

# The Dynamics and Frontiers of Video Game Social Research in Communication Studies-*A Scientometrics Analysis Based on CiteSpace and VOSviewer*

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## Abstract

In this media-rich era, digital entertainment in the form of video games has a major impact on our social interaction and productivity in a borderless social mode. As a result, in order to comprehend the research progress of video game, CiteSpace and VOSviewer were used for scientometrics and knowledge mapping in this study. It displays the state of development, fundamental structure, and frontier areas of video game social communication. The mapping is based on 448 publications collected through Web of Science core database searches. The findings indicate that (1) video game social research has gained increasing attention over the last 23 years, with a curvilinear growth in annual publications, but a core authorship group has yet to materialize, and the United States institutions dominate the number of publications on this topic. (2) Gaming behaviors, gender studies, media effects, and gaming experiences have emerged as the four main hotspots of research in this field under the keyword co-occurrence and clustering analyses. (3) Research in this area has traditionally concentrated on violent, addictive, and other problematic gaming behaviors. The findings of this study forecast future trends in the study of video game social communication and provide the groundwork for more in-depth research.

**Keywords:** video game social, communication, scientometrics, visualisation mapping, CiteSpace, VOSviewer

## 1. Introduction

### 1.1 Video Game Socializing

As the information age's digitalization process accelerates, digital entertainment in the form of video games has not only profoundly altered the course of the global economy, politics, culture, and social life, but has also become fully interwoven into our daily lives (Liu, 2018). Video game refers to the interactive game that depends on digital information technology and electronic media platform. As a fusion medium, video game is closely associated with information technology and digital technology, and with its unique characteristics of fun, interactivity and immersion, it has different extensions in types, platforms and carriers, and has become an important form of leisure and entertainment in the information era (Zhu et al., 2022). The intricacy of video games has long made it an interesting topic of study in social, psychological, computer, and economic sciences (Zhou, 2016). Economist Edward Castronova recognizes that a huge number of people are set to spend a significant amount of time in virtual space in video games and refers to this phenomena as "mass spatial migration." He believes that this "game world" will soon evolve into a new location distinct from Earth (Worlds, 2005). Similarly, Jane McGonigal contends that video games have generated a fragmentation of reality that will transform the world forever (McGonigal, 2011). With the advent of digital technology, video games' social aspects have been increased, providing players with a wide virtual platform for interpersonal interactions (Guan, 2010). Sociality distinguishes new media from traditional media, and sociality is significantly more important in video games than in any other medium. Myers was the first to apply media interaction theory to video game social interaction, proposing that gameplay is similar to human communication behavior (Myers, 2003). Video game social is an interpersonal interaction that occurs in

cyberspace, in which the two interacting parties can communicate in the game's virtual environment, which protected their privacy and satisfied their psychological need for interpersonal interaction by creating new characters and scenarios (Huang, 2008; Liu, 2018). According to Baumeister & Leary (1995), people have a basic need to belong to a social group, and satisfying one's social needs is what leads many gamers to play video games. The social pattern in video games across space and time defies the physical area limitation of traditional game play and generates a new sort of de-bordered meaning exchange and production mode (Tao & Zhai, 2021).

### *1.2 Present Research*

Currently, research on video game social is concentrated in two areas. One is focusing on a single subject. For example, it investigates how gamers act and what motivates them to play (or leave) from a psychological standpoint (Garcia-Lanzo & Chamarro, 2018; Johnson et al., 2015; Mun, 2022). Explain from a sociological perspective how players communicate and work together in temporary teams (Kou & Gui, 2014; Thavamuni et al., 2023). It also concentrates on particular gaming genres. Massively Multiplayer Online Role Playing Game (MMORPG) (Gong et al., 2023; Kim et al., 2022) and Multiplayer Online Battle Arena (MOBA) (Johnson et al., 2015; Thavamuni et al., 2023) are two examples. A thorough assessment of the literature on MMORPGs and MOBA games is provided by Sourmelis et al. (2017) and Mora-Cantalops & Sicilia (2018), respectively. Although prior research have yielded valuable results, they are dispersed and lack systematic classification and summarization, especially in the field of communication. This motivates us to systematically evaluate the state of research on video game social communication from an empirical perspective, as well as to comprehend the development of existing research, which is useful for identifying new research hotspots and filling in research gaps. Based on the quantitative analysis, this study sorts and visualizes the relevant literature using the software CiteSpace and VOSviewer, and focuses on the following questions.

- 1) What is the current state of study on video game social in the communication field?
- 2) What are the topic's specific research hotspots and priorities?
- 3) What have been the historical history and development tendencies of this field's research?

The objective of this study is to reveal the overall trends, research hotspots, and development frontiers in the field of video game social research as it pertains to the communication discipline, and to discover research gaps and shortcomings, providing directions for future research.

## **2. Methodology**

### *2.1 Data Collection*

This study's use of scientometric provides a strong quantitative approach for analyzing a variety of scholarly networks, from visualizations of key term co-occurrence to citation links between journals and other publications (Van Eck & Waltman, 2014). It was initially employed in medicine (Coles & Eales, 1917) and statistics (Gross & Gross, 1927) as a key to open up enormous amounts of research literature. Liu et al. (2021) and Pijselman & Sükösd (2023) use this research approach to empirically analyze current trends and gaps in research on how video games and child development, and gender are integrated within communication, film, and media studies. Both provide excellent examples and inspire this study's methods. Generally, the ideal data for scientometric analyses are sourced from Web of Science (WoS) (Van Leeuwen, 2006). WoS is the most widely used literature repository, with databases such as SCI, SSCI, A&HCI, ESCI, and CPCI, and it covers over 12,000 top journals globally (Gerbic & Stacey, 2005; Gioia et al., 2013). The WoS core collection of databases was chosen as the data source for this study. First, WOS topic searches for video game social publications used "video game", "social" and similar terms, such as "electronic game". The search formula was set as  $TS = ("video\ game" OR "electronic\ game" OR "digital\ game") AND TS = ("social*" OR "interaction")$  (Liu et al., 2021). A total of 3150 related research articles were retrieved, spanning the period 2000 - 2023. Second, the data were refined to assure relevance, accuracy, and minimize references unrelated to video game social communication: (1) The discipline covered only communication subject. (2) Only journal articles and conference papers are allowed. (3) English-only papers. Results from 504 publications were obtained. Finally, 504 records (N=504) were extracted from the WOS database, imported into CiteSpace for duplication removal and data cleaning, and 448 were retained for the study.

### *2.2 Research Instruments*

This study will use CiteSpace 5.7.R4 and VOSviewer 1.6.14 as research tools for visualisation and analysis, and it will be based on a scientometrics and knowledge mapping strategy. CiteSpace and VOSviewer are software tools for information visualization created by Chinese American researcher Prof. Chen's team and Van Eck and Waltman from Leiden University in the Netherlands respectively. Their offer excellent visualisation and analysis features that can clearly visualize the authors, institutions, hot terms, co-citations, and network relationships underlying their data nodes, allowing researchers to conduct objective measurement research as opposed to subjective evaluation. The specific operational steps are as follows: Firstly, CiteSpace was used to conduct a simple statistical analysis of the literature to obtain the

fundamental laws of the video game social research development. Secondly, the VOSviewer software is selected for conducting an analysis of source journals, core authors, research institutes, and cooperative networks in order to gain insights into the central research and current study landscape of video game social research. Finally, CiteSpace was used to conduct keyword co-occurrence, clustering and highlighting analyses to reveal the research hotspots and research frontiers of video game social research in the communication field.

### 3. Results

#### 3.1 Research Status Analysis

##### 3.1.1 Literature Development Trend

The annual number of publications in the literature reflects the research level and development of the topic in a particular subject area (Hua & Wu, 2021; L. Zhou et al., 2021). Figure 1 depicts WoS's statistical column and line composite charts based on search results, which illustrate the annual number of publications and growth rate of video game social research-related literature from 2000 to 2023. It can be classified into three stages based on the number of publications and annual growth rate: the starting stage, the fluctuating growth stage, and the active expansion stage.

2000 - 2010 was the starting stage, the video game social research was introduced to the communication field in 2000, the study investigated the American adolescents' exposure to a variety of media, including video games, as well as the social environment (Roberts, 2000). In 2004, articles appeared with the keywords "media violence" (Uhlmann & Swanson, 2004) and "gender differences" (Lucas & Sherry, 2004). At this stage, researchers also explored the effects of video game social interaction on players' (especially adolescents') gaming behaviours (Hart et al., 2009; Möller & Krahé, 2009; Sheese & Graziano, 2005), motivation (Hoffman & Nadelson, 2010; Jansz & Tanis, 2007; Klimmt, Schmid, et al., 2009), social capital and emotional identity (Klimmt, Hefner, et al., 2009; Peña & Hancock, 2006; Williams, 2006), which enriched the application of video game social research in the communication field.

2011 - 2018 is the fluctuating growth stage, in which the overall number of publications is low and unstable, with the lowest and highest growth rates of the whole stage occurring in 2011 and 2012, at -0.76% and 1.75%, respectively. However, throughout this stage, the annual number of publications has remained essentially constant at roughly 20-30 articles..

2019-2023 is the active expansion stage, with the Covid-19 epidemic breaking in 2019, and the video game industry achieving significant growth during this period as people's leisure and interactive entertainment activities shifted from offline to online due to the prolonged period of home and isolation(He & Zhang, 2022; Qian et al., 2021). Researchers have also noticed this phenomena, since the relevant literature on video game social research has grown to more than 50 papers since 2020, giving an in-depth investigation of video game social research. For example, Lai & Fung(2020) used qualitative research to explain the development of friendship relationships triggered by video games over a ten-year period.

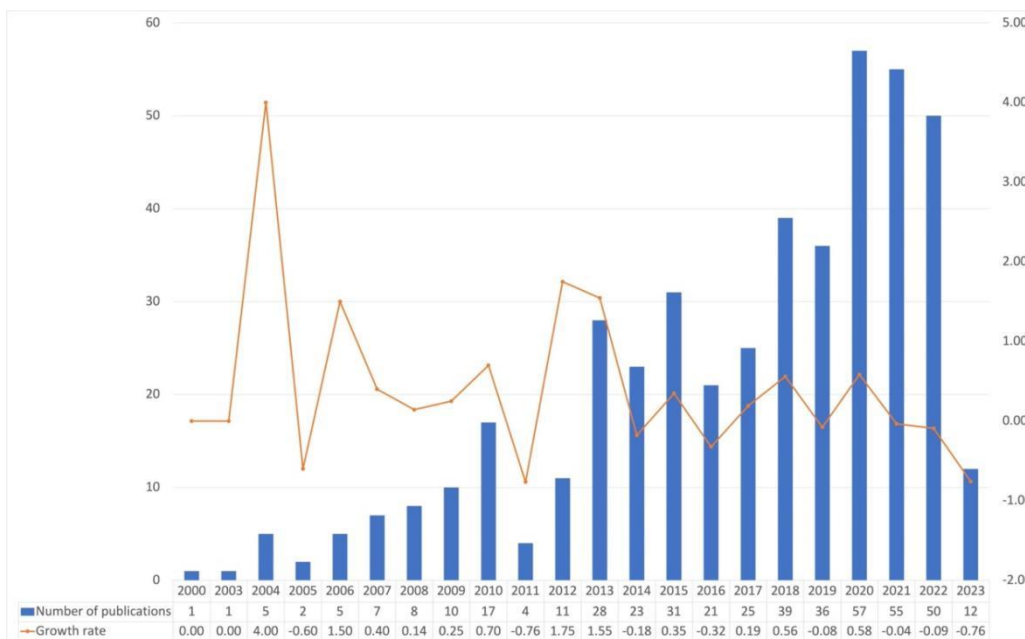


Figure 1. Number of publications and growth rate over the period from 2000 to 2023

### 3.1.2 Source Journal Analysis

Statistically, 448 articles are from 226 journals. According to the Law of Bradford, which states that in a large number of literature systems, literature resources are dispersed according to a certain regular distribution model. If the journals according to the number of articles published in a particular specialty, according to the decreasing order of ranking, can be divided into a core area and the successive several regions, each area of the publication of articles in the amount of equal, at this time the core journals and the successive number of regional journals into a  $1:n:n^2:\dots$  proportionality of journals (Brookes, 1985). Based on the calculation of the core area, the ratio of the number of journals in the video game social research is  $8 : 38 : 180$ , which is close to  $1 : 4.7 : 4.7^2$ , showing a  $1 : n : n^2$  distribution, which is basically consistent with the Law of Bradford. Therefore, this research published more than 8 articles for the core journals, based on VOSviewer calculations listed source journals, the number of articles published, the number of citations, and the impact factor.

Table 1. Source journals (Publications  $\geq 8$ )

Rank	Name of Journal	Publications	Citations	IF
1	Computers in human behavior	53	1765	9.9
2	Games and culture	27	304	2.8
3	Cyberpsychology behavior and social networking	26	1003	6.6
4	New media & society	17	535	5
5	Frontiers in psychology	14	225	3.8
6	Aggressive behavior	9	358	2.9
7	Plos one	9	220	3.7
8	Psychology of popular media	9	51	3
9	Cyberpsychology & behavior	8	807	2.71
10	Sex roles	8	722	3.8
11	Journal of media psychology-theories methods and applications	8	137	1.7

As shown in Table 1, the journal with the highest number of articles published during the period 2000-2023 is Computers in Human Behaviour, with 53 publications, or 11.83% of the total number of articles published, and an impact factor of 9.9. The journal in 2nd rank is Games and Culture with 27 publications, but it has a low number of citations and impact factor. The 3rd ranked journal is Cyberpsychology Behavior and Social Networking with 26 publications and its impact factor is 6.6. The 4th-5th ranked journals are New Media & Society and Frontiers in Psychology, with 17 and 14 publications, or 3.79% and 3.12%, respectively. The journals that ranked 6th-8th were Aggressive Behavior, Plos One, and Psychology of Popular Media, all with 9 publications. The journals Cyberpsychology & Behavior, Sex Roles, and Journal of Media Psychology-theories Methods and Applications, which ranked 9th-11th, each published 8 publications, but their citations were higher.

### 3.1.3 Core Authors and Collaborating Networks Analysis

Core author scholarship is often a good indicator of the overall state and core research strength of an academic field (Liu et al., 2021). Statistically, 448 publications involved a total of 1288 authors. Due to the space limitation, this research adjusted the threshold setting for minimum publication to 6, which obtained 9 highly productive authors, and the results are shown in Table 2.

Table 2. Highly prolific authors (Publications  $\geq 6$ )

Rank	Author	Publications	Citations
1	Tobias Greitemeyer	16	916
2	Rachel Kowert	9	386
3	John A. Velez	9	253
4	Brad J. Bushman	8	1265
5	Jesse Fox	8	498
6	Christopher J. Ferguson	7	350
7	Thorsten Quandt	6	284
8	Craig A. Anderson	6	1401
9	Sarah M. Coyne	6	156

Tobias Greitemeyer has the most publications on video game social research, as indicated in Table 2, with 16 articles and 916 citations to the literature. Rachel Kowert and John A. Velez come in second and third, with 9 publications and 386 and 253 citations to the literature, respectively. Furthermore, among the nine authors, Craig A. Anderson had the most citations (1,401), followed by Brad J. Bushman (1,265). According to the Price's law, the core authors should have at least  $M$  publications, calculated as  $M^P = 0.749 * \sqrt{(N_{PMAX})}$  ( $N_{PMAX}$  is the number of publications of the author with the highest number of publications)(Ding, 1993). The largest number of articles published in this research from 2000-2023 is 16,  $MP \approx 3$ , i.e., authors who published 3 or more publications were selected as core authors. Calculating the authors through VOSviewer with the threshold set to 3, a total of 39 authors were screened with 182 publications, which accounted for 40.62% of the overall publications and did not meet the 50% requirement of Price's Law. As can be observed, the current video game social research does not have a core group of authors in the communication field in the strict sense of the word.

Based on 1288 authors, the visual mapping of the author collaboration network, produced using VOSviewer and superimposed on the time factor, can clearly reflect the researcher changes and the overall situation of this topic in recent years. As illustrated in Figure 2, nodes indicate authors, node size represents the number of publications, lines represent existing collaborations, line thickness denotes collaboration strength, and color represents collaboration time (Xie et al., 2018; Zhu et al., 2022).

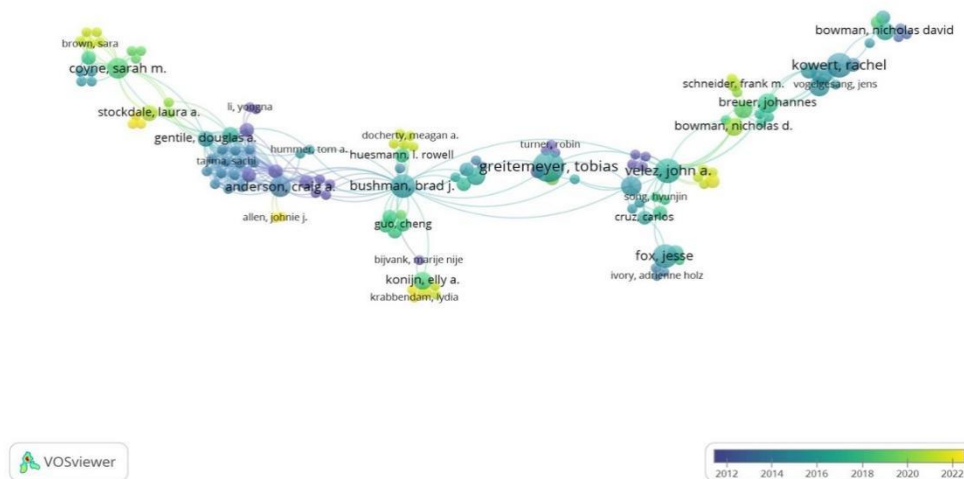


Figure 2. Visualization mapping of author collaboration networks

Figure 2 shows that the application of video game social research in communication is more dispersed, with fewer connections between authors and smaller teams, with a collaborative network centered on Tobias Greitemeyer, Brad J. Bushman, and John A. Velez as the main connecting node, but the three author clusters were formed relatively early, and authors have become more focused on publishing independently in recent years.

### 3.1.4 Research Institutions and Co-Operation Network Analysis

By analyzing the research institutions, it is possible to reveal the contribution and involvement of each institution in the video game social research (Hua & Wu, 2021). According to the statistics, 448 publications involve a total of 586 research institutions. Table 3 and Figure 3 show the research institutions with the number of publications  $\geq 8$  and the co-operation between each institution, respectively.

Table 3 shows that Ohio State University in the United States has the most publications (20), accounting for 4.46% of the total literature and having a greater than any other academic organization. When comparing average citations in the literature, Iowa State University and University of Michigan are far ahead at about 208, their literature has 4.37 times more citations than Ohio State University's. In summary, the top 11 research institutions are primarily from the United States, and the citations of publications by institutions in the United States are much higher than those of other nations at the same level, demonstrating that the United States has an absolute domination in research on this topic.

Table 3. Distribution of research institutions (Publications  $\geq 8$ )

Rank	Organizations	Publications	Average citations	Countries
1	Ohio State University	20	47.55	USA
2	University of Innsbruck	14	48.71	Austria
3	Michigan State University	13	62.08	USA
4	University of Münster	12	48.33	Germany
5	Vrije University Amsterdam	11	155.55	Netherlands
6	Iowa State University	9	208.44	USA
7	Texas Tech University	9	11.44	USA
8	Nottingham Trent University	8	40.75	UK
9	Brigham Young University	8	33.63	USA
10	University of Michigan	8	208.13	USA
11	University of Wisconsin	8	76	USA

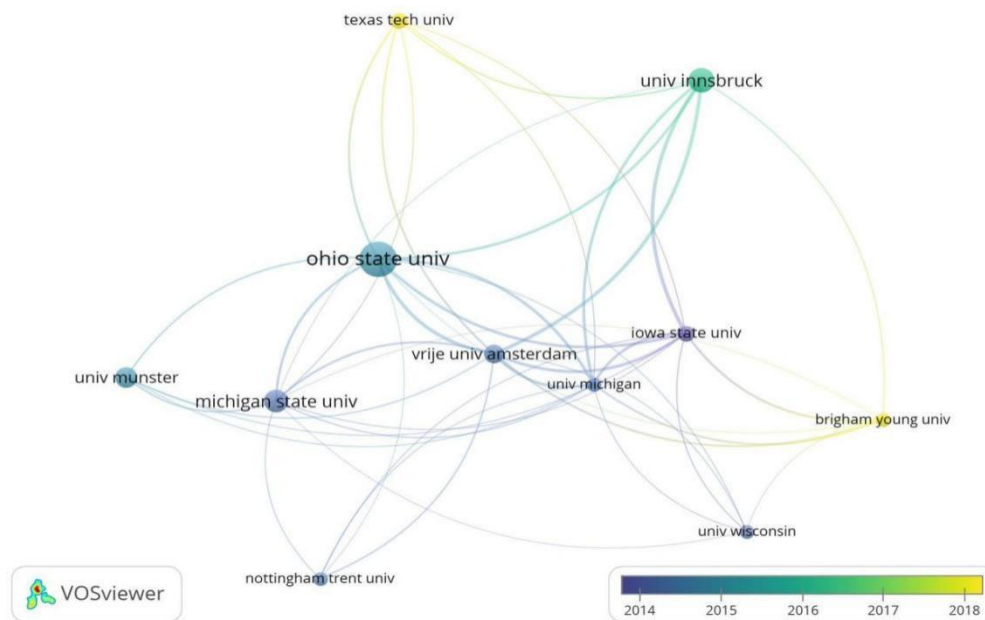


Figure 3. Visualization mapping of research institution collaboration networks

Figure 3 depicts the visualization of the research institution collaboration network, which shows that no conspicuous clusters of research institution collaboration networks appear. According to the distribution of research institutions, each institution is more likely to publish independently, and there is less cooperation across institutions, particularly Brigham Young University and Texas Tech University, which have been increasingly active in recent years, are less connected. This is probably due to two reasons: on the one hand, video game social research has not been given much attention in the communication field and has not connected scholars as a research hotspot. On the other hand, video games are complex and interdisciplinary in nature due to their inherent, cultural, and social aspects (Zhu et al., 2022), which may be at the root of the study's as yet insufficient impact.

### 3.2 Research Hotspots and Development Trend Analysis

#### 3.2.1 Keyword Co-occurrence Analysis

Keywords represent the author's overview and summary of the article's content, therefore keyword co-occurrence analysis might reveal the topic's research hotspots (Lin et al., 2022).



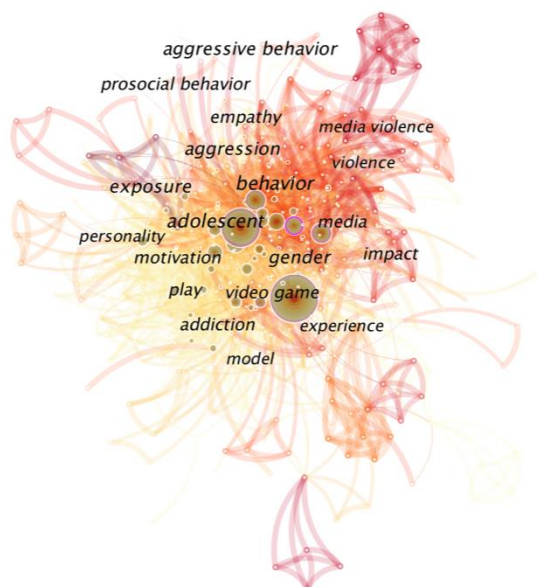


Figure 4. Keyword co-occurrence mapping

Figure 4 shows Citespace's keyword co-occurrence mapping of the literature, with time slices set to 1 year, with 482 nodes and 2549 links. In order to get a clearer path, the network tailoring method was chosen Pathfinder, which was finally presented as 482 nodes with 1706 links and 0.0147 density, indicating that the study is diverse in content but relatively loosely connected.

Table 4. Top 20 high frequency keywords

Rank	Keywords	Count	Centrality	Rank	Keywords	Count	Centrality
1	Video game	123	0.3	11	Computer mediated communication	13	0.04
2	Communication	47	0.36	12	Self	10	0.04
3	Aggression	35	0.12	13	Model	10	0.04
4	Adolescent	35	0.34	14	Internet	10	0.02
5	Gender	31	0.18	15	Experience	9	0.04
6	Media	30	0.18	16	Impact	9	0.04
7	Behavior	30	0.32	17	Prosocial behavior	8	0.02
8	Play	16	0.07	18	Online	8	0.02
9	Violent video game	14	0.09	19	Motivation	7	0.02
10	Addiction	13	0.08	20	Exposure	7	0.06

Table 4 lists the top 20 keywords based on the frequency of appearance of node keywords in publications. Communication, aggression, adolescents, gender, media, and behavior are among the high-frequency study issues in this subject. Combining the node locations in Figure 4 with the centrality data in Table 4, it is concluded that video game social research has been studied in the communication field in recent years, primarily from the three aspects of adolescents' gaming behaviors, gender, and media communication, and to some extent, there is an inherent logical relationship of intertwining and influencing each other. It can also be seen that the node "Gender" contains a big area of light colors, indicating that gender studies became a hotspot for a short period of time.

Expanding the details of the "Gender" node, the result is shown in Figure 5, literature related to gender studies shows exponential growth in 2022. This trend lies in scholars' belief that women's participation in video game environments is still perceived as highly discriminatory (Taylor et al., 2009), that the abilities of women gamers are often overlooked (Cross et al., 2022), and that expanding the representation of gamers is necessary in order to normalise women's presence in video gaming (Gillin & Signorella, 2023). Secondly, game motivation and game behaviour in video games may be related to gender differences (Bonny & Castaneda, 2022; Cross et al., 2022).





Table 5 Statistics of keyword clustering information (partial)

Cluster ID	Size	Silhouette	Mean(Year)	LLR
0	108	0.735	2012	aggression (41.65, 1.0E-4); empathy (22.18, 1.0E-4); adolescence (13.31, 0.001); prosocial behavior (8.99, 0.005); desensitization (8.28, 0.005); thought (8.28, 0.005); moral disengagement (5.51, 0.05); video game play (5.51, 0.05)
1	99	0.708	2016	internet gaming disorder (17.91, 1.0E-4); engagement (13.4, 0.001); video game addiction (9.22, 0.005); problematic internet use (6.69, 0.01); screen time (5.96, 0.05); motivation (5.96, 0.05)
2	54	0.75	2016	discrimination (8.82, 0.005); education (8.82, 0.005); identification (7.39, 0.01); avatars (5.87, 0.05); online harassment (5.87, 0.05); mmorpgs (5.87, 0.05)
3	52	0.854	2009	media effects (9.3, 0.005); television violence (5.73, 0.05); socioemotional and task communication (5.73, 0.05); collaboration (5.73, 0.05); affective and cognitive responsiveness (5.73, 0.05); support (5.73, 0.05); computer-mediated communication (5.11, 0.05)
4	45	0.723	2014	experience (13.9, 0.001); social competence (9.25, 0.005); flow (9.25, 0.005); social displacement (9.25, 0.005); communication (9.25, 0.005); co-playing (5.64, 0.05); emotional engagement (4.62, 0.05); need to belong (4.62, 0.05)
5	31	0.85	2011	gender (12.92, 0.001); competition (10.41, 0.005); identity (6.78, 0.01); sexuality (4.83, 0.05); bias (4.83, 0.05); character choice (4.83, 0.05); community (4.83, 0.05); affective and immaterial labor (4.83, 0.05)
6	20	0.921	2011	video game industry (16.53, 1.0E-4); affordances (13.93, 0.001); labor (13.93, 0.001); creative labour (6.94, 0.01); game integration (6.94, 0.01); occupational community (6.94, 0.01); streaming (6.94, 0.01); media work (6.94, 0.01)
7	16	0.977	2009	knowledge (17.28, 1.0E-4); information technology (8.58, 0.005); co creation (8.58, 0.005); governance (8.58, 0.005); online community (8.58, 0.005); firm (8.58, 0.005);
8	14	0.862	2020	covid-19 (20.81, 1.0E-4); emotion (13.82, 0.001); psychological well-being (13.82, 0.001); social isolation (6.88, 0.01); internet relay chat (6.88, 0.01); social interaction (6.88, 0.01); escapism (4.18, 0.05)
9	10	0.987	2004	sex differences (11.69, 0.001); uses and gratifications (11.69, 0.001)

The study themes can be further summarized by statistically extracting a portion of the terms with high centrality in the 10 clusters into Table 5.

1) Video game social behavior research. Corresponding to "#0 aggression" and "#1 internet gaming disorder", the researcher investigated the violence, aggression and game addiction of adolescents in video games from the social network perspective (Greitemeyer, 2018; Rothmund et al., 2011; Verheijen et al., 2021), discovering aggressive competition (Adachi & Willoughby, 2013), role preferences (Delhove & Greitemeyer, 2020), ethics (Ellithorpe et al., 2015; Teng et al., 2017, 2019) and excessive social network use (Gómez-Galán et al., 2021) are determinants. Examining the mediating role of in-game emotions, sense of competence, and family ties (Wang et al., 2018), and social relationships (Lim et al., 2020; Zhao et al., 2023) suggests that playing games cooperatively attenuates the effects of increased aggression from video games (Velez et al., 2016; Velez & Ewoldsen, 2013), and that exposure to pro-social video games can increase players' pro-social behaviour, pro-social thoughts and empathic responses (Boduszek et al., 2019; Saleem et al., 2012). As well as "#8 Covid-19", prolonged lockdowns during the COVID-19 pandemic significantly increased the odds of gaming addiction (Gómez-Galán et al., 2021).

2) Gender and video game studies. It mainly focuses on the dimensions of sex discrimination and gender differences. Specifically, "#2 discrimination" discusses the relationship between video game use and sexism (Breuer et al., 2015; Fox & Tang, 2014). Playing violent video games increases intergroup bias (Greitemeyer, 2014), whereas flow, co-operation, and problem solving between players can reduce intragroup bias (Adachi & Willoughby, 2013). Video game roles exist in gender socialization (Dill & Thill, 2007), and gender differences in game roles' appearance and dress may shape players' perceptions of gender roles (Miller & Summers, 2007). For example, in the article by Triberti et al.(2017), it is discussed that avatars are presentations of digitized identities that embody stereotypes of women or men. "#5 gender" and "#9 sex differences" examined male and female sexuality in video game roles (Downs & Smith, 2010) and gender differences in video games (Lucas & Sherry, 2004). Research has found that women are significantly less interested in video games, as

a lack of meaningful interaction and gender stereotypes are reasons for their aversion to video games (Hartmann & Klimmt, 2006), as well as having experiences of women being sexually harassed during video game interactions (Fox & Tang, 2017).

3) Media effects of video games. Corresponding to "#3 media effects" discusses the representation of video games in media discourse (Whitton & Maclure, 2017), examines interactivity in video games from the media effects perspective (Sah & Peng, 2019), and tests the impact of games as a communication medium to form of relational bonds on socio-cognitive emotions (M. Kim & Kim, 2023; Peña & Hancock, 2006). "#6 video game industry" explores interactivity and user-generated content in video games from the game industry aspect (J. Kim, 2014) as well as players' participation as consumers in the creation of value in the video game community (Afi & Ouiddad, 2021). "#7knowledge" explores different teaching methods through co-operation and competition in video games (Erickson & Sammons-Lohse, 2021), suggesting that video games can promote the social skill development and motivate students to pursue higher education (Uiphanit et al., 2020), but excessive use of video games still has an impact on adolescents' social and academic performance (Gómez-Gonzalvo et al., 2020).

4) Player experience and social interaction research. Corresponding to "#4 experience" suggests that the content, scenario and experience of video games have an impact on cooperative behaviour (Jin & Li, 2017). Co-operative teams promote cohesion in play, which activates trust, and in turn increases co-operative behaviours (Greitemeyer & Cox, 2013). Whereas social interaction and cooperation are important components of the gaming experience, games are more appealing to socially oriented individuals and are socially beneficial regarding social capital and pro-social behaviour (Collins & Freeman, 2013; Perry et al., 2018). Relevant researchers have also proposed a relationship between video game participation and social ability (Kowert & Oldmeadow, 2013), arguing for the potential impact of social displacement due to video game playing on the size and quality of a player's social circle (Kowert et al., 2014). These results were later questioned when Domahidi et al.(2018) showed in his study that social online video games do not have a negative realistic impact on players' offline friendships or offline social support.

### 3.2.3 Keyword emergence analysis

The keywords of video game social research were analyzed for emergence using CiteSpace software in order to determine research changes in the time dimension as well as research frontiers at a particular period (Kleinberg, 2002). The specific results are shown in Figure 7. Figure 7 shows the changes in the emergence of the top 10 ranked keywords from 2000 - 2023, Year indicates the time when the keyword started to appear, Strength indicates the mutation strength, Begin represents the time when the keyword became a research hotspot, and End indicates the end time.

#### Top 10 Keywords with the Strongest Citation Bursts

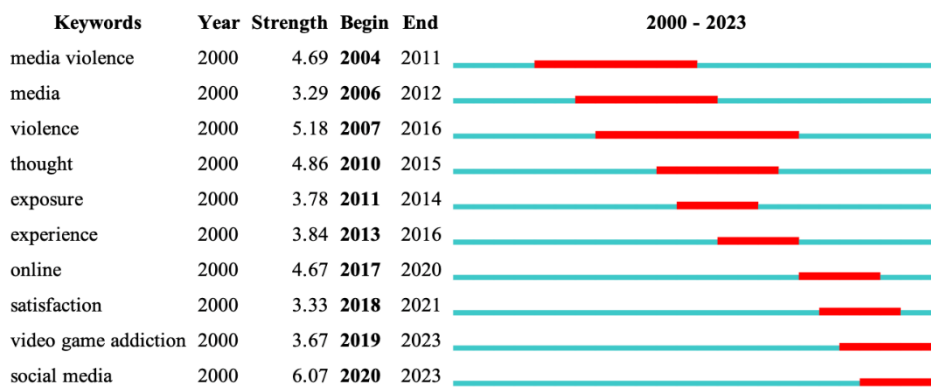


Figure 7. Keyword emergence mapping

Figure 7 displays the changes in the emergence of the top 10 ranked keywords from 2000 to 2023. Year denotes the time when the keyword first appeared, Strength denotes the strength of the mutation, Begin denotes the time when the keyword became a research hotspot, and End denotes the end time. The current research on video game social can be separated into two phases, according to the data. The first phase lasts from 2004 to 2016, and the keywords in this phase are "media violence," "media," "violence," "thought," and "exposure." The duration and mutation intensity show that "violence" has a long persistence of about 9 years and a high mutation intensity. This indicates that during this period, researchers have mainly focused on behavioral transmission in video games. The phrases "online", "satisfaction", "video game addiction", and "social media" appear in the second phase, which runs from 2017 to 2023. All of the keywords have a brief period,

about 2-3 years, illustrating the dispersion of study in this phase, which exhibits a complex investigation. In terms of mutation intensity, "social media" is the keyword with the highest mutation intensity, having mutated as a research hotspot since 2020 and remaining so until now, indicating that the focus of social research on video games is shifting away from the study of gaming behaviors, motivations, and experiences and toward the application of video games as a new digital media technology in practice.

#### **4. Limitations and Conclusions**

##### *4.1 Research Limitations*

Regarding the research methodology, some limitations of this research need to be acknowledged. Firstly, the bibliometric data retrieved from the databases were mainly determined by the search terms. However, there is no standard method for the selection of search terms. Although the terminology used draws on multiple studies (Boyle et al., 2016; Liu et al., 2021), there may still be omissions. Second, the input data used in this research were extracted only from the core database of WoS. Although WoS is one of the most comprehensive interdisciplinary citation resources, its search results may not reflect the full scope of the research area (Liu et al., 2021). Therefore, if we can integrate bibliometric data from multiple databases, the results will be more convincing. Thirdly, this study assessed video game social research in the communication field from a quantitative scientometric analysis approach. However, scientometric indicators, although useful, are not perfect and therefore we should not use them as the only assessment method. Therefore, further synthesis with other research methods is needed to gain a deeper understanding of the field.

##### *4.2 Research Conclusion*

This study uses the WoS database to econometrically analyze 448 video game social research in communication from 2000 to 2023 and create a knowledge map. This research used VOSviewer visualisation software to comb the research status under the topic from the overall development pattern of the literature, source journals, core authors, research institutes, and cooperation networks, then used Citespace software to cluster keywords by research hotspots and research frontiers.

From the literature development pattern, video game social research has three phases: start-up (2000–2010), fluctuating growth (2011–2018), and active expansion (2019–2023). The source journals have 11 core journals. In recent years, authors have focused on independent publications rather than forming a core group. United States dominates this topic's study because the top 11 research institutions are mostly the United States. For future research, exchanges and cooperation between authors, institutions or transnationals can be strengthened, and try to break through the paradigm of independent research and form research synergy, thereby improving the quality and influence of published articles to promote the international co-operation and development.

This study found four video game social research hotspots: game social behavior, gender studies, media effects, and player experience, based on term co-occurrence and cluster analysis. The harms of violence, soft pornography, addiction and other hazards caused by the moral, identity and regulatory deficit in video games that seriously affect adolescent growth and social stability are the most discussed and longest concern of researchers, particularly on violent behaviour. It is clear that the current study of communication studies in the social aspects of video games is still in its infancy and has not yet developed into a fully functioning system. In future research, the mediated application of video games will become the interest of researchers, we can introduce quality education, non-genetic inheritance, digital museums and other fields into the interactive form of video games and related technologies, and positively develop the digital creative content to form a long-term value for research questions, which is the research direction that scholars in this field still need to further explore.

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#### **Authors contributions**

Dr. Syed Agil Alsagoff and Dr.Karmilah Abdullah were responsible for study design and revising. PhD candidate Wu Xuanyi was responsible for data collection. PhD candidate Zhao Fan drafted the manuscript and revised it. All authors read and approved the final manuscript.

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