Emerging Trends in Social Isolation of People Living with HIV: A Bibliometric Analysis

Xin He, Yumiao Lu, Lirong Chen, Qiaoting Xue, Qilian He*

School of Nursing, Dali University, Dali, China
Email: *jiabei2319@163.com, *heqilian@dali.edu.cn

Abstract

Objective: A bibliometric analysis of the field of social isolation of people living with HIV was used to understand the context and trends of research in the field. **Methods:** A visual analysis of authors, institutions, country and keywords was conducted using CiteSpace 6.1R2 software. **Results:** A total of 1310 studies on social isolation of people living with HIV were retrieved from the WoS core database. The number of publications on the social isolation of people living with HIV showed an overall increasing trend, with the highest number of publications (147) in 2021. Author Otis, Joanne ranked first in the number of publications (8), while the University of Toronto (46) was the research institution with the most publications. Keyword clustering showed that the first cluster was hiv/aid; keywords with high co-occurrence centrality were "prevalence" (0.20) "aid" (0.18), and "impact" (0.17). "Qualitative research", "risk factors", and "older adults" are the hotspots of current research. **Conclusion:** Research on social isolation of People Living with HIV has shown certain characteristics and trends in terms of the number of articles published, research focus and interdisciplinary cooperation. Future research should continue to explore the strengths and application potential of this field in depth, and provide more comprehensive and effective scientific support for the prevention and treatment of social isolation among people living with HIV through interdisciplinary cooperation and expansion of research focus.

Keywords

HIV/AIDS, Social Isolation, Citespace, Bibliometric

1. Introduction

Social isolation was first proposed by Berkman (Berkman, 1983) in 1983, defined as "social attachment and social bond irreversible loss", after Lien-Gieschen

(Lien-Gieschen, 1993) in the north American nursing diagnosis association on the basis of the social isolation characteristics, the social isolation is defined as "a personal experience to need or desire to contact with others, but for some reason cannot contact the state". As time progressed, in the field of care, Fleury et al. (2000) defined social isolation as "living alone, lack of job support, and inability to share personal life expectations with confidants". Nicholson (Nicholson Jr., 2009) Using an evidence-based approach to conduct the evolutionary concept analysis of "social isolation", social isolation is defined as "individuals lack of social belonging, lack of contact with others, less social times, lack of accomplishment and high-quality interpersonal relationships". The current study found that many authors emphasise the two-dimensionality of the structure of social isolation by distinguishing between its objective and subjective components. Findlay Fine & Spencer (2009) believe that the connotation of social isolation contains two aspects: one is social alienation, and the other is emotional alienation, both of which cannot be ignored. From the perspective of social isolation, it involves the scope of social networks, such as the number and scope of contact with friends and relatives, and the frequency of interpersonal contact. From the perspective of emotional alienation, it includes negative emotional experiences such as isolation and disgust, which may affect the mental health of individuals. Nicholson (Nicholson Jr., 2009) Using an evidence-based method, he made a conceptual analysis of "social isolation". He proposed that social isolation should be a combination of objective (number of contact and participation) and subjective (sense of belonging and unrealized relationship). Wang (Wang et al., 2017) and colleagues proposed that the social isolation model includes objective social contact and subjective perception of adequacy of contact. Studies suggests that social isolation has been identified as a risk factor for poor physical health. (House et al., 1988; Cornwell & Waite, 2009; Umberson & Montez, 2010). Notably, this problem is particularly relevant for people living with HIV (PLHIV), who are disproportionately affected by disabling social barriers such as stigma and shrinking social network loss during the early stages of the outbreak (Gannon & Stacciarini, 2016; Rueda et al., 2014; Sikkema et al., 2000; Solomon et al., 2018). In addition, it has been shown (Han et al., 2021; Azhar et al., 2020) that social isolation, as one of the common health problems in the psychosocial domain among people living with HIV, increases the risk of many adverse health outcomes such as depression, cognitive dysfunction, and sleep disorders in the HIV-infected population, which seriously affects the quality of life of people living with HIV. HIV is a heavily stigmatised disease, and people living with HIV who suffer from mental illness often experience both physical and psychological threats. In this context, we used bibliometric analysis and knowledge network visualisation to analyse the annual number of publications, national collaborations, institutional collaborations, keyword co-occurrence, keyword clustering, author collaborations and bursting in the field of social isolation of HIV infected people. Through computer space visualisation software, we mapped the knowledge structure in this field of research, as well as research trends and trending

themes to provide basic support and directional guidance for future research to provide references for universal knowledge of social isolation of people living with HIV, risk prevention and precise interventions.

2. Data and Methods

2.1. Data Collection

Using the Web of science core set as the search database, select the "Advanced Search" type, and then select the "Subject" search in Web of science with the search criteria:

#1: TS = (Social alienation OR Social Isolation) OR AB = (Social alienation OR Alienations, Social OR Social isolations OR Alienation, Social OR Social Adversity OR Adversities, Social OR Adversity, Social OR Social Adversities OR Social Breakdown Syndrome OR Breakdown Syndrome, Social OR Breakdown Syndromes, Social OR Social Breakdown Syndromes OR Syndrome, Social Breakdown OR Syndromes, Social Breakdown OR Social Isolation OR Social isolation OR Isolation, Social OR Social Exclusion OR Exclusion, Social OR Social Exclusions)

#2: TS = (HIV OR HIV infections OR "Acquired Immunodeficiency Syndrome") OR AB = (HIV OR HIV infect* OR HIV patient OR HIV 1 OR HIV 2 OR HIV 1 infect* OR HIV 2 infect* OR human immunodeficiency virus OR human immunodeficiency virus 1 OR human immunodeficiency virus 1 infect* OR human immunodeficiency virus 2 OR human immunodeficiency virus 2 infect* OR human immunodeficiency virus infect* OR Acquired Immunodeficiency Syndrome OR Immunologic Deficiency Syndrome, Acquired OR Acquired Immune Deficiency Syndrome OR Acquired Immuno-Deficiency Syndrome OR Acquired Immuno Deficiency Syndrome OR Acquired Immuno-Deficiency Syndromes ORImmuno-Deficiency Syndrome, Acquired OR Immuno-Deficiency Syndromes, Acquired OR Syndrome, Acquired Immuno-Deficiency OR Syndromes, Acquired)

#3: #1 AND #2

Inclusion criteria: People diagnosed with HIV infection by Western Bolt method, type of literature was treatise and language was English.

Exclusion criteria: Exclusion of literature with uncertain main content, no abstract or duplicate publication.

Studies of social isolation of people living with Hiv published from January 1st, 2003, to May 1, 2024 were included in the analysis.

2.2. Analysis Tool

The bibliometric software CiteSpace developed by Chaomei Chen (Chen, 2006) was used for data visualisation and analysis, which is suitable for dynamic, multivariate and time-sharing complex network analysis, and is one of the characteristic and influential software for bibliometric and visualisation analysis in recent years (Chen, 2006). The time of appearance of the first literature related to

social isolation of HIV-infected individuals within the Web of science core set database was used as the starting point of the study timeframe, and the time range (Timeslicing) was set in CiteSpace to 2003-2024, and the time slice (Years Per Slice) was 1 year. The threshold selection (Selection Ctiteria) was g-index (k = 25). Other default parameters were kept unchanged.

3. Result

3.1. Annual Publications

The annual publications of articles on the sense of social isolation of people living with HIV are shown in **Figure 1**. 2003-2024 showed a significant overall growth trend, combined with the year of occurrence of high-frequency keywords, the distribution of clustered time zones, and the implementation of the social environment of dynamic analysis, the research on the social isolation of people living with HIV can be divided into three phases. The first stage of the germination period, the time is before 2010. At this stage, research on social isolation of people living with HIV appeared sporadically, and the total number of publications was relatively small. The second stage of starting and early development, which took place from 2011-2019, showed a gradual growth. The third stage of full development, which takes place after 2019, shows the largest increase in the number of articles published in this stage from 2019-2020.

3.2. Author Co-Occurrence Analysis

Author co-occurrence analysis can reflect the collaborative relationship between core authors and researchers who have published in the field. The obtained author co-occurrence graph is shown in **Figure 2**. In the author co-occurrence graph, the number of nodes (N) is 678, the number of lines (E) is 764, and the
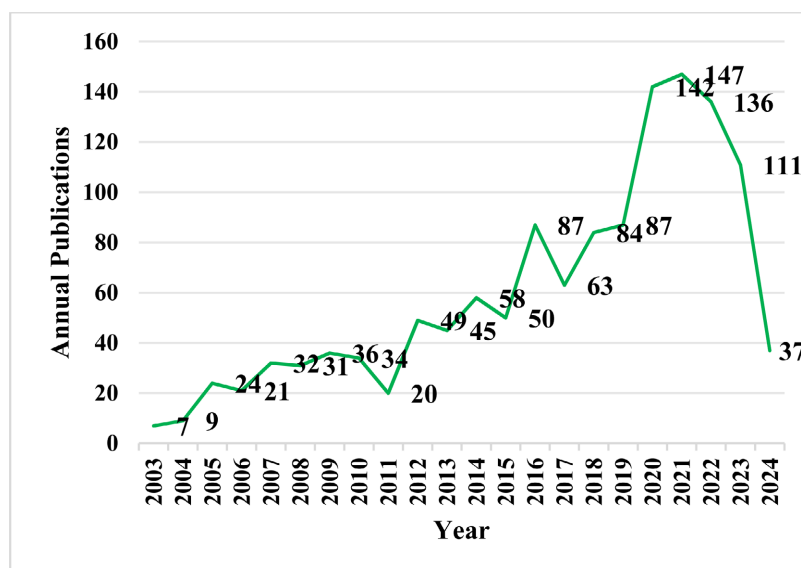

Figure 1. Number of publications in web of science on social isolation of people living with HIV, 2003-2024.

CiteSpace, v. 6.1.R6 (64-bit) Basic
May 9, 2024 at 9:28:10 PM GMT+08:00
WoS: C:\Users\何馨\Desktop\isolation\data
Timespan: 2003-2024 (Slice Length=1)
Selection Criteria: g-index (k=25), LRF=3.0, L/N=10, LBY=5, e=1.0
Network: N=678, E=764 (Density=0.0033)
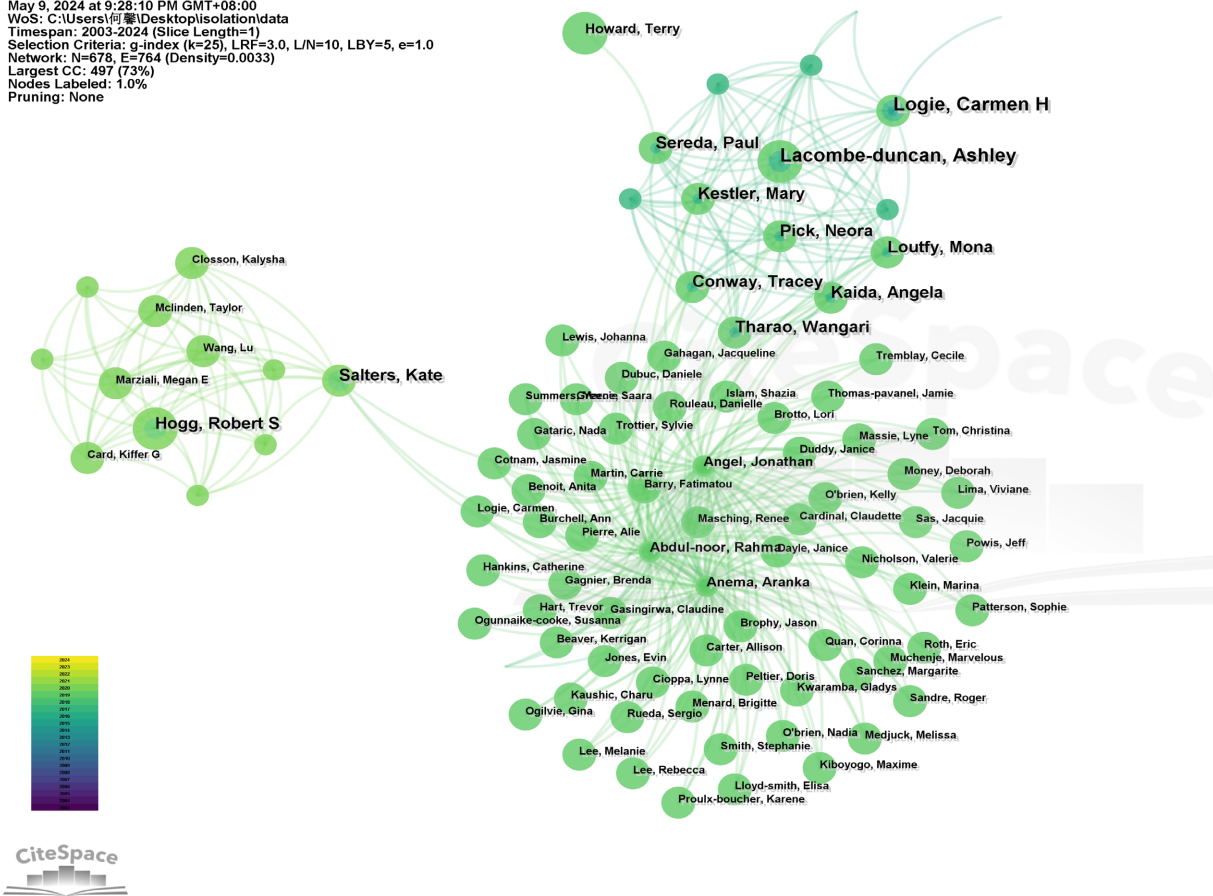Largest CC: 497 (73%)
Nodes Labeled: 1.0%
Pruning: None

Figure 2. Co-presentation of authorship collaborations.

network density (Density) is 0.0033. A line between the nodes indicates that there is a co-operative relationship between the two authors, and the thicker the line is, the higher the frequency of co-occurrence, which means the closer the research relationship. In terms of the total number of published papers, the top authors are Otis Joanne (8), Lacombe Duncan Ashley (7), Rogie Carmen H (7), Sereda Paul (6) and Hogg Robert S (6). In terms the timing of the publication of the literature, some of the earlier scholars who have conducted in-depth research on the social isolation of people living with HIV are Getz, K (2003), Tate, HL (2003), Siskind, V (2003), Nokes, KM (2003), Hermann, B (2003), Patel, AM (2003), Arlinger, S (2003) among others. These studies have laid an important foundation for related research in the field. According to Price's Law of Distribution of Authors of Literature (Price's Law), half of the literature on the same research topic comes from a core set of authors. The formula for core authors is $M \approx 0.749\sqrt{N_{max}}$ (M represents the number of papers, N represents the number of papers of the highest-producing authors in the statistical year), and authors whose number of papers reaches the value of M can be recognised as core authors in the field. According to the co-occurrence results, the source author with the highest number of papers in the Web of science core set database from

2003-2024 published a total of 8 papers, i.e., $Np_{max} = 8$, which yields $M \approx 2.12$, and is rounded to the nearest integer of 3, indicating that authors who published 3 or more papers can be considered as core authors in the field. It can be seen that there are 99 core authors in the field of social isolation of people living with HIV, and the core authors have published a total of 337 articles, which only accounts for 25.72% of the total number of relevant articles, far from reaching the indicator proposed by Price that the sum of the number of articles published by core authors accounts for 50% of the total number of articles. It can be seen that the core group of authors in the field of social isolation of HIV-infected people has not yet been formed.

3.3. Institutional Co-Occurrence Analysis

Keeping other parameters unchanged, the node type was set to Institution, i.e., the literature publishing institution was used as the node for visual analysis. By counting the institution of the first author of the literature, we analyse the inter-institutional cooperation and influence in the field of research on social isolation of people living with HIV. As shown in **Figure 3**, the co-occurrence mapping of institutions with 16 or more publications, the number of nodes is 536, the number of links is 1128, and the network density is 0.0079. In addition, through the links between research institutions, it can be seen that at present, the research related to the social isolation of people living with HIV is mainly carried
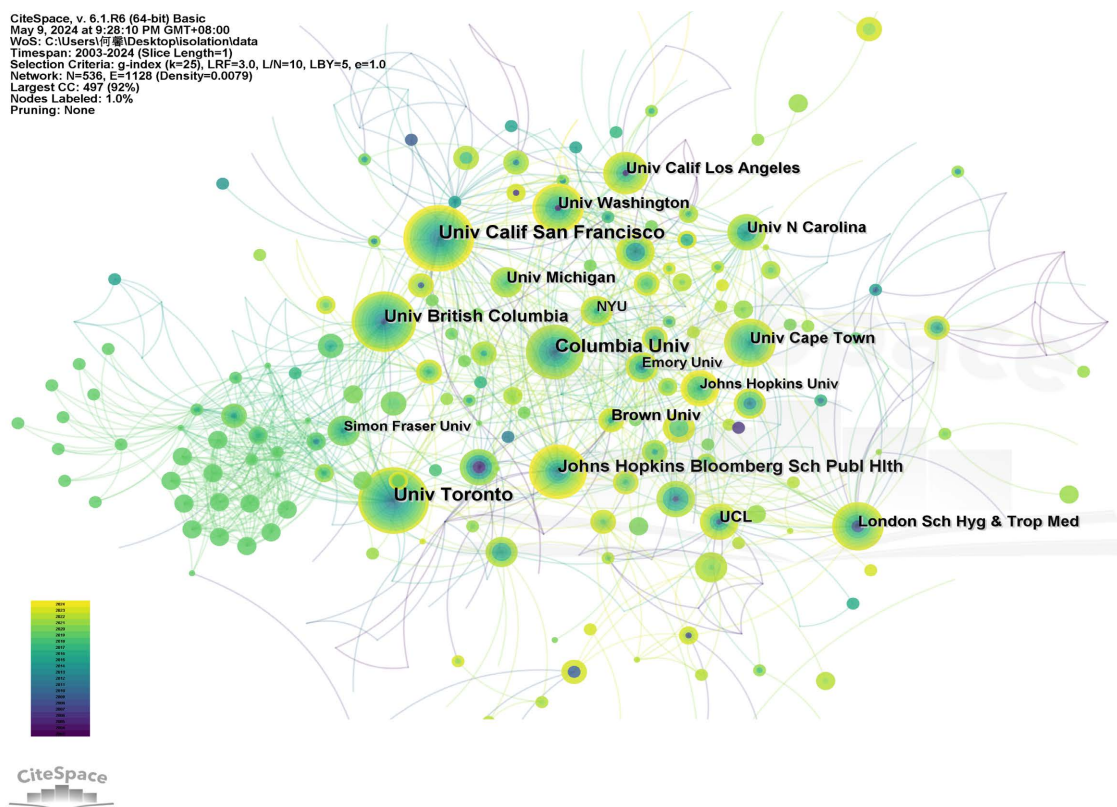

Figure 3. Co-presentation map of Institution collaboration.

out by colleges and universities and in the form of cooperation, and there are fewer institutions that carry out relevant research independently. The research related to the social isolation of people living with HIV is mainly carried out by universities and colleges, and there are fewer institutions that carry out relevant research independently. The top five institutions in terms of the number of publications in the field of social isolation of HIV-infected people are Univ Toronto (46), Univ Calif San Francisco (44), Columbia Univ (39), Univ British Columbia (32), Johns Hopkins Bloomberg Sch Publ Hlth (27 articles). It is worth noting that four of the top five universities are from the United States. In terms of the total number of literature, the above institutions occupy a leading position in terms of the total number of literature published compared with other institutions, and to a certain extent represent the main strength of the current research field of social isolation of people living with HIV; in terms of the proportion of literature, the highest number of publications is 46, and the calculation can be obtained as the M-value of about 5.08, rounded to the nearest 6, i.e., the 62 institutions with the number of publications up to 6 are the core institutions, and the core authors have published a total of 812 articles, accounting for only 61.98% of the total amount of relevant literature, which has reached the indicator of 50% of the total number of literature published by the sum of core institutions proposed by Price. It can be seen that a core group of institutions in the field of research on the social isolation of HIV-infected people has been formed, led by universities in the United States.

3.4. Country Co-Occurrence Analysis

As shown in **Figure 4**, the co-occurrence map of the countries of publication, the number of nodes is 122, the number of links is 631, and the network density

Figure 4. Co-presentation of country collaboration.

is 0.0855. It is observed that among the top 5 countries in the volume of publications on social isolation of people living with HIV, the United States of America tops the list of the volume of publications, which is about three times of that of the United Kingdom which is in the second place, and the top 5 countries are the United States of America (636 publications), the United Kingdom (194 publications), Canada (147 publications), South Africa (117 publications), and Australia (101 publications), respectively. The top 5 countries are the United States (636 articles), the United Kingdom (194 articles), Canada (147 articles), South Africa (117 articles), and Australia (101 articles). The analysis of the nodes shows that the United States, the United Kingdom, Canada, France and Australia have high centrality and are more connected to other countries, while countries such as South Korea and Japan have a centrality of zero, indicating that South Korea and Japan have conducted independent research and are not connected to other countries.

3.5. Co-Occurring Keywords Analysis

Keeping other parameters unchanged, the node type was set to keyword, and the pathfinding algorithm (PathFinder) was selected to generate the keyword co-occurrence map (**Figure 5**). As shown in **Figure 5**, there are 533 nodes and 4292 links in the keyword co-occurrence map, with a network density of 0.0303. The keyword "health" occupies the centre of the map, with a frequency of 235
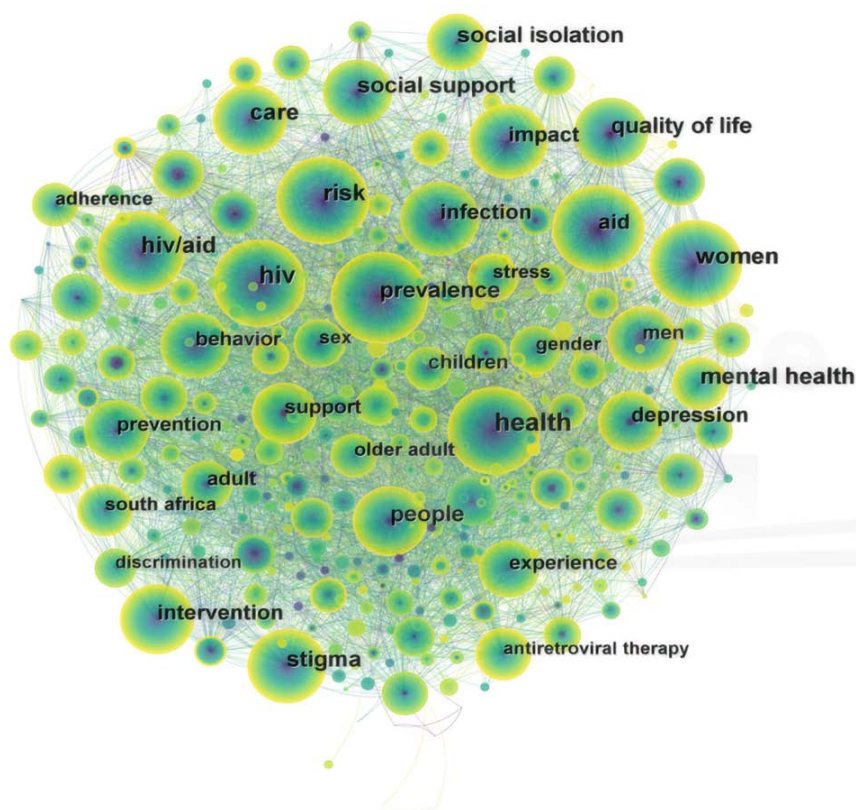

Figure 5. Co-presentation of keywords.

occurrences. In addition, the keywords HIV/AIDS, Risk, Mental Health, Women, Mental Health, Care, Stigma, Prevalence, and social isolation, which represent the mental health aspects of people living with HIV, appeared with high frequency, and together represent the field of social isolation of people living with HIV social isolation of HIV-infected patients. As another important result of keyword co-occurrence analysis, mediational centrality is a measure of the importance of the nodes in the co-occurrence network, and the centrality of a keyword reflects its degree of repetition in the whole keyword co-occurrence network, and the size of the node represents the frequency of the keyword, and the larger the node indicates that the keyword occurs more frequently (Kelemen et al., 2019). Nodes with high intermediate centrality are usually key hubs connecting different hotspots and can be regarded as key points, turning points and triggers in this research field. Keywords with centrality greater than 0.1 are generally considered to be more important and can be regarded as important "intermediary" words connecting high-frequency keywords in the research field. As shown in **Table 1**, the top 20 keywords with the highest frequency of social

Table 1. High frequency keywords and their centrality list.

Number	Frequency	Centrality	Earliest year	Keyword
1	235	0.02	2004	health
2	151	0.08	2004	hiv
3	134	0.02	2005	risk
4	134	0.02	2003	hiv/aid
5	124	0.01	2005	women
6	120	0.00	2012	mental health
7	118	0.08	2005	care
8	106	0.05	2006	stigma
9	105	0.20	2004	prevalence
10	104	0.03	2006	social isolation
11	103	0.03	2005	people
12	94	0.02	2005	social support
13	91	0.02	2003	quality of life
14	86	0.17	2003	impact
15	85	0.02	2007	intervention
16	82	0.01	2005	infection
17	80	0.18	2003	aid
18	77	0.09	2005	depression
19	69	0.09	2004	behavior
20	63	0.02	2006	prevention

isolation studies for HIV infections have included all keywords with centrality above 0.1, a total of 3: prevalence (0.20) aid (0.18) and impact (0.17). The analyses show that these three important keywords are closely related to the content of the phrase "social isolation of people living with HIV", which is an essential element in the study of "social isolation of people living with HIV". Combined with the earliest year, it is found that these words appeared in 2003-2004, which is the early stage of the research on social isolation of people living with HIV, coupled with the high frequency of their appearance and the prominence of the centrality of the research, it is possible to determine that these three keywords are the basic research areas of the research on social isolation of people living with HIV.

3.6. Keywords Clustering Analysis

The co-word analysis methodology in use allows research CiteSpace users to directly analyse topics in a specific research area. Keeping all other parameters constant, the Find Cluster function was run and the Log Likelihood Ratio (LLR) algorithm was selected to cluster keywords in the research area of social isolation of people living with HIV. On the basis of network structure and clustering clarity, the degree of modularity Q (Q) can be used to measure the stability of the generated clustering network, and it is generally believed that a Q value greater than 0.3 indicates that the clustering structure is significantly effective; the average similarity S (S) can be used to measure the degree of similarity of the nodes within the clustered clusters, and it is generally believed that an S value of greater than 0.5 indicates a high degree of matching within the clusters, and the degree of clustering, and it is generally believed that a value of greater than 0.5 indicates a high degree of intra-cluster matching and reasonable clustering. The clustering results are shown in **Figure 6**, the Q value is 0.6865, which is greater than the critical value of 0.3, and the S value is 0.847, which is greater than the critical value of 0.5. In general, the clustering results have a high degree of confidence. According to the clustering results, the high-frequency keywords in the field of social isolation of HIV-infected patients in Web of science core set database are mainly concentrated in 9 clusters.

3.7. Keyword Burst Analysis

Mutant terms are key terms that suddenly increase in a certain period of time or have a significant increase in the frequency of use, through which we can show the stage of cutting-edge research in the field of social isolation of HIV-infected people. Keeping other parameters unchanged, we ran the "Citation/Frequency Burst History" function to generate a list of keywords with mutations in the research field of social isolation of people living with HIV in the Web of science core set database from 2003 to 2024, as shown in **Figure 7**. The cutting-edge trends in the research field of social isolation of people living with HIV in different periods in China were analysed. By eliminating the mutated words that do
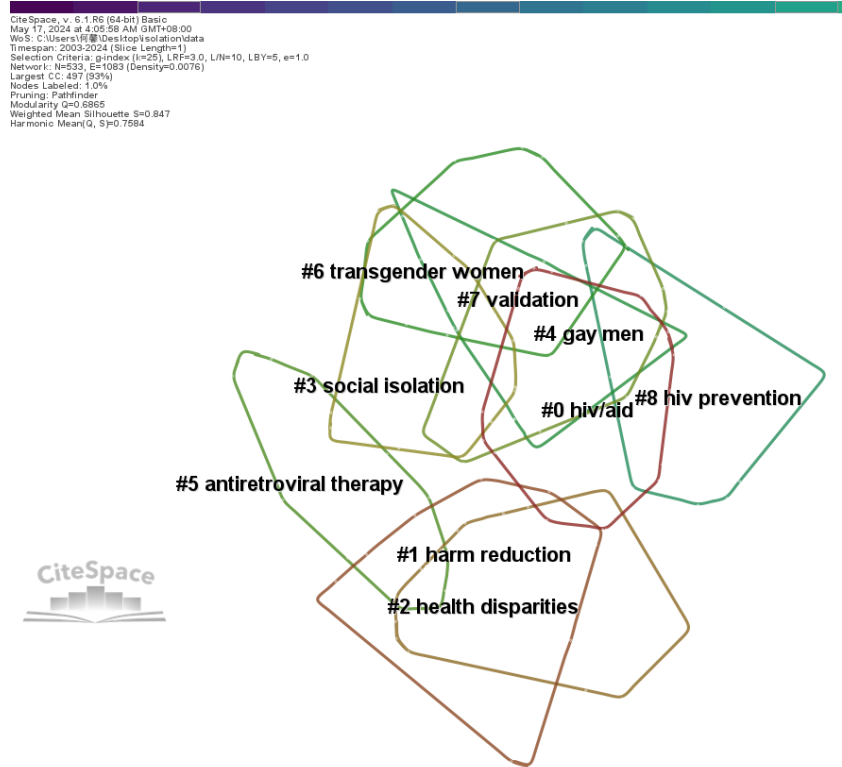
Figure 6. Cluster mapping of keywords.

Top 29 Keywords with the Strongest Citation Bursts

Keywords	Year	Strength	Begin	End	2002 - 2024
aid	2003	12.23	2003	2014	
drug use	2004	3.68	2004	2010	
risk	2005	8.94	2005	2011	
family	2005	3.96	2005	2012	
infection	2005	3.84	2005	2008	
women	2005	3.73	2005	2011	
worker	2006	3.8	2006	2013	
condom use	2006	3.47	2006	2014	
hiv	2004	3.43	2007	2012	
migration	2009	4.24	2009	2017	
social exclusion	2009	3.76	2009	2014	
risk behavior	2007	4.49	2010	2016	
south africa	2010	3.75	2010	2017	
social network	2013	3.27	2013	2016	
context	2006	4.23	2016	2018	
challenge	2006	4.05	2016	2019	
user	2016	3.88	2016	2018	
perspective	2016	3.39	2016	2018	
united states	2005	4.46	2017	2018	
youth	2017	3.86	2017	2019	
network	2017	3.51	2017	2021	
health care	2012	3.29	2017	2020	
substance use	2010	4.43	2019	2021	
consequence	2011	3.7	2019	2022	
resilience	2017	5.34	2020	2021	
health disparity	2020	4.17	2020	2021	
qualitative research	2013	3.26	2021	2024	
risk factor	2012	5.88	2022	2024	
older adult	2013	3.35	2023	2024	

Figure 7. Top 29 terms with the strongest citation bursts.

not fit the research theme, we obtained the keywords that will continue to be mutated until 2024, such as "qualitative research", "risk factor", "older adult" etc., of which the duration of emergence is 1 year, 2 years and 3 years respectively, and the intensity of emergence is larger for "aid" (12.23) and "risk" (8.94).

4. Discussion

4.1. Current Status of Social Isolation of People Living with HIV Research

The annual volume of publications is an important indicator of the research heat and development trend of a research field, and the research heat and development trend of the industry and speciality can be reflected, to a certain extent, by the volume of paper output in a time period (Sikandar et al., 2022). From the graph of the trend of publication, the volume of literature on social isolation of HIV-infected people is generally in an upward trend, suggesting that the relevant research in this field is getting more and more attention. Based on the analysis of the implementation dynamics of combining the year of occurrence of high-frequency keywords, the distribution of clustering time zones and the social environment, the research on social isolation of people living with HIV can be divided into three stages. Before 2010, the research on social isolation of people living with HIV was in the embryonic stage, and the research on social isolation of people living with HIV sporadically appeared at this stage, with the total number of publications being relatively small, which was related to the weak scientific research environment at that time.2011 -2019, the research in this area was in the nascent stage, which was related to the weak scientific research environment at that time. The period of 2011-2019 is the early stage of the development of this research field, and with the increased attention of researchers to the psychosocial aspects of people living with HIV, the number of articles published in this field has shown a gradual growth. The third phase is the period of full development of the field, which took place after 2019, this phase saw the greatest increase in the number of publications in 2019-2020, one of the reasons behind this may be the phenomenon of social isolation among HIV infected patients exacerbated by the New Crown Pneumonia pandemic, which is in line with the findings of the study conducted by Marziali ME (Marziali et al., 2020). The findings showed that most of the studies related to social isolation among people living with HIV were conducted in Europe and the United States (Marziali et al., 2021), and the United States was the first in the fault line of the number of publications, reflecting the leading position of the United States in this field of research. In recent years, in response to the trend of globalisation and the strengthening of AIDS prevention and control, the number of articles published in developing countries such as China and India has also gradually increased. In terms of authors and institutions publishing, the top authors are Otis, Joanne (8 articles), Lacombe-duncan, Ashley (7 articles), the total number of core authors in the field of research on social isolation of people living with

HIV is 99, and the core authors have published a total of 337 documents, and the core authors in the field of research have not yet been formed. The core author group of a research field epitomises the continuity and depth of scientific practice in that field (Inger & Maria, 2008), and a research group that continuously focuses on a particular research direction can keep abreast of the latest frontiers in that direction and gain more in-depth insights. The results of this study show that in the research field of "social isolation of people living with HIV", the research teams are mostly small collaborative teams, and the authors who have published one document are more than the others, which indicates that most researchers have not yet chosen "social isolation of people living with HIV" as a long-term and fixed research direction, and that they have not yet chosen "social isolation of people living with HIV" as a long-term and fixed research direction. This indicates that most researchers have not chosen "social isolation of people living with HIV" as a long-term and fixed research direction, and there is less communication and cooperation among authors. This suggests that in the next step of research, the co-operation between authors should be strengthened and the continuous attention to this topic should be emphasised in order to further promote the development of this field. Through the connection between research institutions, it can be seen that at present, the research related to social isolation of HIV-infected people mainly relies on universities and is carried out in the form of co-operation, and there are fewer institutions that carry out related research independently. Thus, it can be seen that universities are an important research force for the social isolation of HIV-infected people. The reason for this may be that universities are the main research bases for social isolation among people living with HIV, and they can rely on the talents and resources of universities, CDCs and hospitals to systematically build up and integrate multidisciplinary clusters of public health, medicine, and psychosocial sciences.

4.2. Hot Topics and Frontiers of Social Isolation of People Living with HIV Research

Keywords are a high-level summary and distillation of the research topic, and the research hotspots in the field can be found by analysing the frequency of keyword occurrences. The summary of keyword co-occurrence and clustering information reveals that the current research hotspots of social isolation among people living with HIV mainly focus on disease prevalence, risk factors, lesion outcomes and related health behavior interventions. These hotspots together constitute a multidimensional perspective of the current research on social isolation of people living with HIV. The prevalence of the disease, on the other hand, reflects the occurrence of social isolation among HIV-infected individuals, and also reveals the seriousness and urgency of the problem. The persistence of social isolation among HIV-infected individuals further exacerbates the risk of disease transmission (Xie et al., 2017). In the absence of social support and understanding, many infected individuals may choose to conceal their condition, which re-

sults in their inability to receive the necessary medical care and treatment in a timely manner, which in turn increases the likelihood of viral transmission. At the same time, this sense of isolation may also lead to negative emotions such as low self-esteem, loneliness and depression (Cain et al., 2013) among infected people, which in turn affects their mental health and quality of life. Risk factor studies have analysed the internal and external factors that contribute to social isolation among HIV-infected individuals, including individual psychological and social contexts. Risk factor studies have analysed the internal and external factors that contribute to social isolation in HIV-infected individuals, including individual psychological and social contexts, and Marziali ME (Marziali et al., 2021) have shown that unstable housing, recent experience of violence, and a diagnosed mental health condition have important policy implications for social isolation in HIV-infected individuals. Relevant studies have shown (Dickens et al., 2011; Hawthorne, 2008; Smith & Hirdes, 2009) that age is also an influential factor in the sense of social isolation among people living with HIV, and that social isolation may be more common among older people compared to younger infected people, with estimates ranging from 7% to 29% of older people being affected by social isolation. In addition, Oke OO, Casale et al (Oke et al., 2019) found that stigma is a very important risk factor among HIV infected individuals and that social support can buffer the adverse effects of stigma. Aspects of social isolation lesion outcomes in people living with HIV show that social isolation can affect the quality of life and health management of people living with HIV. It has been shown (Comfort et al., 2024) that there is a negative correlation between social isolation of people living with HIV and their adherence to antiretroviral therapy, i.e., the stronger the sense of social isolation, the more difficult it is for infected patients to adhere to regular treatment. This may not only lead to an increase in viral load, but also accelerate disease progression and even increase the risk of drug resistance. In addition, social isolation may also affect the nutritional status of HIV-infected individuals (Casado et al., 2013), as a lack of social support may result in their inability to receive adequate nutritional support, further weakening their immunity and increasing the risk of contracting other diseases. A study by Marziali ME et al. (Marziali et al., 2021) found that there is a correlation between social isolation and mortality rates among HIV-infected individuals, emphasising the importance of mitigating the need to mitigate the effects of social isolation among HIV-infected individuals. In terms of relevant health behavior interventions, interventions for social isolation among HIV-infected people are being explored and improved. Some studies (Mulder et al., 1994) have demonstrated that the provision of psychological support and counselling can effectively alleviate infected people's sense of social isolation and enhance their psychological resilience and social adaptability. In addition, publicity and education on HIV prevention and treatment to improve social understanding and acceptance of HIV-infected people is also an important way to reduce the sense of social isolation (Abubakari et al., 2021). At the same

time, support at the policy level is also essential, such as providing stable housing security and strengthening the rational allocation of medical resources, all of which can create a more friendly social environment for HIV-infected people and reduce their sense of social isolation (Marziali et al., 2021). Keyword emergence terms can predict the research trend and development direction of the field. From the keyword emergence graph, it can be found that the keywords that will continue to emerge until 2024 include "qualitative research", "risk factor", "older adult" and so on, indicating that these words predict the future research direction. Firstly, the emergence of the keyword "qualitative research" suggests that future research will focus more on in-depth understanding and exploration of the psychological, social and cultural context of people living with HIV. Qualitative research can help us better understand the real experiences, needs and challenges of patients, and thus provide strong support for the development of more effective interventions and treatment programmes. Azhar S (Azhar et al., 2020) et al. explored how social isolation and depression affect cisgender women living with HIV through qualitative interviews. At the same time, the emergence of "risk factor" signals that future research will pay more attention to the risk factors of social isolation among people living with HIV. Through in-depth research on risk factors, we can better understand the causes of social isolation among HIV-infected people and provide scientific basis for the development of relevant interventions. In addition, "older adult" is one of the keywords, indicating that the study of HIV infection in the elderly population will gradually become a research hotspot. With the increasing trend of population aging, HIV and age discrimination remain major public health challenges in the United States and globally. Older adults with HIV infection may experience cross-stigma due to HIV and age discrimination (Brown & Adeagbo, 2021). Future research will focus more on the characteristics, needs, and challenges of older adults with HIV in order to provide more precise interventions and treatment options.

5. Conclusion

Using CiteSpace software, this study analysed the literature on social isolation of people living with HIV in the Web of Science Core Set database. By visually combing the number of publications, research authors, institutions, countries, and keywords in the field over the past 20 years, it reveals the current development, hot issues, and future trends in the field of research on social isolation of people living with HIV. This study aims to help researchers quickly grasp the development of research on social detachment of people living with HIV, accurately understand the research hotspots and cutting-edge issues, and provide a reference basis for subsequent research. This study found that the number of publications in this field has shown a rising trend year by year, and more rapid development in recent years. However, the size of the research team is small and the cooperation between teams is insufficient. In the future, we should devote

ourselves to building multidisciplinary and multicentre research cooperation to further explore the advantages and application potential of this field. Currently, the research focus of social isolation in people living with HIV is mainly concentrated on various aspects such as disease prevalence, risk factors, lesion outcomes and related health behavior interventions. There is great potential for development in the areas of risk factors, elderly HIV patients, and phenomenological studies. However, there are limitations to this study, as only articles from the Web of Science Core Collection database were analysed and only English databases were included in this study, and these reasons may cause problems of literature bias. Future studies can adopt multi-language and multi-database comparative analyses to complement the research frontiers and hotspots.

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Conflicts of Interest

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

References

Abubakari, G. M., Owusu-Dampare, F., Ogunbajo, A., Gyasi, J., Adu, M., Appiah, P., Torpey, K., Nyblade, L., & Nelson, L. E. (2021). HIV Education, Empathy, and Empowerment (HIVE3): A Peer Support Intervention for Reducing Intersectional Stigma as a Barrier to HIV Testing among Men Who Have Sex with Men in Ghana. *Int J Environ Res Public Health, 18,* 13103. https://doi.org/10.3390/ijerph182413103

Azhar, S., Gandham, S., Vaudrey, J. et al. (2020). "They Kept Away": Social Isolation of Cisgender Women Living with HIV in Hyderabad, India. *Clinical Social Work Journal, 48,* 64-76. https://doi.org/10.1007/s10615-019-00736-w

Berkman, L. (1983). The Assessment of Social Networks and Social Support in the Elderly. *Journal of the American Geriatrics Society, 31,* 743-749. https://doi.org/10.1111/j.1532-5415.1983.tb03393.x

Brown, M. J., & Adeagbo, O. (2021). HIV and Aging: Double Stigma. *Current Epidemiology Reports, 8,* 72-78. https://doi.org/10.1007/s40471-021-00265-6

Cain, R., Jackson, R., Prentice, T., Collins, E., Mill, J., & Barlow, K. (2013). The Experience of HIV Diagnosis among Aboriginal People Living with HIV/AIDS and Depression. *Qualitative Health Research, 23,* 815-824. https://doi.org/10.1177/1049732313482525

Casado, J. L., Iglesias, V., del Palacio, M., Marín, A., Perez-Elías, M. J., Moreno, A., & Moreno, S. (2013). Social Isolation in HIV-Infected Patients According to Subjective Patient Assessment and DEXA-Confirmed Severity of Lipodystrophy. *AIDS Care, 25,* 1599-603. https://doi.org/10.1080/09540121.2013.793275

Chen, C. M. (2006). Citespace ii: Detecting and Visualizing Emerging Trends and Transient Patterns in Scientific Literature. *Journal of the American Society for Information Science and Technology, No. 3,* 57.

Comfort, A. B., Asiimwe, S., Amaniyre, G., Orrell, C., Moody, J., Musinguzi, N., Bwana,

M. B., Bangsberg, D. R., Haberer, J. E., & Tsai, A. C. (2024). META Study Investigators. Social Networks and HIV Treatment Adherence among People with HIV Initiating Treatment in Rural Uganda and Peri-Urban South Africa. *SSM Popul Health, 25,* Article ID: 101593. https://doi.org/10.1016/j.ssmph.2023.101593

Cornwell, E. Y., & Waite, L. J. (2009). *Social Disconnectedness, Perceived Isolation and Health among Older Adults. Journal of Health and Social Behavior, 50,* 31-48. https://doi.org/10.1177/002214650905000103

Dickens, A. P., Richards, S. H., Greaves, C. J., & Campbell, J. L. (2011). Interventions Targeting Social Isolation in Older People: A Systematic Review. *BMC Public Health, 11,* 1-22. https://doi.org/10.1186/1471-2458-11-1

Fine, M., & Spencer, R. (2009). S*ocial Isolation Development of an Assessment Tool for HACC Services* (pp. 4-5). Macquarie University: Centre for Research on Social Inclusion.

Fleury, J., Keller, C., & Murdaugh, C. (2000), Social and Contextual Etiology of Coronary Heart Disease in Women. *Journal of Women's Health & Gender-Based Medicine, 9,* 967-978. https://doi.org/10.1089/15246090050199991

Gannon, B. N., & Stacciarini, J. M. (2016). Review of the Literature: A Rural-Urban Comparison of Social Networks of Older Adults Living with HIV. *Journal of the Association of Nurses in AIDS Care, 27,* 419-429. https://doi.org/10.1016/j.jana.2016.02.004

Han, S., Hu, Y., Wang, L., Pei, Y., Zhu, Z., Qi, X., & Wu, B. (2021). Perceived Discrimination and Mental Health Symptoms among Persons Living with HIV in China: The Mediating Role of Social Isolation and Loneliness. *AIDS Care, 33,* 575-584. https://doi.org/10.1080/09540121.2020.1847246

Hawthorne, G. (2008). Perceived Social Isolation in a Community Sample: Its Prevalence and Correlates with Aspects of Peoples' Lives. *Social Psychiatry Psychiatric Epidemiology, 43,* 140-150. https://doi.org/10.1007/s00127-007-0279-8

House, J. S., Landis, K. R., & Umberson, D. (1988). Social Relationships and Health. *Science, 241,* 540-545. https://doi.org/10.1126/science.3399889

Inger, P., & Maria, F. (2008). The Lived Experience of Closeness in Partners of Cancer Patients in the Home Care Setting. *International Journal of Palliative Nursing, 14,* No. 1. https://doi.org/10.12968/ijpn.2008.14.1.28148

Kelemen, A., Cagle, J., Chung, J., & Groninger, H. (2019). Assessing the Impact of Serious Illness on Patient Intimacy and Sexuality in Palliative Care. *Journal of Pain and Symptom Management, 58,* 282-288. https://doi.org/10.1016/j.jpainsymman.2019.04.015

Lien-Gieschen, T. (1993). Validation of Social Isolation Related to Maturational Age: Elderly. *Nurs Diagn, 4,* 37-44. https://doi.org/10.1111/j.1744-618x.1993.tb00082.x

Marziali, M. E., Card, K. G., McLinden, T., Wang, L., Trigg, J., & Hogg, R. S. (2020). Physical Distancing in COVID-19 May Exacerbate Experiences of Social Isolation among People Living with HIV. *AIDS Behav, 24,* 2250-2252. https://doi.org/10.1007/s10461-020-02872-8

Marziali, M. E., McLinden, T., Card, K. G., Closson, K., Wang, L., Trigg, J., Salters, K., Lima, V. D., Parashar, S., & Hogg, R. S. (2021). Social Isolation and Mortality among People Living with HIV in British Columbia, Canada. *AIDS Behav, 25,* 377-388. https://doi.org/10.1007/s10461-020-03000-2

Mulder, C. L., Emmelkamp, P. M., Antoni, M. H., Mulder, J. W., Sandfort, T. G., & de Vries, M. J. (1994). Cognitive-Behavioral and Experiential Group Psychotherapy for HIV-Infected... *Psychosom Med, 56,* 423-31. https://doi.org/10.1097/00006842-199409000-00007

Nicholson Jr., N. R. (2009). Social Isolation in Older Adults: An Evolutionary Concept Analysis. *J Adv Nurs, 65,* 1342-1352.
https://doi.org/10.1111/j.1365-2648.2008.04959.x

Oke, O. O., Akinboro, A. O., Olanrewaju, F. O., Oke, O. A., & Omololu, A. S. (2019). Assessment of HIV-Related Stigma and Determinants among People Living with HIV/AIDS in Abeokuta, Nigeria: A Cross-Sectional Study. *SAGE Open Medicine*, 7.
https://doi.org/10.1177/2050312119869109

Rueda, S., Law, S., & Rourke, S. B. (2014). Psychosocial, Mental Health, and Behavioral Issues of Aging with HIV. *Current Opinion in HIV and AIDS, 9,* 325-331.
https://doi.org/10.1097/COH.0000000000000071

Sikandar, H., Abbas, A. F., Khan, N., & Qureshi, M. I. (2022). Digital Technologies in Healthcare: A Systematic Review and Bibliometric Analysis. *International Journal of Online and Biomedical Engineering (iJOE), 18,* 34-48.
https://doi.org/10.3991/ijoe.v18i08.31961

Sikkema, K. J., Kalichman, S. C., Hoffmann, R., Koob, J. J.,Kelly, J. A., & Heckman, T. G. (2000). Coping Strategies and Emotional Wellbeing among HIV-Infected Men and Women Experiencing AIDS-Related Bereavement. *AIDS Care, 12,* 613-624.
https://doi.org/10.1080/095401200750003798

Smith, T. F., & Hirdes, J. P. (2009). Predicting Social Isolation among Geriatric Psychiatry Patients. *International Psychogeriatrics, 21,* 50-59.
https://doi.org/10.1017/S1041610208007850

Solomon, P., O'Brien, K. K., Nixon, S., Letts, L., Baxter, L., & Gervais, N. (2018). Qualitative Longitudinal Study of Episodic Disability Experiences of Older Women Living with HIV in Ontario, Canada. *BMJ Open, 8,* e021507.
https://doi:10.1136/bmjopen-2018-021507

Umberson, D., & Montez, J. K. (2010). Social Relationships and Health: A Flashpoint for Health Policy. *Journal of Health and Social Behavior, 51,* S54-S66.
https://doi.org/10.1177/002214651038350

Wang, J., Lloyd-Evans, B., Giacco, D., Forsyth, R., Nebo, C., Mann, F., & Johnson, S. (2017). Social Isolation in Mental Health: A Conceptual and Methodological Review. *Soc Psychiatry Psychiatr Epidemiol, 52,* 1451-1461.
https://doi.org/10.1007/s00127-017-1446-1

Xie, T., Yang, J. P., Simoni, J. M. et al. (2017). Unable to Be a Human Being in Front of Other People: A Qualitative Study of Self-Isolation Among People Living with HIV/AIDS in China. *J Clin Psychol Med Settings, 24,* 211-222.
https://doi.org/10.1007/s10880-017-9513-z