

Research Hotspots and Future Trends in the Application of Artificial Intelligence in Psychology: A Bibliometric Visualization Analysis Based on CiteSpace

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Abstract: *The rapid advancement of artificial intelligence (AI) has accelerated its integration with psychology, fostering profound transformations in research paradigms within the discipline. However, this interdisciplinary development also faces challenges related to technological ethics, data privacy, and insufficient cross-disciplinary collaboration. Using CiteSpace as the bibliometric visualization tool, this study systematically analyzed 347 publications indexed in the China National Knowledge Infrastructure (CNKI) database from 1997 to 2025 to reveal the dynamic knowledge structure and research evolution in this field. The results indicate that current research hotspots primarily focus on AI-enabled mental health services and intelligent education, cognitive and emotional modeling, optimization of human resource management, and governance of ethical risks. The technological trajectory demonstrates a clear transition from theoretical exploration to practical applications, while policy initiatives have significantly promoted the precision of mental health screening and intervention. Future research should prioritize the establishment of a multi-level ethical governance framework and strengthen international collaborative mechanisms to facilitate the high-quality development of mental health services and the integration of interdisciplinary theories. The findings provide valuable insights for optimizing resource allocation and promoting the sustainable development of AI-driven mental health services.*

Keywords: Artificial intelligence, Psychology, Bibliometric visualization analysis.

1. Introduction

With the rapid advancement of artificial intelligence (AI), its integration with psychology has triggered transformative changes across the discipline [1]. AI has not only introduced innovative technological paradigms for traditional research areas such as emotion recognition and psychological assessment but has also expanded the scope of psychological interventions through technologies including machine learning and natural language processing [2]. Nevertheless, the rapid pace of AI development has been accompanied by increasing ethical and regulatory challenges, making the effective governance of AI applications in psychology an urgent concern [3].

Although AI is widely regarded as a product of the modern technological era, its conceptual origins can be traced back to Aristotle's theory of syllogistic logic, which laid the philosophical foundation for artificial intelligence. The discipline of AI was formally established in 1956; however, its development remained relatively stagnant until the late 1980s [4].

By examining the current landscape and developmental characteristics of intelligent psychology, this study aims to provide evidence-based references for researchers and practitioners to optimize research strategies and practical applications in response to the evolving demands of the AI era.

2. Data Sources and Methods

2.1 Data Retrieval and Literature Screening

The literature analyzed in this study was retrieved from the China National Knowledge Infrastructure (CNKI) database. The search strategy targeted publications containing the term "artificial intelligence" in combination with one or more of the following topics: mental health services, cognition and emotion, mental health education, human resource management, ethical governance, and psychiatry. The publication period was limited to 1997–2025.

The inclusion criteria were as follows:

1) Publications related to artificial intelligence, psychology, cognitive science, education, human resource management, ethics, or psychiatry.

2) Peer-reviewed articles published within the specified time frame.

The exclusion criteria included:

1) Publications unrelated to the interdisciplinary development of artificial intelligence and psychology;

2) Duplicate records; and

3) Articles with incomplete bibliographic information.

Following the retrieval and screening procedures, a total of 347 publications were included for subsequent bibliometric analysis.

2.2 Research Methods

By generating dynamic and interactive knowledge maps,

CiteSpace visually presents the clustering structure, temporal evolution, and burst patterns of scientific knowledge, thereby effectively revealing knowledge connections across different research fields [5].

3. Results

3.1 Publication Trends

The annual publication output, as summarized using Microsoft Excel, indicates a steady increase in the number of publications since 2017. This growth coincides with the release of the New Generation Artificial Intelligence Development Plan by the Chinese government in 2017, which explicitly emphasized the integration of artificial intelligence with psychology. The policy initiative substantially promoted the rapid development of this interdisciplinary research field.

3.2 Author Analysis

Using CiteSpace, the time span was set from 1997 to 2025, with a time slice of one year, and the node type was defined as Author. A total of 255 nodes were generated, indicating that 255 authors had published research on the application of artificial intelligence in psychology. As illustrated in Figure 1, the visualization presents representative authors with relatively high publication outputs and collaborative relationships. Within the interdisciplinary field of artificial intelligence, mental health services, and mental health

education, scholars such as Luo Fang and Jiang Liming have reported that intelligent assessment technologies have achieved substantial progress in evaluating students' academic performance, knowledge acquisition, personality traits, mental health status, and teaching effectiveness [6]. Other researchers, including Lu Yu and Yu Shengquan, have employed core AI technologies such as machine learning and natural language processing while drawing upon Self-Determination Theory as the theoretical foundation [7]. Building on students' psychological needs as well as family and environmental factors, they developed intelligent companion-learning robots and automated psychological needs diagnostic systems [8], thereby facilitating timely identification and targeted intervention for behavioral problems among primary and secondary school students [8].

Research conducted by Zhou Zhuozhao and colleagues has primarily focused on cognitive science [9], emphasizing its integration with artificial intelligence and emerging technologies [10]. Their work encompasses critical reflections on traditional cognitive paradigms, the exploration of novel research methodologies, and analyses of the challenges and limitations associated with technological development [11]. Meanwhile, scholars including Yu Jiayuan and Chen Wei have examined the transformation of psychological research in the era of artificial intelligence [12], while also discussing the opportunities and challenges of mind-oriented education in the age of AI [13].



Figure 1: Author Collaboration Network in Research on Artificial Intelligence Applications in Psychology

3.3 Institutional Analysis

Figure 2 presents the institutional collaboration network, highlighting representative institutions with relatively high publication outputs and collaborative relationships.

Its researchers argue that current artificial intelligence represents only one manifestation of human intelligence and emphasize that language cognition, cognitive processes, and cultural cognition will play increasingly important roles in the future evolution of AI [14].

Their studies examine the limitations of conventional approaches to psychological screening, diagnosis, and intervention while exploring how intelligent technologies can provide more effective solutions throughout the mental health service process [15].

Researchers from the School of Psychology, Shanghai University of Sport and the School of Business Administration, Shanghai University of International Business and Economics have collaborated on studies in the field of mental health education. Their research explores representative methodologies for investigating child-robot

interaction and discusses how current findings can inform the design and development of intelligent robotic products for children [16]. Their work expands the theoretical framework

of algorithmic human resource management and provides new insights into strategic human resource management [17].



Figure 2: Institutional Collaboration Network in Research on Artificial Intelligence Applications in Psychology

3.4 Keyword Co-occurrence and Cluster Analysis

The resulting network contained 234 keyword nodes and 316 co-occurrence links, reflecting the knowledge structure and thematic relationships within the research field.

As illustrated in Figure 3, “artificial intelligence” is the largest and most central keyword, indicating its strong connections with other research topics. The keywords “mental health” and “cognitive science” also exhibit high frequencies and centrality, suggesting that they constitute major research

themes within the interdisciplinary field.

In recent years, emerging keywords such as “human-machine systems,” “human-computer interaction,” “psychological assessment,” and “machine cognition” have attracted increasing scholarly attention, reflecting a technology-driven research trajectory in which algorithm optimization and user experience have become important focal points. Meanwhile, researchers have increasingly explored the application of artificial intelligence in areas such as mental health assessment [10] and autonomous machine cognition [18].

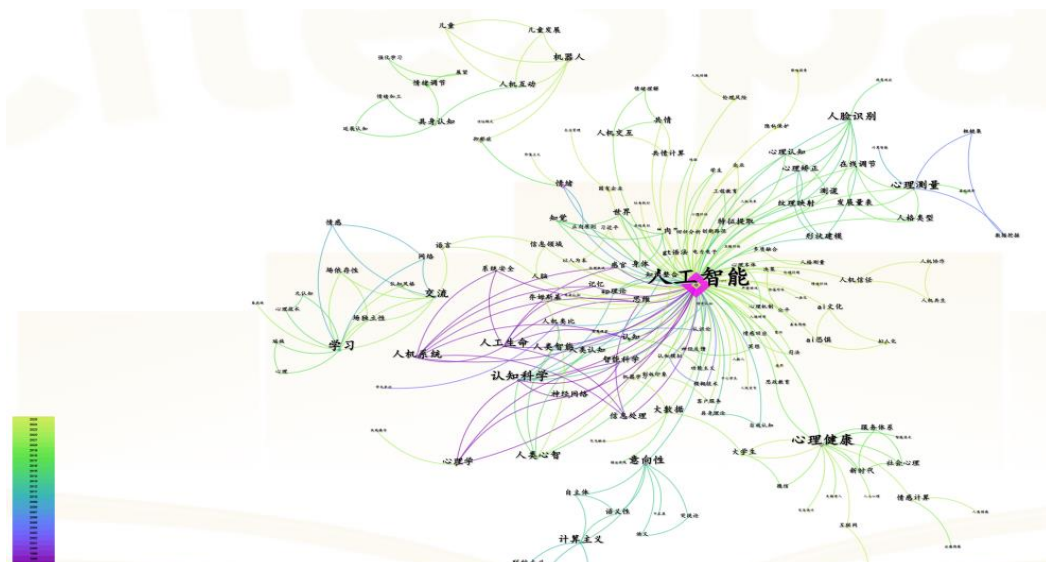


Figure 3: Keyword Co-occurrence Network in Research on Artificial Intelligence Applications in Psychology

3.5 Keyword Cluster Analysis

The clustering results demonstrated good reliability and representativeness. Specifically, the modularity value (Q) was 0.744, exceeding the commonly accepted threshold of 0.30,

indicating a well-defined clustering structure. In addition, the mean silhouette score (S) reached 0.9809, which is substantially higher than the recommended threshold of 0.50, suggesting excellent internal consistency and high clustering quality.

Overall, current research hotspots are primarily concentrated on the intersection of artificial intelligence and human cognition, multidimensional investigations of mental health, and studies of cognition and behavior from an evolutionary

perspective. These findings suggest that the field is increasingly characterized by interdisciplinary integration, with growing emphasis on the convergence of technological innovation and theoretical advancement.



Figure 4: Keyword Clustering Network in Research on Artificial Intelligence Applications in Psychology

3.6 Keyword Timeline and Burst Analysis

Based on the keyword clustering results, a keyword timeline visualization was generated using CiteSpace, as presented in Figure 5.

1) Early Stage (1997–2016)

During this period, research primarily focused on integrating fundamental psychological theories with artificial intelligence. Studies explored human psychological processes, including emotion, mental health, and cognitive mechanisms, providing theoretical foundations for simulating human behavior in artificial intelligence systems.

2) Intermediate Stage (2017–2020)

Research during this stage emphasized the application of evolutionary theory to optimize artificial intelligence algorithms. At the same time, some scholars critically examined the concept of artificial life from the perspective of biological evolution, raising questions regarding its theoretical assumptions and developmental implications.

3) Recent Stage (2021–2025)

Since 2021, the integration of artificial intelligence and mental health research has continued to deepen. AI has been increasingly applied in mental health services and psychiatric care, facilitating more intelligent, personalized, and precise approaches to psychological assessment, screening, and intervention.

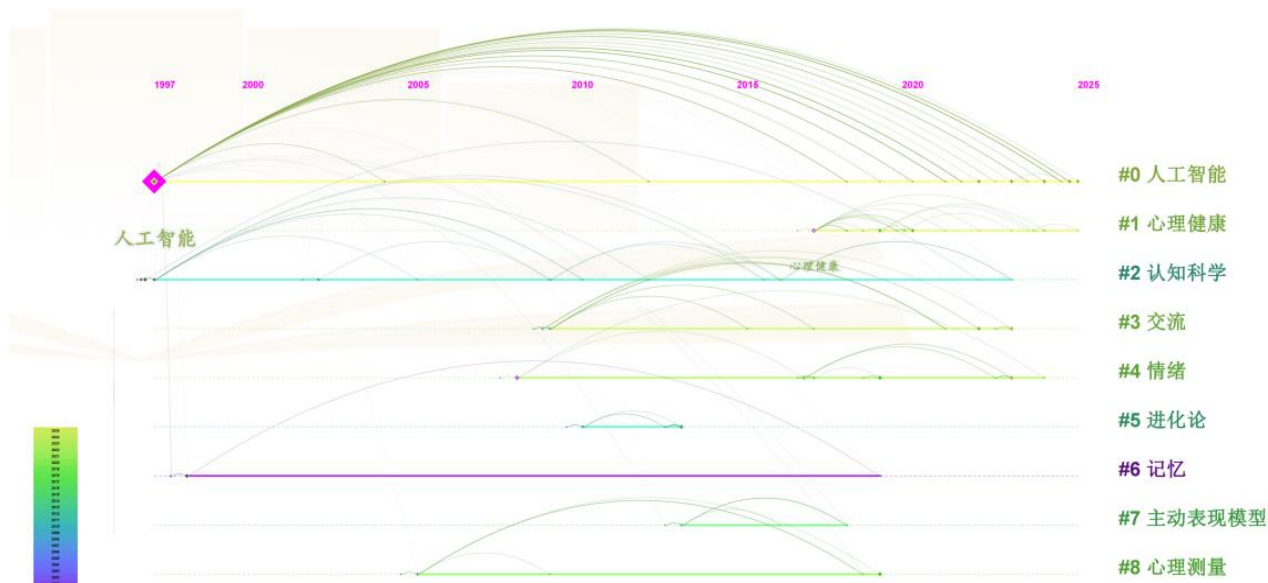


Figure 5: Keyword Timeline Visualization in Research on Artificial Intelligence Applications in Psychology

3.7 Keyword Burst Analysis

Based on the keyword clustering results, a keyword burst detection analysis was performed using CiteSpace, and the corresponding burst map is presented in Figure 6.

Between 2020 and 2023, the strong citation bursts of “creativity” and “human–AI trust” suggest that research attention expanded toward the innovative capabilities of artificial intelligence as well as ethical and trust-related issues associated with human–AI interaction [19]. During the period from 2021 to 2023, the burst emergence of “human–computer interaction” and “psychological assessment” indicates that the integration of artificial intelligence and psychology entered a new stage of development. Increasing research efforts have focused on affective computing, AI-assisted psychological assessment, and other intelligent technologies designed to enhance psychological evaluation and intervention [20].

Top 10 Keywords with the Strongest Citation Bursts

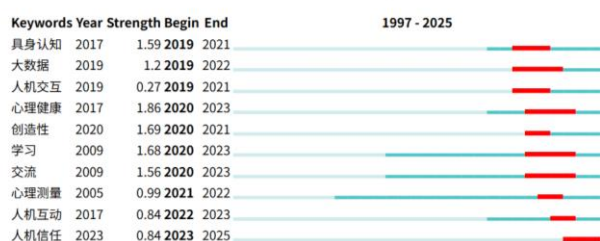


Figure 6: Keyword Burst Detection Map in Research on Artificial Intelligence Applications in Psychology

4. Summary and Future Perspectives

4.1 Summary

Based on the bibliometric visualization tool CiteSpace, this study systematically analyzed 347 publications on the interdisciplinary field of artificial intelligence and psychology indexed in the China National Knowledge Infrastructure (CNKI) database from 1997 to 2025. From the perspective of knowledge mapping, the study identified the major research hotspots, evolutionary trajectories, and future development trends within this field. The findings indicate that artificial intelligence has gradually penetrated multiple domains of psychological research, promoting a paradigm shift from traditional theory-oriented research toward data-driven and intelligent approaches.

4.1.1 Intelligent Mental Health Services and Mental Health Education

Supported by technologies such as machine learning and natural language processing, artificial intelligence has demonstrated substantial advantages in mental health screening, offering efficient and accurate assessment methods. Existing AI-assisted assessment approaches incorporate diverse data sources, including social media data, intelligent device records, video game data, and wearable sensor data [21].

Artificial intelligence also enables the development of personalized psychological interventions by analyzing individual psychological characteristics and behavioral needs. For example, the “AI Good Teacher” system developed by Yu

Shengquan and colleagues dynamically adjusts mental health education strategies through intelligent robotic technologies to satisfy students’ needs for autonomy, competence, and relatedness [22]. Such applications have demonstrated considerable potential not only in mental health education for primary and secondary school students but also among military personnel and older adults [21,23].

Furthermore, intelligent technologies have expanded mental health education beyond traditional classroom settings into everyday life. Lu Yu and colleagues developed the “Smart Learning Companion” robot, which integrates natural language dialogue and affective computing technologies to provide students with 24-hour psychological support [24]. Meanwhile, with the rapid development of the Internet and intelligent education, artificial intelligence has become increasingly integrated into modern educational systems, highlighting the growing importance of cross-cultural developmental psychology in the AI era [25].

4.1.2 Intelligent Research on Cognition and Emotion

The frequent occurrence of keywords such as cognitive science and emotion reflects the continuous convergence of artificial intelligence and cognitive science. By integrating natural language processing, computer vision, and biosignal analysis, AI technologies have enabled increasingly accurate emotion recognition and dynamic modeling of affective states.

Cai Shushan classified human cognition into five hierarchical levels—neural cognition, psychological cognition, linguistic cognition, cognitive thinking, and cultural cognition [26]. Based on this framework, he conducted a comparative analysis of human intelligence and artificial intelligence, providing a more comprehensive theoretical understanding of the nature and development of AI [27].

4.1.3 Intelligent Human Resource Management

Against the backdrop of digital transformation, artificial intelligence has provided effective solutions to many limitations of traditional human resource management by facilitating the establishment of data-driven decision-making systems, improving talent forecasting capabilities, and enabling integrated data management throughout the entire employee lifecycle—from recruitment and performance evaluation to training and employee turnover. In addition, AI supports the implementation of lifelong learning programs, enhances employees’ comprehensive competencies, and enables the development of personalized learning management systems based on big data and artificial intelligence technologies [28].

4.2 Future Perspectives

At the technological level, greater efforts should be devoted to advancing privacy-preserving technologies that enable the principle of data usability without data visibility, thereby safeguarding personal privacy while facilitating data utilization. In addition, algorithmic fairness and ethical transparency should be continuously improved through the development of automated bias detection and mitigation

techniques.

At the institutional level, ethical review procedures and regulatory mechanisms should be further refined. Establishing a dynamic monitoring platform for AI-assisted psychological applications would facilitate continuous risk assessment, timely identification of ethical issues, and effective accountability throughout the application lifecycle.

At the societal level, interdisciplinary collaboration should be further strengthened. Researchers from psychology, computer science, medicine, ethics, and related disciplines should jointly develop standardized ethical guidelines and technical standards. Meanwhile, public education initiatives should enhance users' understanding of both the capabilities and limitations of AI technologies, thereby encouraging broader societal participation in ethical governance.

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