The Intellectual Structure of Women's Studies: A Bibliometric Study of its Research Topics and Influential Publications[*]

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Abstract

This study investigated the intellectual structure of women's studies using bibliometric methods focusing on identifying research topics and influential publications. We analyzed 57,544 women's studies papers published from 1975 to 2017 and explored the intellectual structure of the field based on the research keywords and cited references (CRs). Research keywords were used to identify major research topics and visualize the change in topics by period, while the CRs revealed works that have been influential in the field over many years and show the knowledge background of women's studies. Based on the results of the analysis, major research topics of women's studies were classified into six clusters: gendered experiences, sex role, gendered violence, health, sexual minorities, and sexually transmitted diseases (STDs). Furthermore, the long-term changes to keyword overlay maps demonstrated that research on women's studies entered the maturation stage in 2010, following its beginning in the 1990s and growth period in the 2000s, and the research topics have expanded from conventional issues like sex role and health to emerging issues like sexual minorities and STDs. Additionally, the knowledge background of women's studies was identified through CR analysis. Therefore, scientific literature published since the 1990s and the publication medium of books have majorly impacted the field of women's studies. Not only women's studies itself but also social psychology studies constituted the intellectual structure of women's studies. In particular, women's studies

CRs published in the 1990s have been influential to date, comprising the important knowledge background of the field.

Introduction

With the global spread of the feminist movement to expose and change the sex discrimination prevalent in social structures worldwide, social interest in women's studies has been growing steadily in the recent years. Women's studies is not simply confined to issues related to biological sex, but is a multidisciplinary research area covering sex, gender, and sexuality issues and further examines gendered social structures and relationships from a feminist point of view (Lozano, 2013; Lundgren, Shildrick, & Lawrence, 2015; Tsay & Li, 2017; Wren et al., 2007). In particular, the recent research topics of women's studies have expanded beyond women issues to include men, masculinity, and sexual minority issues.

Along with the quantitative growth in women's studies and diversification of the topics and contents of the field, studies using bibliometric analysis to investigate the general characteristics and intellectual structure of women's studies have been observed. Bibliometric techniques are used to identify research trends in various fields such as economics, innovation, entrepreneurship, management, and science and technology (Boyack, Klavans, & Börner, 2005; Van Eck & Waltman, 2010; Kay, Newman, Youtie, Porter, & Ismael, 2014; Tur-Porcar, Mas-Tur, Morigo, Roig-Tierno, & Watt, 2018). Analyzing bibliographic information is considered an effective way to review research trends or achievements and reveal the knowledge background of a specific field and its development. Previous works on women's studies using the bibliometric method can be divided into two categories. The first category comprises studies analyzing gender disparities in research achievements by applying the bibliometric method. Cronin, Martinson, and Davenport (1997) explored the gender disparities in the field of women's studies by analyzing gender distribution for three major journals from 1970 to 1994 (i.e., *Feminist Studies, Signs: Journal of Women in Culture and Society*, and *Frontiers: A Journal of Women's Studies*). Since then, several studies have investigated gender disparities in various fields using bibliometric indicators such as the number of papers, citation patterns, collaboration practices, and h-index (Abramo, D'Angelo, & Caprasecca, 2009;

Bordons, Morillo, Fernández, & Gómez, 2003; Borrego, Barrios, Villarroya, & Ollé, 2009; Geraci, Balsis, & Busch, 2015; Kretschmer, Kundra, & Kretschmer, 2012; Mählck, 2001; Ozel, Kretschmer, & Kretschmer, 2014; Paul-Hus, Bouvier, Ni, & Sugimoto, 2015).

The second category of previous works consists of studies that analyze the characteristics and structure of the field of women's studies through bibliometric methods. Dehdarirad, Villarroya, and Borrios (2015) investigated the development and growth of the scientific literature on women in science and higher education using some bibliometric indicators, and then ascertained the correlation between the national Gender Inequality Index and research performance. Tsay and Li (2017) collected data on women's studies research over the period from 1990 to 2013 and demonstrated the characteristics and implications of the field using bibliometric indicators such as the growth rate of research, distribution of countries and languages, document types, and major journals. In addition, Söderlund and Madison (2015) analyzed the women's studies publications by authors based in Sweden between 2000 and 2010, and proposed numerous hypotheses regarding their growth rate, impact, and other bibliometric indicators. Finally, Brihante, Moreeira, de Souza Vieira, and Catrib (2016) described the panorama of the scientific literature on gender violence based on articles published from 1982 to 2013, from a bibliometric perspective. As noted above, there has been a steady increase in the number of studies attempting bibliometric analysis to identify the characteristics of women's studies. However, most of these studies were limited to quantitative approaches, using bibliographic data such as publications, citations, authors, and country information in a statistical way and evaluating research productivity. To date, no systematic analysis that reveals the overall characteristics and knowledge background of women's studies has been conducted. Therefore, this study aimed to analyze the intellectual structure of women's studies based on bibliometric methods in terms of content as well as quantitative aspects. For this purpose, we first derived major research topics in women's studies through keyword mapping and clustering analysis and examined the changes in the topics by period using keyword overlay mapping. In the remainder of this paper, we first analyzed the cited references (CRs) in the women's studies literature to identify the intellectual structure of women's studies and then suggested its characteristics and implications.

Data and Methods

We used the Web of Science (WoS) database provided by Clarivate Analytics to collect data for analysis. Recent studies applying bibliometric analysis to women's studies have constructed datasets using search terms extracted from the title, abstract, and keyword fields of studies on bibliographic databases such as WoS or Scopus (Söderlund & Madison, 2015; Tsay & Li, 2017). However, since the breadth of research topics in women's studies has expanded in recent years, there is a risk that research on emerging topics such as masculinity and sexual minorities would be omitted from keyword-based queries using terms such as: woman, female, gender, and feminist (Brihante et al., 2016; Dehdarirad et al., 2015; Tsay & Li, 2017).

In this study, we collected appropriate data for investigating "women's studies" using Web of Science Categories (WCs) that are used for scientometric analysis as a conventional way to delimit the research area (Carley, Porter, Rafols, & Leydesdorff, 2017). This could be applied to the field of women's studies to obtain a more comprehensive dataset. Thus, we selected the "Women's studies" category for analysis among the possible 252 WCs. Thus, we collected 57,544 publications in the 43 years from 1975 to November 16, 2017 for all document types in the WoS Core Collection, which includes the Science Citation Index Expanded (SCIE), Social Sciences Citation Index (SSCI), Arts & Humanities Citation Index (A&HCI), and Emerging Sources Citation Index (ESCI).

We used Search Technology Inc.'s VantagePoint to analyze the bibliographic information and the keyword refinement of the retrieved studies. Keyword mapping and clustering analysis were performed using the VOSviewer software developed by CWTS (Centre for Science and Technology Studies) of Leiden University in the Netherlands. The research areas were identified through keyword mapping and clustering for keywords that occurred more than five times with the full counting method. VOSviewer is a powerful tool for visualizing bibliometric networks, it used to detect research communities and topics (Yan, Ding, & Jacob, 2012), and it constructs a map based on a co-occurrence matrix (Van Eck & Waltman, 2010). After mapping and clustering the global map with keywords extracted from publications between 1975 and 2017, a keyword overlay map was constructed to examine the change in keywords by disparate sub-criteria on the global map (Leydesdorff & Rafols, 2012; Leydesdorff, Rafols, & Chen, 2013). To make the keyword overlay maps, the total time span was divided into three time periods. Using data calculated from the global map, coordinate values indicating the posi-

tion of each keyword on the map were fixed, and node sizes and link information were recalculated for each period. Thus, we could identify the development of and structural changes in research topics by each period.

To explore the knowledge background of women's studies, we propose the CR analysis method, which shows the influential publications in a specific field (Thor, Bornmann, Marx, & Mutz, 2018), to identify CRs that have made a significant contribution to women's studies. To find influential CRs, we extracted all the references from women's studies publications and established the distribution of frequencies of the CRs. Then, the most frequently used CRs were investigated using CRExplorer, which is a software tool developed by Thor, Marx, Leydesdorff, and Bornmann (2016a, 2016b) for analyzing the CRs in a specific research field or topic. This is particularly suitable for identifying publications that have been frequently cited in the field and determine their historical roots using the graph and list of CRs (Thor et al., 2016a, 2016b).
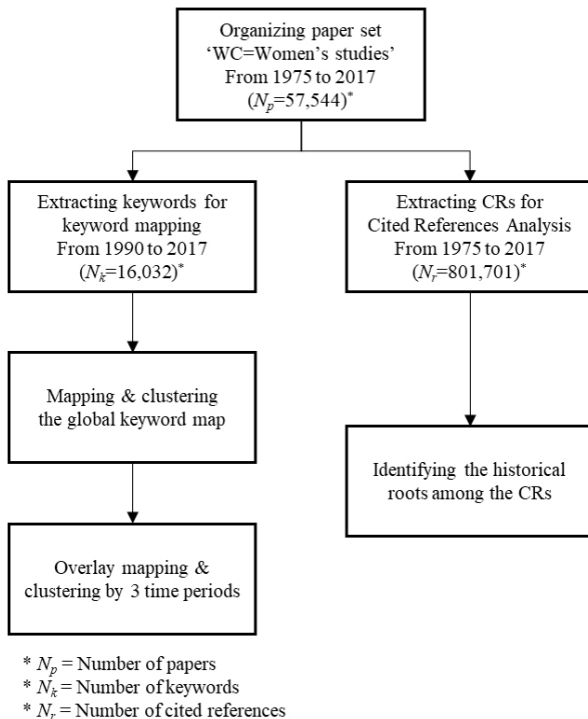
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            Organizing paper set
            'WC=Women's studies'
             From 1975 to 2017
                (Np=57,544)*

  Extracting keywords for         Extracting CRs for
     keyword mapping        Cited References Analysis
     From 1990 to 2017          From 1975 to 2017
      (Nk=16,032)*               (Nr=801,701)*

     Mapping & clustering
    the global keyword map

                               Identifying the historical
                                   roots among the CRs
       Overlay mapping &
   clustering by 3 time periods
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* N_p = Number of papers
* N_k = Number of keywords
* N_r = Number of cited references

Figure 1. Research Process to Investigate the Intellectual Structure of Women's Studies.

Results and Discussion

Overall Characteristics of Women's Studies

Figure 2 shows the number of women's studies papers by publication year from 1975 to 2017, demonstrating an overall increase in the number of papers. After 1995, more than 1,000 research papers were published annually and over 2,000 papers have been published annually since 2008. This fact plausibly explains the claim that women's studies is a constantly growing research field. In addition, the inset of Figure 2 shows the predicted growth pattern of women's studies up to 2050, calculated using the cumulative number of papers in a logistic regression model with a confidence interval of 99%. The growth rate of the field and future growth can be predicted through the calculated result, and based on the result, women's studies is expected to achieve sustained growth in the future. Moreover, the inflection point could be calculated from the logistic regression model, and this point can be used to identify when the research field "hits" the peak in the growth pattern (Ahn & Lee, 2017; Daim, Rueda, Martin, & Gerdsri, 2006; Martino, 2003). The inflection point of women's studies is 2010, and it can be confirmed that the slope of the inset was very steep around 2010.
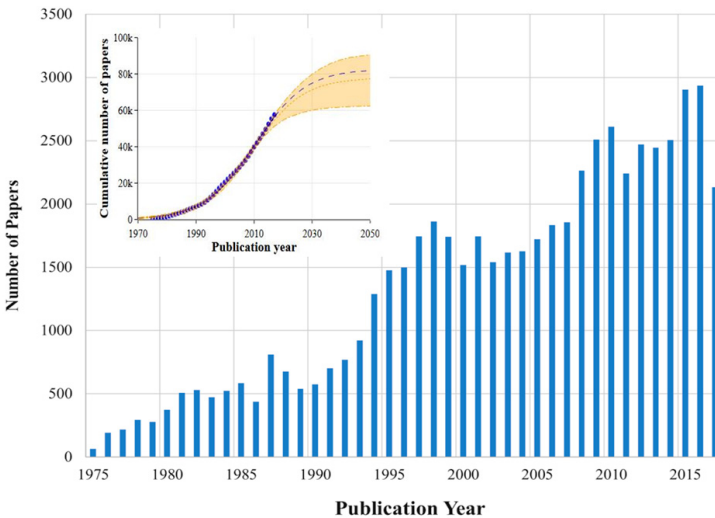

Figure 2. Number of Papers by Publication Year for Women's Studies and (inset) Cumulative Number of Papers with Prediction Value until PY=2050 (99% confidence interval) by Publication Year for Women's Studies.

Based on the result of extracting countries by examining all authors' affiliations, we found that research in the field of women's studies has been conducted in a total of 142 countries. Figure 3 shows the top 12 most productive countries among these, calculated based on the number of papers published. The USA has produced 58.14% (24,811) of total research publications and has played a leading role in the field of women's studies. This could be interpreted in relation to the history of the American women's movement and the early development of women's studies. The first women's movement aimed at acquiring women's vote, and the public rights movement was centered in the USA, including the Seneca Falls Convention held at Seneca Falls, New York, in 1848. The women's suffrage movement, which began in earnest in the late 1800s, was mainly conducted by American associations such as the National Woman's Rights Committee, National Woman Suffrage Association, and American Woman Suffrage Association (Tong, 1998). As the women's movements in the USA actively progressed in the early period, women's studies could be developed as an independent research area. Since the mid-1980s, the concept of gender has been applied to women's studies by researchers such as Carroll Smith-Rosenberg and Joan W. Scott in the USA (Scott, 1986; Smith-Rosenberg, 1985), and the scope of women's studies has expanded to various disciplines like sociology, psychology, politics, and law. This research trend had become an academic background in which the field of American women's studies covered a variety of research topics. This sociocultural background has provided the basis for the USA to become a leader in women's studies in terms of quantitative research results, followed by the UK at 10.30% (4,397) and Canada at 5.74% (2,448). In combination, these top three countries account for 74.18% of the total publications, followed by Australia at 4.93% (2,104), Germany at 1.56% (664), the Netherlands at 1.34% (571), Sweden at 1.24% (529), France at 1.21% (518), India at 1.18% (502), Israel at 0.97% (412), Spain at 0.96% (409), and South Korea at 0.84% (357).

The Global Keyword Map of Women's Studies

To identify major research topics and areas of women's studies, 16,032 keywords that occurred more than five times were extracted from the Keywords Plus field of WoS using VantagePoint. According to Zhang et al. (2015), Keyword Plus terms are as effective as Author Keywords in terms of bibliometric analysis identifying the research trends and knowledge structure of various scientific fields.
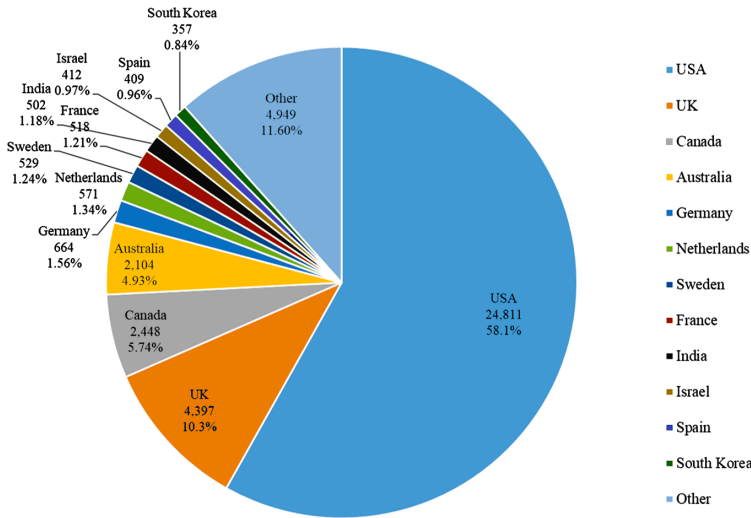
Figure 3. Distribution of Number of Papers by Countries on Women's Studies (1975–2017).

Keywords Plus terms not only reflected the characteristics of the research field by providing keywords extracted from the titles of references,[1] but also offered sufficient data for analysis in the case of women's studies. In women's studies literature, only 20% of the total publications contain the author keyword field. Moreover, the keyword set extracted from titles and abstracts contains many common words that are difficult to refine, such as "article," "work," "theory," "method," and "year." For these reasons, we used Keywords Plus terms as the source of keyword mapping and clustering.

Due to the absence of Keyword Plus terms before 1990, analysis for keyword mapping was conducted for 51,049 papers published from 1990 to 2017. Figure 4 comprises the global keyword map of women's studies showing research issues and their relationships, derived from extracted keywords using VOSviewer, an integrated algorithm-based mapping tool. In Figure 4, the size of each node reflects the number of papers for that keyword, and the distance between nodes represents the relevance between keywords. In other words, the larger the node size, the more the papers published on the topic, and the closer the distance between the

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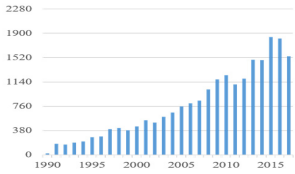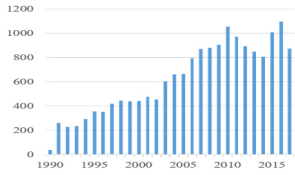[1] Further information regarding Keyword Plus field is available at http://interest.science.thomsonre uters.com/content/WOKUserTips-201010-IN

Figure 4. Global Keyword Map of Women's Studies (1990–2017).

nodes, the higher the correlation between papers in which the keyword appears.

The global keyword map of women's studies was composed of six clusters distinguished by different characteristics, meaning that the research areas of women's studies are composed of six main topics. The C1 cluster is "gendered experiences," which includes terms such as "women," "gender," "work," "politics," "family," "labor." The C1 cluster forms the research area dealing with how women's experiences, ranging from the public domain such as politics and labor to the private domain such as family and children, are influenced by gendered social structures and cultures. Socially (re)constructed women's experiences on the grounds of gender differences are the main research topics. Sociocultural interpretations of various issues surrounding women in the domain of everyday life are also shown in this cluster. This research area covering broad topics has the most stable growth pattern in the number of papers, and the trend charts in Table 1 show an upward or downward trend in the number of documents for keywords belonging to each cluster from 1990 to 2017. The C1 trend chart shows that the number of documents has been increasing steadily since 1990.

Research topics in the C2 cluster can be defined as "sex role" with core keywords "attitudes," "behavior," "sex-differences," "perceptions," and so forth. This cluster can be understood as a research area about a series of sex roles that is so-
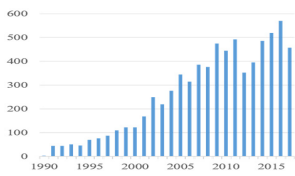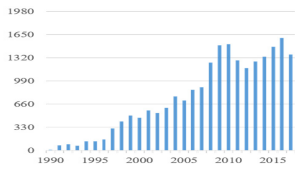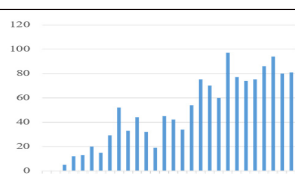
cially constructed and learned by a person as appropriate for people based on their biological sex. The keywords "men" and "masculinity" are also observed in this cluster, meaning that not only the sex roles given to women but also social conventions related to men are treated as research topics here. Sex role, which has been studied by a number of researchers since the 1960s (Hochschild, 1973), is a research topic that constitutes a large part of women's studies as shown in the C1 and C4 clusters. According to the C2 trend chart, since the early 1990s, research on sex role has been actively conducted compared to other clusters.

The C3 cluster includes keywords related to violence against women such as "domestic violence," "violence," "abuse," "intimate partner violence," and "rape" as core keywords. Based on these keywords, it seems that the research in the C3 cluster focuses on gendered violence issues, particularly between men and women, so the characteristic of the C3 cluster is defined as "gendered violence." In addition, the gendered violence cluster also covers keywords related to secondary damage such as "victimization" and "posttraumatic stress disorder," forming an expanded research area. Recognition of gendered violence, particularly violence against women, began in earnest with the definition of the concept of "violence against women" in the 1993 UN Declaration on the Elimination of Violence against Women (Devries et al., 2013), and since then, it has become one of the major research topics in women's studies.

The C4 cluster is composed of studies related to the physical issues faced by women. Keywords such as "United States," "health," "risk," "prevalence," "care," "risk factor," "pregnancy," and so on appeared as core keywords, and the commonalities of keywords can be integrated into the term "health." In contrast to the C1 cluster, research in the C4 cluster is likely to focus on women's physical issues. In addition, based on the fact that "United States" has emerged as one of the core keywords in the C4 cluster, it seems that there are many case studies for the USA in this research area. The C4 cluster, along with the C1 and C3 clusters, occupied a large part of the women's studies research area, with the number of papers in the C4 cluster increasing extensively since 1997.

The C5 cluster can be defined as "sexual minorities," since this cluster is composed of keywords such as "mental health," "stress," "gay," "sexual orientation," "lesbians.". The occurrence of the keyword "mental health" along with "gay," "lesbians," and "homosexuality" can be explained in two ways. First, most studies before the 1980s treated sexual minorities as having a mental disorder (Boehmer, 2002). Second, many recent studies in this research area have addressed the negative impact of the stress experienced by sexual minorities on mental health.

Table 1.
Characteristics and Core Keywords of Each Cluster

Cluster	No. of Keywords	Characteristics	Core Keywords	Publication Trend Chart by Year
C1	129	Gendered Experiences	women, gender, work, impact, politics, children, family, race, identity, power, life, labor, perspective, mothers, employment	
C2	122	Sex Role	attitudes, men, behavior, sex, sex differences, perceptions, gender differences, stereotypes, masculinity, model, meta-analysis, students, adolescents, college students, self-esteem	
C3	63	Gendered Violence	domestic violence, experiences, violence, abuse, intimate partner violence, victimization, rape, aggression, posttraumatic stress disorder, victims, battered women, strategies, validity, conflict, history	
C4	154	Health	United States, health, risk, prevalence, care, risk factors, pregnancy, depression, population, age, social support, outcomes, symptoms, prevention, management	
C5	16	Sexual Minorities	mental health, stress, gay, psychological distress, orientation, distress, gay men, sexual orientation, lesbians, marital status, homosexuality, multiple roles, physical health, bisexual women, perceived discrimination	
C6	16	Sexually Transmitted Diseases	people, AIDS, infection, black, HIV, condom use, stigma, HIV/AIDS, South Africa, HIV infection, disclosure, partners, transmission, risk behaviors	

Sexual minorities research has been a minor part of women's studies up to the present, and the research outcomes have begun to "coalesce" (Lick, Durso, & Johnson, 2013). The trend chart also shows a dynamic pattern, reflecting the fact that this research area has not entered the stabilized stage.

Lastly, the C6 cluster can be characterized by "sexually transmitted diseases," (STDs) since the core keywords of this cluster are "AIDS (Acquired Immune Deficiency Syndrome)," "infection," "HIV (Human Immunodeficiency Virus)," and so on. In addition, the keywords "black" and "South Africa" show that a number of studies related to a specific region or race have been conducted in this research area. Moreover, the occurrence of the keyword "stigma" shows that social discrimination against STDs is also treated as an important research topic in the cluster. With regard to the emergence and growth of STD issues, there is a need to pay attention to the role of the USA. Since the 1970s, the human rights movements against the social discrimination and stigma experienced by homosexuals in American society has progressed greatly. HIV/AIDS began to spread in the early 1980s, and the research on related issues was actively conducted in this social atmosphere (Boehmer, 2002). Within this social context, studies related to STDs have become a major research topic of women's studies since the 1980s.

Changes in Research Topics of Women's Studies

Changes in the research topics in women's studies were identified by the overlay mapping based on the clustering and mapping result. From 1990 to 2017, the entire 28-year period was divided into three time periods, and analysis was performed using keywords that occurred more than five times in each time period. Table 2 shows the number of papers in each time period and the keywords used in keyword mapping.

Table 2.
Number of Papers and Keywords Used in Keyword Mapping Analysis

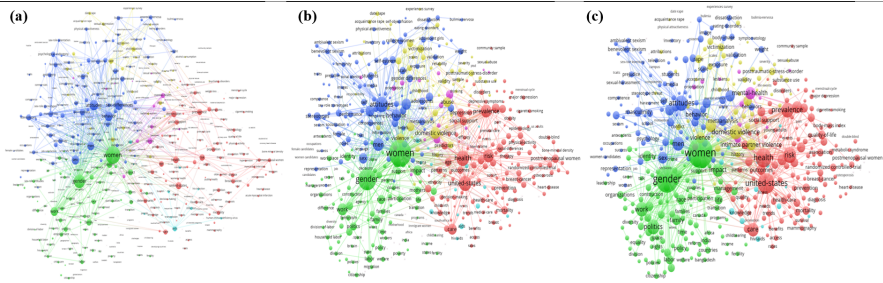| Time Period	Year	No. of Papers	No. of Keywords among 500 Target Keywords
Period 1	1990–1999	12,571	250
Period 2	2000–2009	18,228	433
Period 3	2010–2017	20,250	432

Figure 5. Keyword Overlay Map of Women's Studies: (a) Period 1 (1990–1999), (b) Period 2 (2000–2009), (c) Period 3 (2010–2017).

The overlay map in Figure 5(a) corresponds to the first period from 1990 to 1999 and can be regarded as the beginning period of women's studies. There are 12,571 published papers and 250 keywords in Period 1. The number of papers published for a single year exceeded 1,000 for the first time in 1994, and the number of papers published during this period also increased sharply, as shown in Figure 2. Although the number of keywords is small, all six clusters identified in the global map are observed in Figure 5(a). This demonstrates the fact that women's studies began to form its intellectual structure in the 1990s, dealing with research on emerging topics such as sexual minorities and STDs, together with traditional research topics such as sex role and health.

In addition to conventional research topics related to women's health and sex role, new discourses were emerging that focused on differences within women, particularly from the race and ethnicity perspective, in the 1990s. The discussion that emphasizes multiple and simultaneous oppressions experienced by women has been rearticulated by Patricia Hill Collins's book *Black Feminist Thought* published in 1990 (Mann & Huffman, 2005), and "intersectionality" emerged as a major research topic of women's studies in the 1990s. After introducing the concept of intersectionality for discussion of issues of black women's employment in the USA by Kimberlé Crenshaw (1989), it became a principal research topic of the field. As a result, various issues of race, age, class, and sexuality and other differences in addition to gender began to be addressed from the early 1990s (Kinser, 2004; Yuval-Davia, 2006). This new theory that focuses on the diversity and differences among women has spread research topics from women's studies into various fields as shown in Figure 5(a), and this tendency has been maintained until the present day.

The next period, Period 2, from 2000 to 2009 can be regarded as the growth period of women's studies. There are 433 keywords in Period 2, a significant increase compared to Figure 5(a), and each node size is also enlarged as shown in Figure 5(b). This indicates that the research topics became more diverse, and research outcomes were also increased quantitatively. In this period, the growth of the C3 (gendered violence) and C4 (health) clusters is particularly noticeable, which is consistent with the result of the trend chart in Table 1, which showed an increase in the number of papers during this period. Another feature of this period is the diversification of C5, sexual minorities. Specific keywords related to sexual minorities such as "bisexual women," "lesbians," and "homosexuality" began to occur along with existing keywords such as "mental health" and "stress."

Meanwhile, Period 3 from 2010 to 2017 has a similar pattern to Period 2, showing various research topics and a quantitative growth in the number of papers as shown in Figure 5(c). In particular, the growth of Period 3 is relatively noticeable considering that this period is shorter than Periods 1 and 2. Keywords such as politics, leadership of the C1 cluster about gendered experience grew in Period 3 compared to Period 2. Additionally, the "mental health" keyword of the C5 cluster about sexual minorities expanded remarkably in this period. Moreover, based on the overall expansion in the number of papers and the node size of keywords, period 3 can be seen as the maturation stage in the field of women's studies.

As a result of examining the changes in research topics of women's studies through research keywords mapping, we found that the field has been growing constantly since the 1990s. The research topics represented in keywords were concentrated on conventional topics related to sex role and health in the early 1990s but expanded to emerging topics related to sexual minorities and STDs after 2000, and the scale of research topics generally increased from 2010. Each research topic has experienced an increase or decrease over time, but the intellectual structure, which is composed of six clusters, continues to be maintained.

Identifying the Knowledge Background of Women's Studies

In this section, we investigate the knowledge background of the field using CRs as another way to identify the complete intellectual structure of women's studies, including the works published before 1990, which have not been covered in the previous keyword clustering and mapping analysis. To detect influential CRs in the field of women's studies, we restricted the imported range of CR years to the period 1900−2020 when importing data into CRExplorer, and the number of

Table 3.
Top 10 Publications in the Field of Women's Studies with the Highest Number of Occurrences (Identified by the References Cited in Women's Studies Papers)

No.	Cited References	Title	Publication Medium	N_CR[1]	N_PYEARS[2]
CR1	Butler J (1990)	Gender Trouble: Feminism and the Subversion of Identity	Book	1,166	27
CR2	Gilligan C (1982)	In a Different Voice: Psychological Theory and Women's Development	Book	899	35
CR3	Bem SL (1974)	The Measurement of Psychological Androgyny	*Journal of Consulting and Clinical Psychology*	766	43
CR4	Collins PH (1990)	Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment	Book	691	28
CR5	Connell RW (1995)	Masculinities	Book	655	23
CR6	Butler J (1993)	Bodies That Matter: On the Discursive Limits of Sex	Book	599	23
CR7	West C (1987)	Doing Gender	*Gender and Society*	534	30
CR8	Connell RW (1987)	Gender and Power: Society, the Person and Sexual Politics	Book	454	29
CR9	Strauss A (1990)	Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory	Book	424	24
CR10	Foucault M (1977)	Discipline and Punish: The Birth of the Prison	Book	397	21

Note. 1) N_CR: number of occurrences, 2) N_PYEARS: number of years in which the publication has been cited.

references was reduced from the original 1,326,415 to 801,701. Some variants of the same CRs were cleaned up manually on the basis of the information in the dataset, such as author names and the title of the journal or book, since the existence of variants has been noted to be a major problem that causes the impact of a particular publication to be underestimated, particularly in the case of books (Thor et al., 2018). Table 3 shows the 10 most cited publications in the field of women's studies; these CRs have been steadily cited since their years of publication. In general, the more frequently scientific publications are cited, the more important

they are deemed to be for the advancement of knowledge (Bornmann, de Moya-Anegón, & Leydesdorff, 2010; Marx, Bornmann, Barth, & Leydesdorff, 2014; Merton, 1965). From this perspective, the impact of certain CRs on forming the intellectual structure of women's studies is revealed, and the knowledge background of the field can be identified.

In the women's studies dataset, the most cited publication is Judith Butler's (1990) *Gender Trouble: Feminism and the Subversion of Identity*, which has been highly influential in women's studies and the evolution of queer theory. In addition to Butler's (1990) book, publications on gender, ethnicity, masculinity, methodology, and so forth have had a decisive effect on women's studies. According to Glänzel and Schoepflin (1999), non-serial scientific literature, particularly monographs and books, plays a significant role in scientific communication in the social sciences and humanities. In the case of women's studies, which are classified as a social science according to the WoS Scope Note, books have also played an important role in the formation and transmission of scientific knowledge, with 8 of the top 10 publications being books (exceptions are CR3 and CR7).

These 10 publications have an impact not only on the number of occurrences (*N_CR*) but also on the number of years in which the publication has been cited (*N_PYEARS*). In general, the impact of publications is observed in the first few years after publication (Thor et al., 2018), but the top CRs in the field of women's studies have been constantly cited by other publications and have had a long-term impact since publication. Another feature observed in Table 3 is that half of the top 10 publications (CR1, CR4, CR5, CR6, CR9) were published after 1990. As mentioned in Figure 5(a), the 1990s was a period of increased academic interest in divergent experiences of women, conceptualized as intersectionality in the field of women's studies. Specialist research on specific themes of women's studies, such
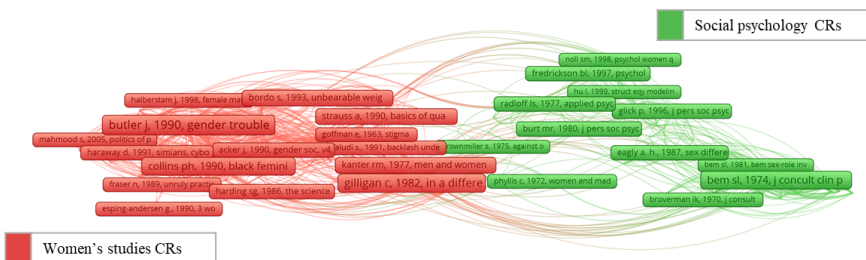

Figure 6. Co-citation Map of CRs (Cited more than 100 times).

as gender, queer, race, and masculinity, were published in this period and have become major research topics in the field. As a result, the publications in Table 3 are continuously cited and have formed a part of the influential knowledge background of women's studies.

Lastly, Figure 6 shows the CR co-citation map of CRs cited more than 100 times, including the top 10 publications in Table 3. The clustering resolution parameter was set at 0.50, with a minimum possible cluster size of 1, to produce the most effective clustering result, as shown in Figure 6. According to Cobo, López-Herrera, Herrera-Viedma, & Herrera (2011), CRs are used to identify the intellectual base used by the scientific research field. If co-citation analysis is performed and clusters are detected, it is possible to grasp the key references cited by the field. In the case of women's studies, a total of 152 CRs were cited more than 100 times; these could be categorized into two different intellectual bases: one a research area in women's studies itself and the other a research area related to social psychology studies.

In the CR group located on the left side of the co-citation map, major studies are mentioned in and around Butler's *Gender Trouble* (CR1) as the central figure and classified into the field of women's studies directly. This research area includes a number of studies that were published around the 1990s, such as Butler's *Gender Trouble*, Collins's *Black Feminist Thought*, and Gilligan's *In a Different Voice*, providing an explanation of the moral development of women that has had a decisive influence on the field of women's studies. These studies played an important role in establishing an independent research field during the emergence period of women's studies in the 1990s and have been influential CRs to date. As can be seen in Figure 4, the keyword map of the field, themes such as race, queer, and even the concept of intersectionality covered in these studies are the main research topics that constitute the intellectual structure of women's studies.

Moreover, the research area on the right side of the map contains a number of journals that cover psychological, social, or women's issues such as the *Journal of Personality and Social Psychology*, *Psychology of Women Quarterly*, *Applied Psychology*, *Women and Madness*. Thus, this research area forms the social psychology studies group relating to women's studies. Bem's paper published in the *Journal of Consulting and Clinical Psychology* (CR2) belongs to the social psychology research field as a core paper. Most studies belonging to this group were published in the 1970s and 1980s, and there are fewer nodes and links on the map than for the women's studies CR group. This indicates that, in this field, there are fewer citations of social psychology CRs than of women's studies CRs. Considering these

results, Figure 6 demonstrates how the intellectual structure of women's studies is not only (re)produced within the field but is also influenced by social psychological research in terms of cited references. Moreover, since its start in 1990, the major basis of the intellectual structure has shifted from the social psychological research field to the women's studies research field.

Conclusion

In this study, we applied bibliometric methods to identify the intellectual structure of women's studies using scientific literature published from 1975 to 2017. Six major research topics in women's studies—gendered experiences, sex role, gendered violence, health, sexual minorities, and STDs—were detected via keyword mapping and clustering. The results of keyword overlay mappings by time, from 1990 to 2017, demonstrated that research in the field of women's studies has evolved over time in the following order: beginning, growth, and maturation.

In the early 1990s, the research topics in women's studies were concentrated around conventional issues such as sex role or health; however, over time, an expansion was observed owing to the inclusion of emerging topics like sexual minorities or STDs. Meanwhile, the cited reference analysis method was used to reveal the knowledge background of women's studies. The top 10 most cited CRs extracted from among 801,701 references from women's studies published from 1975 to 2017 were investigated. As a result, the document type "book" has been cited in a large number of publications of various mediums, and CRs published after 1990 have also been cited frequently. The result of co-citation analysis of CRs that were cited more than 100 times shows that not only women's studies but also social psychology studies form the intellectual basis of women's studies cited in the scientific literature. It is also concluded that women's studies CRs published around the *1990s*, such as Butler's *Gender Trouble*, Collins's *Black Feminist Thought*, and Gilligan's *In a Different Voice*, have been influential thus far as important knowledge background for the field.

We identified the intellectual structure of women's studies by investigating the major research topics and influential CRs in the field over a long period. The following limitations should be considered. Regarding the data coverage, the women's studies category of WoS was selected for analysis; owing to the inter-disciplinary characteristics of women's studies, it is possible that a few publications were overlooked or missed in this study. In addition, the Keyword Plus field of

WoS was used to conduct research topic analysis. Although the Keyword Plus field is effective for bibliometric analysis, it has inherent limitations in that it does not provide the keyword information for all literature collected in this study. Future studies should overcome these limitations by expanding the data coverage and securing additional keyword information. Moreover, the scientific structures or relationships of women's studies could be investigated from another viewpoint using new methods, such as topics modeling or social network analysis. The scientific publications of women's studies are expected to provide comprehensive insights into the field, which will act as catalysts for future studies.

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