicate that carefully adapting curricula to local cultural values and engaging parents and community leaders can help reduce resistance (6, 8). For example, integrating Islamic principles into early sexual education has been proposed as a means of harmonizing religious frameworks with contemporary health needs (6).

The literature also underscores the role of teachers as key change agents in implementing sexual self-care education. Teachers' attitudes toward sexuality, their comfort with the content, and their ability to manage classroom dynamics significantly affect program outcomes (5, 8). Research shows that without sufficient training and institutional support, teachers may avoid sensitive topics or fail to deliver interactive and student-centered sessions (9, 10). Conversely, programs that invest in teacher capacity-building and align

content with existing personal and social education frameworks show higher fidelity and better outcomes (15, 21).

A parallel area of scholarship has explored self-care models and theoretical underpinnings that can inform sexual health education. Self-care frameworks emphasize individual agency and knowledge development, but also highlight the role of systemic support—schools, families, and health systems—in enabling young people to exercise sexual autonomy responsibly (1, 2). For instance, fostering early sexual literacy has been associated with improved self-concept and protective behaviors among adolescents (3, 22). Evidence suggests that programs addressing sexual self-concept—including comfort with one’s body, understanding of pleasure, and safe practices—are protective against exploitation and risky behavior (23, 24).

Bibliometric approaches have emerged as a robust method for mapping the knowledge landscape and identifying gaps in sexual health education research. Such methods allow for analyzing publication trends, co-authorship networks, and conceptual developments to inform policy and practice (25-27). Through these analyses, it becomes possible to track influential scholars, highlight underexplored topics, and guide resource allocation for future research. Recent bibliometric reviews indicate a steady global rise in publications on sexual health and self-care education since the early 2000s, with notable contributions from high-income countries and increasing but still limited participation from low- and middle-income countries (5, 19).

Another critical issue is the contextual complexity of implementing sexual self-care education in diverse educational systems. Policymakers face the challenge of balancing global public health recommendations with local sensitivities (19, 28). In contexts where sexual harassment and exploitation are prevalent, the role of educational institutions in prevention and victim support becomes particularly urgent (28, 29). Moreover, research suggests that relational and sexual education can also contribute to broader well-being outcomes such as self-efficacy, reduced anxiety, and healthier intimate relationships (16-18).

Despite the progress made, the field still faces persistent gaps. Many studies focus on adolescents but neglect younger children, even though early interventions can establish protective knowledge and behaviors (3). Additionally, much of the existing research has been conducted in Western settings, leaving important cultural and systemic differences underexplored (4, 5, 19). Furthermore, evaluation studies often rely on self-reported outcomes rather than long-term behavioral or biological measures, limiting understanding of true program impact (11, 12).

In this context, bibliometric analysis provides a powerful lens for examining the evolution of sexual self-care education research. By synthesizing three decades of global scholarship, mapping conceptual clusters, and identifying key contributors and geographic trends, this study addresses critical knowledge gaps and provides actionable insights for researchers, educators, and policymakers.

## Methods and Materials

The present study is a review research because its aim is to examine prior studies in the field of sexual curriculum education in order to identify and extract new findings. This study reviewed various research conducted on sexual self-care education during the years 1993–2023 that were indexed in the Scopus database.

The study was conducted using different bibliometric analysis techniques. Considering the nature of the subject, the research approach can also be classified as a form of content analysis. Given the very large volume of data and information involved, the research can also be regarded as a data mining process.

Bibliometric analysis is a tool for determining the status of research conducted in a specific field, identifying trends and potential knowledge gaps, and it plays an important role in the management and decision-making of science and technology (see e.g., reference 4). Bibliometric analysis mainly enables the development of analytical methods and bibliometric indicators derived from statistical metrics and is a tool that manages records of information related to publications, citations, patent documents, reports, and more (see reference 5). Bibliometric analysis also provides additional statistics regarding data such as author, affiliation, and keywords (see reference 6). Moreover, it facilitates the integration of information to develop research areas in a specific topic or across entire disciplines (see reference 4). Bibliometric analysis also enables the visualization of indicators in a network format (see reference 5).

VOSviewer is a software tool used to construct and visualize bibliometric networks. For example, these networks may include journals, researchers, or individual publications and can be built based on citations, bibliographic coupling, co-citation, or co-authorship relations. VOSviewer also provides text mining capabilities, which can be used to construct and visualize networks of co-occurring important terms extracted from a body of scientific literature. Its unique capabilities—such as topic clustering, co-citation analysis, and the identification of prominent authors—differentiate VOSviewer from other similar tools.

Accordingly, data and information from articles published and indexed in the Scopus database over the last 30 years (1993–2023) were collected. The search in Scopus was conducted on February 16, 2024. The search results identified 1,186 articles.

The search string used was:

“sex education” OR “sexual self-care” OR “sexual health” OR “sexual literacy” OR “sexual hygiene” AND “teacher”

To analyze the data and to recognize relationships and interactions among the various variables used in the studies, social network analysis techniques were applied. Social network analysis can be performed using various software tools. In this study, VOSviewer was used. Bibliometric data from the 1,186 articles were imported into the software, and through social network analysis, the necessary tables and visualizations were generated and examined as the software output.

Findings and Results

Studies on Sexual Self-Care Indexed in Scopus

The search results in the Scopus database using the keywords (*sex education, sexual self-care, sexual health, sexual literacy, sexual hygiene, teacher*) on February 16, 2024, identified 1,186 records. Of these records, 1,013 were research articles, 61 were review papers, 47 were book chapters, 25 were books, and 17 were conference papers.

Table 1. Studies on Sexual Self-Care Indexed in Scopus

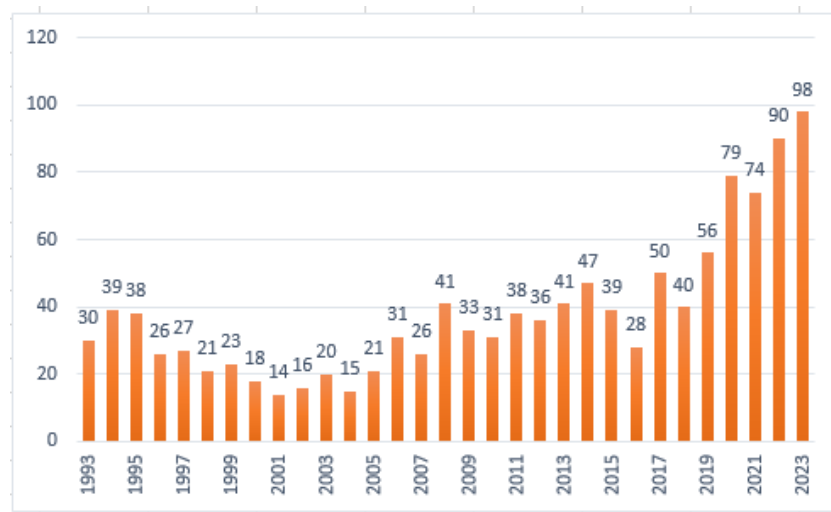
| Document Type | Number of Records |
|---------------|-------------------|
| Article       | 1,013             |
| Review Papers | 61                |
| Book Chapters | 47                |

|                   |       |
|-------------------|-------|
| Books             | 25    |
| Conference Papers | 17    |
| Total             | 1,186 |

As shown, the majority of the records are journal articles, accounting for over 85% of all indexed outputs.

### Temporal Developments

At this stage of the research, the objective was to analyze the temporal trend of documents published over the past 30 years. In other words, this phase aimed to clarify how many documents have been published in this field during the three-decade period. For this purpose, only published articles were examined, totaling 1,017 articles. The distribution of articles over time is presented in the following chart.



**Figure 1. Published Articles in the Field of Sexual Self-Care by Year**

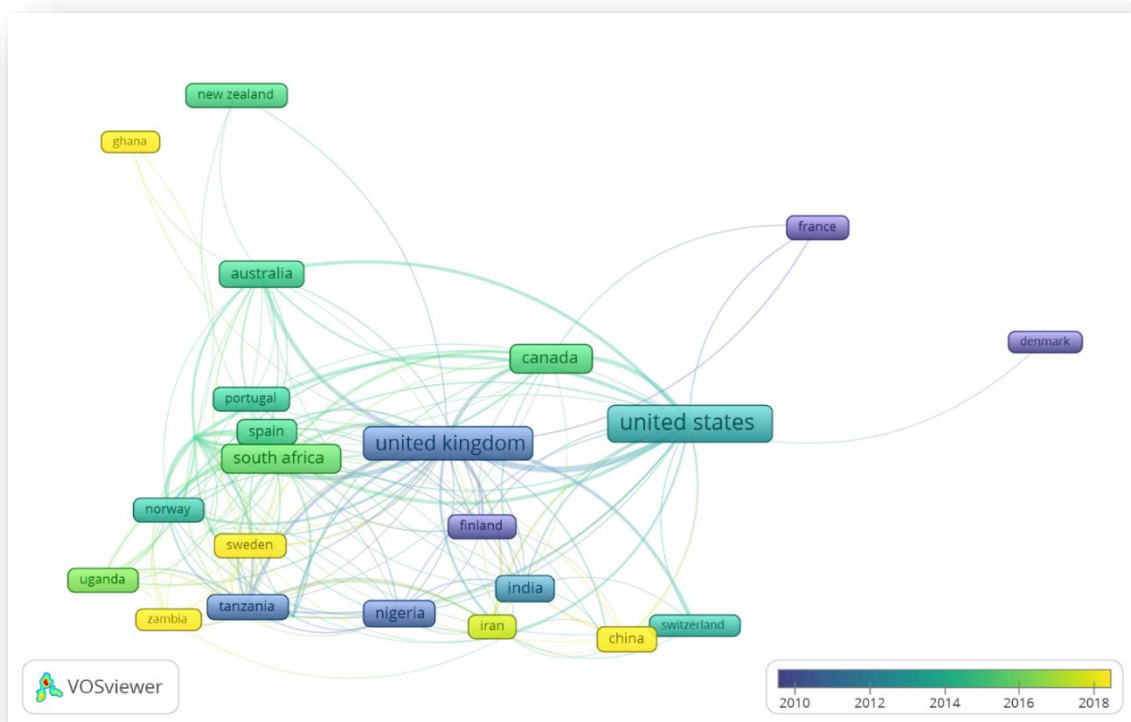
As shown, the highest frequency of publications occurred in 2023, with 98 studies on sexual education being published that year, while the lowest frequency was observed in 2001, with only 14 studies. This chart demonstrates a cyclical yet generally increasing trend in the number of articles indexed in Scopus.

### Geographical Expansion

After importing the data into VOSviewer, a country-level citation network was constructed (Figure 2). The type of analysis was set to *citation analysis*, and the unit of analysis was *country*. The minimum number of documents per country was set to one article, and the minimum number of citations per country was set to 100 citations. Based on the software's analysis, 29 countries were mapped (Figure 1). Table 2 presents the top 10 highly cited countries ranked by *total link strength*. The United Kingdom, with 4,403 citations, emerged as the most highly cited country.

When interpreting the citation network, the following should be noted:

1. Each node in the network represents a country.
2. The size of the node indicates the frequency of publications from that country.
3. The links between nodes show the *strength of connections* between countries.
4. The color gradient of each node represents the *temporal dimension* of the country's presence in the field: blue indicates older contributions, and the shift toward warmer colors indicates newer entrants into the field.



**Figure 2. Temporal Evolution of Countries in the Field of Sexual Self-Care**

As illustrated, European countries—including France, Denmark, Finland, and the United Kingdom—were among the earliest to engage in this field. The United Kingdom was also identified as both the most productive and most highly cited country. In contrast, Asian and some African countries, such as Iran and China, have entered the field more recently. Among the articles indexed in Scopus, Iran ranked 15th, with 17 articles among the 29 countries that had received more than 100 citations.

**Table 2. Highly Cited Countries in the Field of Sexual Self-Care**

| Rank | Country        | Documents | Citations | Total Link Strength |
|------|----------------|-----------|-----------|---------------------|
| 1    | United States  | 255       | 4,998     | 179                 |
| 2    | United Kingdom | 188       | 4,403     | 270                 |
| 3    | Canada         | 77        | 1,416     | 89                  |
| 4    | South Africa   | 63        | 1,071     | 170                 |
| 5    | Australia      | 53        | 897       | 74                  |
| 6    | Netherlands    | 39        | 891       | 171                 |
| 7    | Nigeria        | 39        | 406       | 23                  |
| 8    | India          | 38        | 458       | 20                  |
| 9    | China          | 35        | 319       | 18                  |
| 10   | Spain          | 32        | 354       | 43                  |

### Active Contributors

### Highly Cited Articles

In the data analysis, the first step was to identify the articles with the highest number of citations. Table 3 lists the articles with more than 100 citations.

**Table 3. Articles with More Than 100 Citations Indexed in Scopus in the Field of Sexual Self-Care**

| No. | Authors & Year of Publication                      | Title                                                                                                                                          | Citations | Summary                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Wolfe, David A. et al. (2009)                      | A school-based program to prevent adolescent dating violence                                                                                   | 383       | Educating youth about healthy relationships as part of their required health curriculum reduced physical dating violence (PDV) and increased condom use 2.5 years later at a low cost per student.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 2   | Ross, David Anthony et al. (2007)                  | Biological and behavioral impact of an adolescent sexual health intervention in Tanzania                                                       | 205       | This intervention significantly improved knowledge, reported attitudes, and some reported sexual behaviors, especially among boys, but showed no sustained effect on biological outcomes during the 3-year trial period.                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 3   | Blakely, Amy et al. (2009)                         | How sources of sexual information relate to adolescents' beliefs about sex                                                                     | 198       | Different sources of sexual information were associated with distinct underlying beliefs among adolescents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 4   | White, Daniel et al. (2002)                        | Limitations of teacher-delivered sex education                                                                                                 | 186       | Compared with conventional sex education, this specifically designed intervention did not reduce sexual risk behaviors in adolescents.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 5   | Stephenson, Judith M. et al. (2004)                | Student-led sex education in England (RIPPLE study)                                                                                            | 167       | Peer-led sex education was effective in some respects, but broader strategies are needed to improve young people's sexual health. The role of single-gender sessions warrants further investigation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 6   | Hawkins, J. David et al. (2008)                    | Effects of the Social Development Intervention in childhood 15 years later                                                                     | 166       | A universal intervention for urban elementary school students, focusing on classroom management, children's social competence, and parenting practices, produced long-term positive effects on mental health, sexual health, and educational and economic outcomes 15 years post-intervention.                                                                                                                                                                                                                                                                                                                                                                          |
| 7   | Pound, Pandora et al. (2016)                       | What young people think about sex and relationships education and their school relationships: A qualitative synthesis of views and experiences | 153       | Positive outcomes emerged from relationship and sex education when delivered by professionals who maintained clear boundaries with students.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 8   | Buston, Katie et al. (2002)                        | Implementing teacher-delivered sex education: Barriers and facilitators                                                                        | 121       | Program fidelity was supported by intensive teacher training, alignment with existing Personal and Social Education (PSE), and senior management backing. Barriers included curriculum time competition, brief lessons, low prioritization of PSE, limited teacher experience and skill in role-play, as well as staff turnover, theoretical understanding gaps, and research commitment.                                                                                                                                                                                                                                                                               |
| 9   | Eisenberg, Marla E. et al. (2008)                  | Support for comprehensive sexuality education: Perspectives of parents of school-age youth                                                     | 115       | The study highlighted a mismatch between parents' expressed views and preferences and the actual content of sex education currently taught in most public schools.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 10  | Arnab, Sylvester et al. (2013)                     | The development approach of a serious game-based learning tool to support relationships and sex education in the classroom                     | 105       | Observational data analysis showed that, compared with traditional classroom teaching, the game-based approach encouraged teachers and students to engage in group discussions and dialogue during and after gameplay.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 11  | Latifnejad Roudsari, Robab et al. (2013)           | Socio-cultural challenges of sexual health education for adolescent girls in Iran                                                              | 105       | Cultural resistance appeared to be more influential than religious prohibitions in shaping the nature and content of sexual health education. Despite prominent socio-cultural concerns about sexual health education for adolescents, emerging challenges were found to be partly manageable.                                                                                                                                                                                                                                                                                                                                                                          |
| 12  | Kaestle, Christine E. & Allen, Katherine R. (2013) | The role of masturbation in healthy sexual development: Young adults' perceptions                                                              | 102       | Findings showed that young adults' perceptions and feelings about masturbation are shaped by a developmental process: (1) learning about the act and how to do it, (2) learning and internalizing social stigma and taboos surrounding this pleasurable behavior, and (3) coping with the tension between stigma and pleasure. Almost all participants learned about masturbation through media and peers (not parents or teachers). Gender played a role in managing stigma and pleasure: most women reported still struggling with or normalizing the contradiction, while most men recognized the beneficial aspects of masturbation for healthy sexual development. |



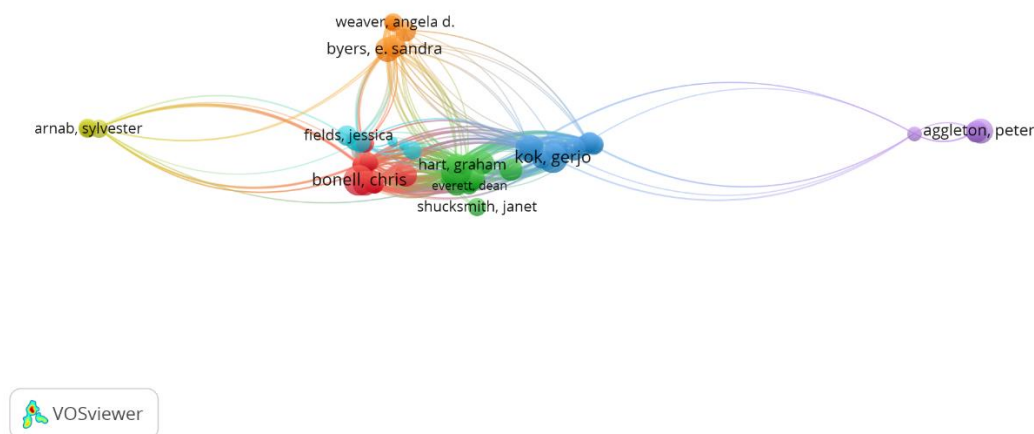
According to Table 2, 12 articles have received more than 100 citations. Among the highly cited articles, 16.6% were published during 1993–2003, 66.6% during 2004–2013, and 16.6% during 2014–2023. It is noteworthy that 25% of the highly cited articles were published in 2013. Additionally, among the highly cited articles, one Iranian article is also present.

### Highly Cited Authors

After importing the data into VOSviewer, the author citation network was constructed (Figure 2). The type of analysis was set to *citation analysis* and the unit of analysis was *author*. The minimum threshold was set to one article per author and at least 100 citations per author. Based on the software analysis, 153 authors were identified. Some of these 153 nodes are not connected to each other. The largest connected set consists of 97 authors, which is shown in Figure 3. Table 4 presents the top ten authors ranked by *total link strength*.

When interpreting the author citation network, the following points are important:

1. Each node in the network represents an author.
2. The size of the node reflects the frequency of publications by each author.
3. The links between nodes represent the *strength of the connection* between authors.
4. The colors of the nodes indicate the clusters of authors grouped based on their collaboration or thematic relationships.



**Figure 3. Most Highly Cited Authors in the Field of Sexual Self-Care**

Based on the software analysis, White ranks first with 9 articles, 591 citations, and a total link strength of 234. Buston and Abraham, each with 5 articles, are in the second and third positions with 425 and 452 citations, respectively. It is notable that although Buston has slightly fewer citations than Abraham, due to stronger link strength, Buston is ranked second. Scott and Hart, each with 3 articles and 358 and 339 citations respectively, rank fourth and seventh among the most highly cited authors.

White, Buston, Hart, and Scott were identified as older highly cited authors in this field, with an average publication year around 2001–2002. In contrast, Bonell, who ranks eighth among the most highly cited authors, represents newer contributions with high citation counts, with an average publication year of 2018.



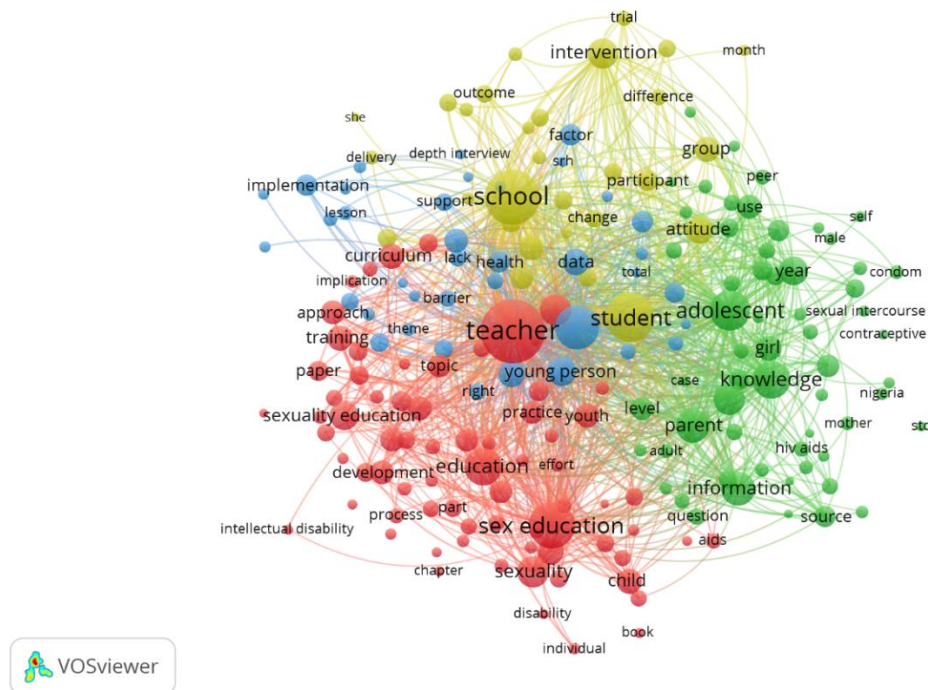
**Table 4. Top Ten Highly Cited Authors in the Field of Sexual Self-Care**

| Rank | Author              | Median Publication Year | Number of Articles | Citations | Total Link Strength |
|------|---------------------|-------------------------|--------------------|-----------|---------------------|
| 1    | White, Daniel       | 2002                    | 9                  | 591       | 234                 |
| 2    | Buston, Katie       | 2002                    | 5                  | 425       | 167                 |
| 3    | Abraham, Charles    | 2005                    | 5                  | 452       | 126                 |
| 4    | Scott, Sue          | 2001                    | 3                  | 358       | 117                 |
| 5    | Fletcher, Alan G.   | 2009                    | 7                  | 226       | 108                 |
| 6    | Matthews, Catherine | 2007                    | 6                  | 176       | 104                 |
| 7    | Hart, Graham        | 2002                    | 3                  | 339       | 101                 |
| 8    | Bonell, Chris       | 2018                    | 9                  | 186       | 100                 |
| 9    | Sharma, Herman      | 2016                    | 5                  | 183       | 98                  |
| 10   | Byers, E. Sandra    | 2008                    | 6                  | 262       | 87                  |

After importing the data into VOSviewer, the keyword co-occurrence network was analyzed. In total, 21,727 unique words were identified as keywords provided by authors in titles and abstracts. Applying a threshold of at least 50 occurrences, the list was reduced to 200 keywords. Using the criterion of a minimum of ten words per cluster, the software divided the data into four clusters (Figure 4).

When interpreting the keyword network, the following points are important:

1. Each node represents a keyword.
2. The size of the node reflects the frequency of that keyword's occurrence.
3. The links between nodes represent the *strength of the association* between keywords.
4. The colors of the nodes represent distinct thematic clusters.



**Figure 4. Keywords of Articles in the Field of Sexual Self-Care**

The most frequent keywords include teacher (2,386 occurrences), school (1,803), student (1,432), sex education (1,254), and study (1,154). This highlights the central role of teachers and schools in sexual self-care education for students.

The keyword clusters are shown in four colors — green, red, yellow, and blue — each representing a different thematic dimension:

- **Research Methods in Sexual Self-Care (Blue):** Includes terms such as *in-depth interview, factor, focus group, focused group discussion, implementation, interview, adolescent girl, barrier, challenge, comprehensive sexuality, data, text, learner, lesson, program, opportunity, provision, need, qualitative study*.
- **Subject Knowledge in Sexual Self-Care (Green):** Contains terms such as *sexual education, sexual relations, teenage pregnancy, sexually transmitted diseases, prevention, maturity, age, awareness, behavior, ethics, boy, communication, condom, contraception, woman, AIDS, information, internet, knowledge, puberty, relationship, respondent, sexual activity, sexual behavior, prevention, pregnancy, peer*.
- **Contextual Factors in Sexual Self-Care (Yellow):** Includes terms like *analysis, change, transformation, difference, effect, effectiveness, evaluation, evidence, educational level, group, impact, intervention, model, outcome, participant, perception, elementary school, quality, school, middle school, sexual health, sexual health education, skill, testing*.
- **Determinants of Sexual Self-Care Education (Red):** Includes terms such as *approach, child, classroom, association, content, culture, curriculum, development, education, instructor, effort, experience, family, focus, gender, perspective, policy, population education, practice, process, program, school nurse, subject, teacher, teaching, understanding, value*.

## Discussion and Conclusion

The findings of this bibliometric study provide a systematic overview of the research landscape on sexual self-care and sexual health education over the past three decades. A total of 1,186 documents were indexed in Scopus between 1993 and 2023, with a marked predominance of original research articles (over 85%), reflecting a maturing field that continues to expand in conceptual and methodological scope. The data revealed a clear upward trajectory in scholarly output, culminating in the highest number of publications in 2023. This sustained growth suggests an escalating recognition of sexual self-care as an essential component of public health and educational practice worldwide (25-27). Similar upward publication trends have been reported in other thematic areas of health and social development, indicating that sexual health literacy and self-care are increasingly prioritized by academic and policy agendas (5, 19).

The temporal analysis also showed that the most influential articles in this field—those with more than 100 citations—were published predominantly between 2004 and 2013, accounting for nearly 67% of the highly cited studies. This concentration of influential work during the early 2000s highlights a period of conceptual consolidation when core themes such as school-based sex education, teacher-led interventions, and student perceptions were rigorously studied. For instance, foundational works like those of Buston et al. and Wight et al. critically examined the barriers teachers face, including curriculum constraints and lack of training (9, 10). Similarly, Stephenson et al. demonstrated the effectiveness and limitations of pupil-led interventions in England, calling for more nuanced approaches (13). These early studies appear to have shaped subsequent programmatic innovations and informed the shift toward more learner-centered and participatory models.

Another important finding is the geographic distribution of research output, with the United States and the United Kingdom emerging as the most prolific and highly cited contributors. The U.S. led in total documents and citations, while the U.K. showed the strongest global link strength, indicating robust international collaboration. This dominance mirrors earlier bibliometric analyses in related health education fields (25, 27) and underscores the concentration of resources and established research networks in high-income countries. Yet, the entry of Asian and African countries—notably Iran and China—into this domain in recent years is promising, reflecting a growing global interest in adapting sexual health education to non-Western contexts (4, 5). Iranian scholarship, such as the qualitative analyses by Latifnejad Roudsari et al., has illuminated the socio-cultural barriers that influence the acceptability and design of sexual education, providing contextually grounded knowledge for culturally sensitive interventions.

The analysis of highly cited authors further underscores the intellectual architecture of the field. Daniel White leads in productivity and influence, aligning with his work on teacher-led and policy-driven sexual health programs (10). Scholars like Katie Buston, Charles Abraham, and Sue Scott have contributed to understanding implementation challenges and psychological determinants of sexual behavior (9, 13). More recent influential voices, such as Chris Bonell, mark a generational shift toward evaluating innovative delivery models and considering equity in access to sex education. The strong citation networks around these scholars suggest that their theoretical and empirical contributions remain foundational for both researchers and practitioners designing curricula and interventions.

The conceptual mapping of keywords revealed four prominent thematic clusters: research methods, subject knowledge, contextual factors, and determinants of sexual self-care education. The predominance of terms such as “teacher,” “school,” and “student” reinforces the centrality of the school system as the principal arena for sexual self-care education. This finding is consistent with prior evaluations of school-based programs which emphasize the school as an accessible and socially legitimate site for early intervention (11, 15, 21). At the same time, the emergence of research-oriented keywords such as “qualitative study,” “focus group,” and “in-depth interview” indicates methodological diversification, reflecting a growing use of qualitative inquiry to capture student experiences and cultural complexity (4, 14).

The prominence of self-care, autonomy, and sexual self-concept in the keyword network reflects the field’s gradual shift from risk-only frameworks to empowerment and developmental well-being. Earlier programs often emphasized disease prevention and abstinence, while contemporary models integrate positive sexuality, self-confidence, and relational competence (23, 24). Evidence indicates that enhancing adolescents’ self-concept and comfort with their own sexual identity can serve as a protective factor against unsafe sexual practices and exploitation (3, 22). Interventions that support sexual literacy—the ability to understand, express, and act upon sexual health knowledge responsibly—are linked to greater resilience and self-efficacy (17, 18).

Notably, pedagogical innovation remains a driving force for research development. Traditional lecture-based delivery has proven insufficient in engaging learners or addressing sensitive content (9, 10). In response, student-centered and participatory approaches have been tested, including digital and gamified platforms. For example, the serious games model by Arnab et al. offers an interactive environment where students can explore complex relational and sexual scenarios safely and reflectively (15). Likewise, web-based and low-cost virtual sexual health education tools have shown effectiveness in improving sexual

function, reducing anxiety, and expanding reach, particularly among marginalized populations (16, 17). Such tools may be especially beneficial in conservative or resource-limited contexts, where face-to-face discussion is constrained (19, 20).

The bibliometric results also bring attention to socio-cultural complexity, particularly in Middle Eastern and North African (MENA) regions. Research shows that cultural taboos and social stigma can overshadow explicit religious restrictions as barriers to implementing sexual self-care education (4, 5). Scholars have advocated for integrating culturally congruent frameworks, such as aligning sexual health principles with religious teachings, to foster acceptance and reduce resistance (6, 8). These culturally adaptive models are essential for extending evidence-based practices beyond Western contexts and ensuring equitable access to accurate sexual health information (19).

Finally, the study highlights the interdisciplinary nature of sexual self-care research. While much of the literature is anchored in education and public health, there is increasing integration with psychology, sociology, and digital innovation (14, 29). For example, understanding adaptive coping strategies among students and educators exposed to sexual harassment contributes to reducing burnout and creating safe learning environments (28, 29). Likewise, frameworks for relationship and sexuality education that account for emotional and psychological readiness can improve outcomes beyond knowledge acquisition (16, 20).

Although this bibliometric study offers a comprehensive overview of three decades of research on sexual self-care education, several limitations must be acknowledged. First, the analysis relied exclusively on the Scopus database, which, while extensive, may not fully capture research indexed in other academic repositories or in regional and non-English-language journals. Consequently, valuable insights from local studies and grey literature may have been excluded. Second, bibliometric indicators such as citation counts and co-authorship networks can be influenced by external factors, including journal visibility, disciplinary citation practices, and the preferential referencing of studies from high-income countries, potentially underestimating contributions from low- and middle-income regions. Third, the study's keyword-based search strategy might not have encompassed all relevant terminologies, especially in non-Western contexts where sexual health discourse is framed differently. Finally, while bibliometric mapping provides structural insight, it does not assess the quality or effectiveness of the interventions described, requiring complementary systematic reviews for deeper evaluation.

Future research should aim to overcome geographic and conceptual imbalances identified in this analysis. More context-specific studies are needed from underrepresented regions, particularly Africa, the Middle East, and parts of Asia, where cultural and systemic barriers to sexual health education remain underexplored. Comparative studies could illuminate how different socio-religious frameworks influence program acceptance and effectiveness. Researchers should also advance the field's methodological diversity by combining bibliometrics with systematic and realist reviews to link publication trends with intervention outcomes. Additionally, future work should move beyond self-reported data and short-term knowledge metrics to include longitudinal and behavioral outcomes, examining how sexual self-care education influences real-world practices and health indicators. Expanding research into digital interventions, including artificial intelligence-driven and gamified platforms, will also be essential to evaluate scalability, inclusivity, and ethical considerations in diverse settings.

For practitioners and policymakers, this study underscores the need to strengthen teacher training and institutional support for sexual health education. Teachers require not only accurate knowledge but also practical tools to navigate sensitive conversations and adapt content to students' cultural and developmental contexts. Schools and ministries of education should integrate evidence-based, culturally respectful curricula that go beyond risk avoidance to foster self-efficacy, healthy relationships, and positive sexual identity development. The findings also suggest that combining traditional classroom programs with digital and interactive platforms can expand reach, reduce stigma, and support differentiated learning needs. Finally, educational systems should foster collaborative networks among researchers, practitioners, parents, and community leaders to ensure sustainable and socially accepted sexual self-care education programs.

### Acknowledgments

The authors express their deep gratitude to all participants who contributed to this study.

### Authors' Contributions

All authors equally contributed to this study.

### Declaration of Interest

The authors of this article declared no conflict of interest.

### Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

### Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

### Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

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