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Impact factor research of open–access (OA) papers in Chinese social sciences

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ABSTRACT

Open-access (OA) Papers' impact research has become more and more popular in scientific evaluation, and it is also an important issue that scientific research management departments have been discussing. Since previous studies have focused on the influence of traditional literature indicators research papers, this study combines traditional literature indicators and Altmetrics indexes. This article uses the data of Chinese social science open-access (OA) papers in WoS for the past 5 years as a sample and uses descriptive statistics, correlation analysis, and regression analysis to explore the impact of traditional paper indicators and Altmetrics indexes on the use of papers. The results show that both literature indexes and social media indexes have a significant impact on the use of papers, and deepen the understanding of the impact factor of research papers. Overall, the results of this study prove that traditional literature indexes and social media indexes have an impact on the use of papers. This method promotes the role of social media indexes in the influence of paper use. Finally, the reasons for the influence factors of the paper are analyzed, and relevant suggestions are put forward.

KEYWORDS

Open access; Influencing factors; Altmetrics; Cited times; Usage count

Introduction

With the rapid development of big data, cloud computing, and artificial intelligence, the global information technology revolution has turned modern scientific research from an isolated system to a new discipline development and cross-discipline tendency. The changes in information science are getting more noticeable. In the global context, the development status of academic achievements is also constantly updated. There have been new changes in the use of journal papers, the times cited, the academic cooperation of institutions, the hot topic of research, and the academic cooperation of scholars. These changes have also promoted the research progress of the international information science community to present new research trends, and even information science has undergone new changes and developments. Therefore, the academic research on the influential factors of journal papers will also be subject to corresponding changes and influences. As early as 1955, Garfield proposed using the times cited of academic papers to evaluate the impact of academic papers (Garfield, 1995). Different citations affect the citation value of the paper (Lin, 2018; Li et al., 2014; Yang et al., 2016). The impact factors of academic papers are not limited to the num-

ber of cited times and the impact factors of published journals. The measurement and evaluation of diversity have become the consensus of academics and management departments.

In recent years, social media has developed rapidly, and the influence of open-access (OA) journals and papers has become more common through Altmetric indicators (Yang et al., 2018). In 2012, non-scientists or academics can access the most popular articles free of charge through altmetrics.com; Altmetrics also provides a recent timeline for post-release filtering and peer review of open access journals (McFedries, 2012). In addition, the open access to publications through electronic journals has greatly expanded the downloading and use of the literature and has also increased the basis for assessing the impact of the article. Open access publications have been shown to have access to more restricted access articles, measure online activities, and highlight interest in their articles through altmetrics (Mounce, 2018). Scholars generally use the academic papers to obtain important research results in scientific research activities. The value and influence of scientific research results have become the focus of evaluation researchers; at the same time, the evaluation method of scientific research results has aroused widespread concern in academia and society. Therefore, an in-depth analysis of the influential factors of Chinese open-access (OA) international academic papers is of great importance for enhancing the influence of Chinese open-access (OA) international academic papers, promoting the exchange and cooperation of subject content, and expanding the international influence of subjects significance. It also helps Chinese scholars and the international academic community to improve the quality of academic papers and academic influence.

The study of the impact factors of journal papers plays a vital role in the science and technology management department and the international talent evaluation standards. What are the international academic influences or impact factors of Chinese social science open-access (OA) papers? What impact factors have the greatest influence on Chinese social science open-access (OA) papers? Are there any related correlations between these impact factors? Answering these questions will be based on a comprehensive study of the influence factors of international academic papers on open-access (OA) papers in Chinese social sciences, combining traditional literature indicators and Altmetrics indicators, descriptive statistics, correlation analysis, and multiple linear regression models of literature data indicators are used to comprehensively detect the impact factors of Chinese social science open-access (OA) papers, and thus to promote a new perspective on the research of the impact factors of academic papers.

Related studies

The impact factors of academic papers play an important role in scientific research evaluation and have aroused widespread concern in the academic circles and scientific research management departments at home and abroad. With the development and application of the Internet and social media more and more common, the depth and breadth of research on the influence of academic papers are also expanding. A large number of bibliometric studies have shown that the influence of academic papers is affected by many factors, especially through a large number of literature data sets to study the factors of influence. Some scholars study the impact factors of academic papers by citations with their subject areas, references, published journal language and author reputation (Bornmann, 2013; Bornmann & Schier, 2012); and the influence factors of the number of citations on academic papers (Tahamtan et al., 2016; Meng et al., 2017); and analyzing the impact of citation rate on the

paper; studying the factors affecting the citation rate of the paper (Peng & Zhu, 2012; Vanclay, 2013; Onodera & Yoshikane, 2015; Cheng et al., 2017). The number of citations is closely related to the downloading. In this increasingly digital age, the number of uses and citations of academic papers, and the relationship between citations and research quality are becoming the targets of the evaluation (O'Leary, 2008; Jefferson, 2018).

Impact of open–access （OA） papers

With the development of information technology and the improvement of open access policies around the world, open-access (OA) academic papers have become an important channel for academic exchange and knowledge dissemination. The quality of open-access (OA) academic papers is relatively high. Foreign research on open-access (OA) journal papers is mainly focused on the impact analysis of open-access (OA) journal papers in different countries and regions, and the impact analysis of journals. For example, the impact of open-access (OA) academic paper communication and dissemination factors on journal use (Harnad & Brody, 2004); the impact of open access journal papers on citation and collaboration indicators (Torres-Salinas et al., 2016); open-access (OA) Journal papers on the impact of international cooperation between countries (Breugelmans, 2018). Impact of journal impact factors on open access journals (Chua et al., 2016). The impact of open policies on open-access (OA) (Zhang & Watson, 2017). The difference in the time between the use of open access and non-open-access and social media concerns (Wang et al., 2015). Research on the quality of papers and the impact of academic papers. Research on the impact of the Science paper Online Open access Academic Resource Library (Guo et al., 2015). The difference in the influence of open-access (OA) published by China and the United States (Yang et al., 2018).

The influence of social media on papers

Traditional indicators such as citation frequency are usually used to measure the achievements and influence of academic papers, and scientific research management departments even use these indicators as the criteria for selecting talents. However, in recent years, people's attention to academic achievements has also been changing. With the continuous development of network technology and social economy, especially the rapid development of social media,

Tencent QQ, Weibo, WeChat, Facebook, Twitter, etc., are commonly used in the emergence of integrated social networking platforms; academia and all sectors of society have begun to question the shortcomings of traditional indicators to measure academic achievement and influence. In 2010, Altmetrics was able to be proposed, promoted and applied. Altmetrics.com is the most relevant and comprehensive source of social media data for scientific papers (Robinson-Garcia et al., 2014). In recent years, Altmetrics indicators have been applied to the impact evaluation of academic papers (Robinson-Garcia et al., 2014). In this context, the standard of traditional metrology to measure academic papers and outcomes has caused controversy, and two academic views have emerged: one view is that the emerging Altmetrics indicator will replace traditional metrological indicators; another view is that Altmetrics Indicators are a complement to traditional metrology indicators and are a perfect combination. Traditional measurement indicators generally use times cited to evaluate the impact or impact factors of academic papers. Altmetrics, entity measures, usage metrics, article-level metrics, and other terminology have been proposed for a complete and compre-

hensive measurement of the impact of academic papers (Glänzel & Gorraiz, 2015).

The impact of Chinese social science paper

In recent years, Chinese social science research has grown rapidly around the world. China's emergence as a new scientific force attracted great concern (Liu et al., 2018). Some studies use the latest social science citation index to explore the patterns and dynamics of social science research in China through bibliometric analysis (Liu et al., 2015). The important role of economics, management, library and information science in the humanities and social sciences cooperation network, and their extensive interdisciplinary cooperation and key role in the entire collaborative network (Ma et al., 2014). The impact of the language of the paper on disciplines, regions, and publications (Flowerdew & Li, 2009). Academic influence of researchers, papers and works, institutions and regions on Chinese humanities and social science research (Zhang et al., 2008).

All of the above studies are based primarily on that individual citation database literature indicators or a single social media data metric that has studied the impact of the paper. For this reason, this study combines the literature indicators of the citation database with the online indicators of social media to comprehensively study and analyze the impact factors of the paper. In this study, we mainly explore the questions of the impact of paper through the literature data of Chinese social sciences in WoS database for past 5 years and online data of Altmetrics:

1. What factors in the literature data affect the times cited and the number of uses?
2. Is the Altmetrics indicator the main factor in the impact of the paper?
3. Among the traditional citation indicators and Altmetrics indicators, which literature indicators have the most significant impact on the paper?

Data and method

Data

In this study, through the research of journals and papers in the WoS database, the database has certain standards for classifying disciplines and selecting open-access (OA) papers and journals. In 2017, SSCI included 231,634 articles and 78,507 open-access (OA) papers. In December 2018, we retrieved the dataset of the Chinese Social Science Citation Index (SSCI) through the WoS database. Search strategy: "Address: AD=(PEOPLES OR CHINA)", language: English, time span: 2013-2017; index: SSCI; total retrieved 69,984 data, refined by Article, finally got Article (59,663), and then refined Open-access(14,216). Because the data of this study used WoS data combined with Altmetrics data indicators to comprehensively analyze the influencing factors of the paper, therefore, using the Altmetric Attention Score as a dependent variable for the impact factors. Altmetrics.com's dataset includes more research on Altmetric Attention Score, News mentions, Blog mentions, Policy mentions, Twitter mentions, Number of Mendeley readers, Number of Dimensions citations and more. The Altmetrics.com data corresponding to the Chinese social science open-access (OA) is collected on Altmetrics.com through DOI data in WoS. In addition, since not all data in WoS has DOI, there are 8,538 DOI document data corresponding to Altmetrics.com in the DOI of WoS literature, so these data are used as sample data of this study. Altmetrics.com data collection was on December 14, 2018.

Method

The research framework of this paper is shown in Figure 1. In short, It firstly summarizes all the literature data of 8,558 Chinese social science open-access (OA) papers in WoS, such as times cited, number of uses, article title, number of authors, number of institutions, number of cooperative countries, number of funds, References, number of keywords, topic popularity, publication time lag, page number, and Altmetric Attention Score (As) of the corresponding literature. Then statistical analysis and correlation analysis use Stata software to investigate the data differences and correlation degrees of all variables. Finally, in order to deeply study the impact factors of Chinese social science open-access (OA) papers, multiple linear regression analysis was performed by stata software to detect the total cited data (Tc) and the number of uses (U1), the number of uses (U2), the influence factor of Altmetric Attention Score (As).

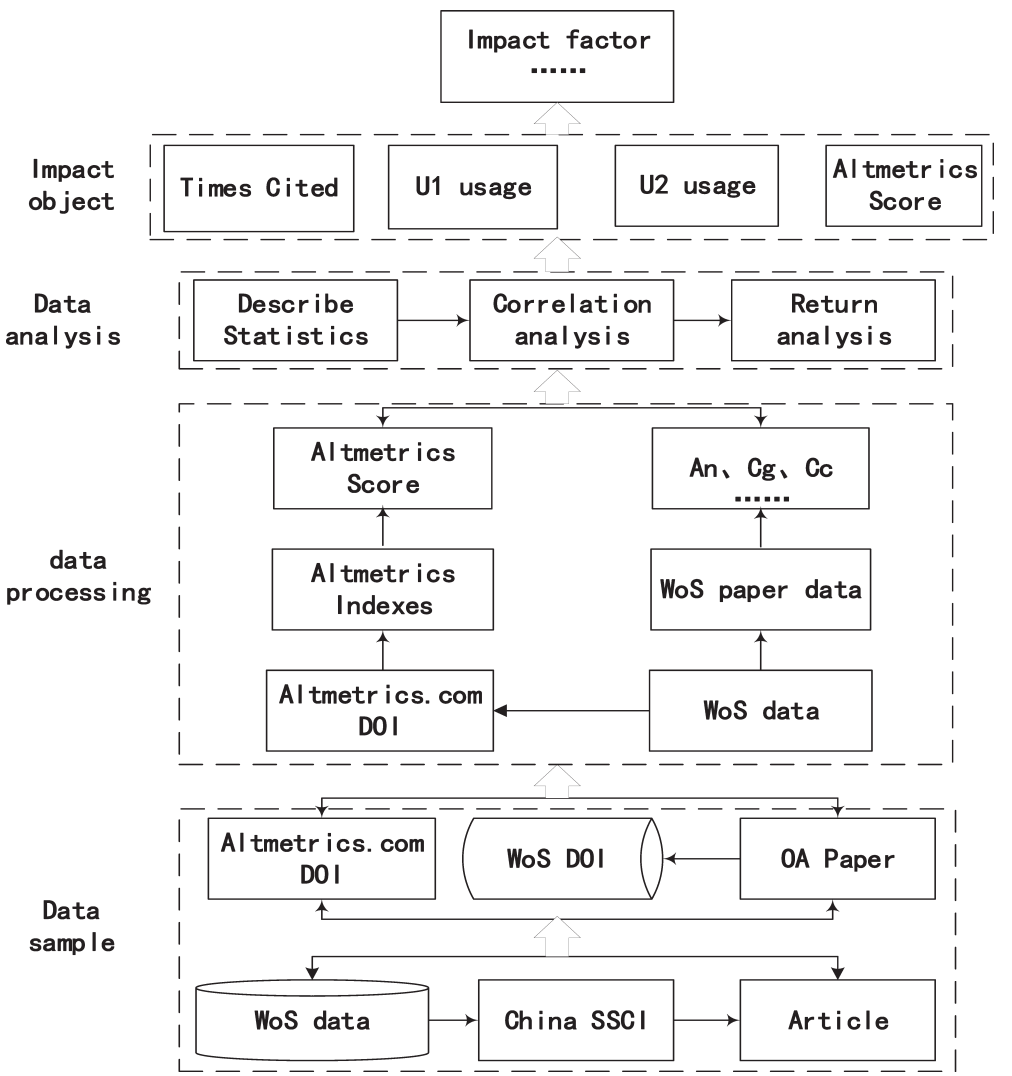

Figure 1 Data processing and research framework

Variable description

Dependent variable

Through literature analysis, it is found that the Times Cited, the number of uses (U1), (U2) and the Altmetric Attention Score (As) are the literature indicators that represent the value of the paper to some extent. Therefore, the four Literature indexes are selected in this paper as dependent variables.

Times Cited. The times cited refers to the number of citations after the publication of academic papers, which can objectively explain the extent to which the academic papers are used and valued, and their role and status in academic exchanges. In the core collection of Web of Science, the fields are represented by TC.

Usage Count (U1, U2). Usage Count in the WoS core dataset. The number of uses for the last 180 days is represented by the field U1, and the number of uses from 2013 to the present is represented by the field U2. In recent years, discussions on the measurement and concept of usage times have become more and more concerned, and a large part of social media tends to consider using indicators as research objects (Glänzel & Gorraiz, 2015).

Altmetric Attention Score (As). The Altmetric Attention Score is the result of an international monitoring analysis of published research papers. Researchers should pay close attention to and keep track of their professional academic papers, research results and progress.

Independent variable

This paper selects all the literature index data generated by the use and influence of open-access (OA) academic papers. On the basis of previous studies, the number of authors, institutions, cooperative country data, number of funds, number of references, number of keywords, topic popularity, publication time lag, and page number are determined as independent variables. Among them, the number of institutions as an indicator to measure the cooperation of the paper (Adams et al., 2007) is expressed by the number of institutions. The topical heat represents the popularity of keywords through the average frequency of keywords in each paper; the cooperative countries are measured by the number of cooperative countries of the paper. Specific variables and metrics are shown in Table 1.

Table 1 Variable names and meaning

Variable	Variable name	meaning	Remarks and metrics
Dependent variable	Citation	Times Cited.	The cited frequency of the paper in the WoS core set database
	U1	Usage Count	Last 180 days of usage
	U2	Usage Count	Number of uses since 2013
	AS	Altmetrics score	Altmetrics.com attention score
Independent variable	An	Author Count	Number of authors per paper
	Cg	Institutional cooperation Count	The organization derived from WoS data is the criterion
	Cc	National cooperation Count	The number of national cooperation derived from WoS data is the criterion
	Fn	Funds Count	Number of funds funded by the fund

Variable	Variable name	meaning	Remarks and metrics
	Nf	References Count	Number of references exported using the WoS core database
	Kn	Keywords Count	Number of keywords exported using the WoS core database
	Th	Topic Heat	Firstly, according to the key words of the WoS core database, the keyword frequency is calculated, and the average value of the keyword frequency is calculated according to the frequency of each keyword, which represents the topic heat.
	Pt	Publish time lag	The year of publication of the 2017 issue, indicating the time since the publication of the paper
	Pn	Page number	Number of page numbers exported using the WoS core database

Regression model design

Regression analysis is to discuss the relationship between objective things and represent the statistical relationship between variables. Prior to regression analysis, the correlation between all variables needs to be analyzed. There are many benefits to using regression analysis. The details are as follows: it indicates a significant relationship between the independent variable and the dependent variable; it indicates the intensity of the influence of multiple independent variables on one dependent variable. Regression analysis better compares the interactions between variables that measure different scales, such as the link between the reference and the number of times of citations. These can help researchers, data analysts, and data scientists to exclude and estimate a set of better variables for building predictive models.

Since the variables in this paper are not all 0-1 variables, and all the variables selected in this paper obey the normal distribution, the regression model selects the multiple linear regression model. In addition, most of the literature, especially the domestic literature, is based on the correlation analysis of the same indicator level or different indicator levels with the cited frequency or hot topic in the field of library and information. This kind of research method is easy to interpret. However, the impact factors of the paper are multifaceted, the influence of a single index of the literature on the times cited is difficult to reach true and accurate. However, only the combination of traditional literature measures and Altmetrics indicators, the marginal effect of controlling other influencing factors, multivariate linear regression analysis was used to detect the true impact of the indicator. Therefore, this paper intends to use the multiple linear regression model to study the effects of WoS data and Altmetrics indicators of Chinese social science open-access (OA) paper on Tc, U1, U2, As. The specific models are as follows:

$$\mathrm{Tc} = \beta_0 + \beta_1 \mathrm{an} + \beta_2 \mathrm{cc} + \beta_3 \mathrm{cg} + \beta_4 \mathrm{fn} + \beta_5 \mathrm{nf} + \beta_6 \mathrm{kn} + \beta_7 \mathrm{th} + \beta_8 \mathrm{pt} + \beta_9 \mathrm{pn} + \varepsilon$$

$$\mathrm{U}_1 = \beta_0 + \beta_1 \mathrm{an} + \beta_2 \mathrm{cc} + \beta_3 \mathrm{cg} + \beta_4 \mathrm{fn} + \beta_5 \mathrm{nf} + \beta_6 \mathrm{kn} + \beta_7 \mathrm{th} + \beta_8 \mathrm{pt} + \beta_9 \mathrm{pn} + \varepsilon$$

$$\mathrm{U}_2 = \beta_0 + \beta_1 \mathrm{an} + \beta_2 \mathrm{cc} + \beta_3 \mathrm{cg} + \beta_4 \mathrm{fn} + \beta_5 \mathrm{nf} + \beta_6 \mathrm{kn} + \beta_7 \mathrm{th} + \beta_8 \mathrm{pt} + \beta_9 \mathrm{pn} + \varepsilon$$

$$\mathrm{As} = \beta_0 + \beta_1 \mathrm{an} + \beta_2 \mathrm{cc} + \beta_3 \mathrm{cg} + \beta_4 \mathrm{fn} + \beta_5 \mathrm{nf} + \beta_6 \mathrm{kn} + \beta_7 \mathrm{th} + \beta_8 \mathrm{pt} + \beta_9 \mathrm{pn} + \varepsilon$$

$$C_{ij} = c_{j1} V_{i1} + c_{j2} V_{i2} + \wedge + c_{jp} V_{ip} + c_{jp}, \; j = 1, k$$

Results

General situation

In this study, the DOI of the Chinese social science open-access paper in the WoS database for the past five years (2013-2017) corresponds to the DOI number in Altmetrics.com to obtain all Altmetrics indicators for open-access papers. The Chinese social science open-access paper in the past five years is shown in Figure 2. Figure 2 shows the total number of Article and open-access papers in China's social sciences in the last five years (2013-2017) and the proportion of open-access papers in Article. At the same time, we can clearly see that the total number and proportion of Article and open-access papers are growing steadily year by year, and the growth trend is more obvious, and the follow-up continues to grow. The proportion of Chinese social science open-access papers in Article increased from 17.53% in 2013 to 28.55% in 2017 and nearly doubled in five years. In recent years, China has paid more and more attention to sharing academic resources and increased investment in research funding for open-access construction.

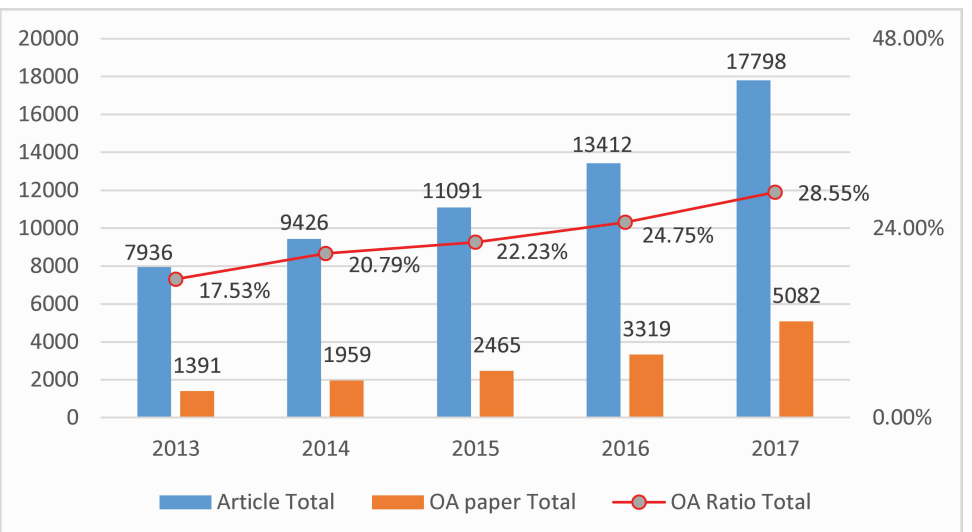

Figure 2 Article Total and open-access (OA) paper Total of OA paper in Chinese SSCI

Distribution of Dependent variable

Before the model is estimated, this paper analyzes the distribution law of dependent variables, as shown in Figure 3. It can be seen that the number and score of Tc, U1, U2 show different distribution characteristics. Nearly 85% of Tc is distributed between 0-40 times, and nearly 90% of U1 usage times are distributed between 0-20 times, nearly 95% of U2 is distributed between 0-70 times, and nearly 50% of As scores are distributed between 0-30 times. Therefore, the dependent variable of this paper conforms to the normal distribution regular, and it is reasonable to carry out multiple linear regression.

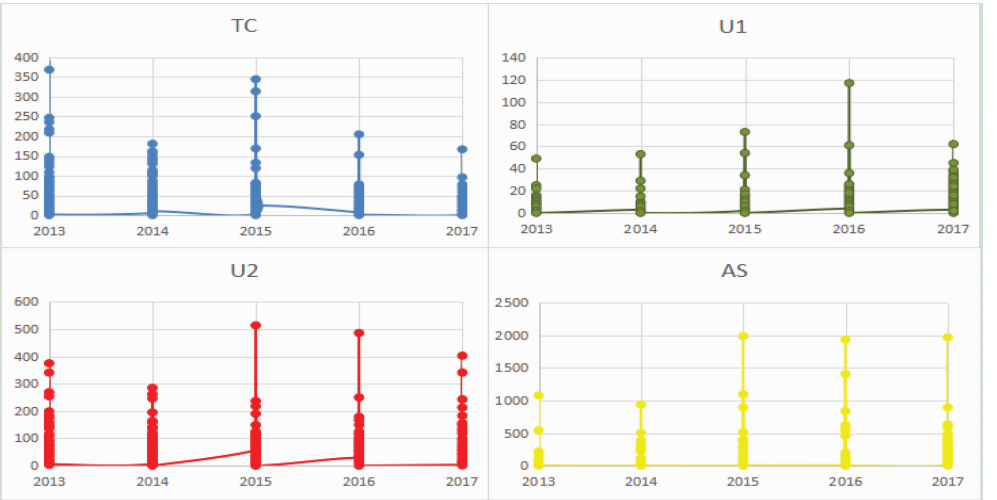

Figure 3 Dependent variable distribution

Descriptive statistics of variables

Descriptive statistics for the main variables involved in this paper are shown in Table 2. This table lists the mean and standard deviation of the independent and dependent variables for all indicators in the 8538 literature. As can be seen from the table, the average value of the Altmetric Attention Score (As) is 9.2552, the standard deviation is 56.5173, the maximum is 1990, and the minimum is 0, which indicates that the attention of the paper on social media varies greatly. The papers are all cited by 7.2381, the standard deviation is 15.1157, the maximum is 369, and the minimum is 0. This indicates that the times cited between different papers are quite different. The mean number of references (Nf) is 48.18869, the standard deviation is 21.8943, the maximum is 369, and the minimum is 0, indicating that the number of references between the papers is also large. Descriptive statistics for other variables are not repeated here.

Table 2 Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Tc	8538	7.238112	15.11571	0	369
u1	8538	2.613844	3.894892	0	117
u2	8538	19.79562	22.94729	0	514
As	8538	9.255212	56.5173	0	1990
An	8538	6.409346	7.088889	1	218
Cg	8538	3.600141	5.093536	0	182
Cc	8538	2.062661	2.395808	0	52
Fn	8538	2.046615	1.907718	0	28
Nf	8538	48.18869	21.8943	0	369
Kn	8538	3.493441	2.524615	0	23
Th	8538	18.21458	47.27482	0	282.3333
Pt	8538	2.312134	1.329915	0	5
Pn	8538	1.141719	148.0787	−12835	76

Correlation analysis

In order to prove the rationality of all variables, this paper makes a correlation analysis between dependent and independent variables before regression analysis. That is, correlation analysis is performed between all variables such as Tc, U1, U2, As, An, Cg, Cc, Fn, Nf, Kn, Th, Pt, and Pn, as shown in Table 3. This table lists the correlation coefficients and significance levels between the variables. We can see that the correlation coefficient between each variable is very small from this table. The absolute value is lower than 0.6. There is no strict collinear relationship between the independent variables, which can be included in the same regression model for empirical testing. Except that Th and Tc, U1, U2, and Cg are -0.0024, -0. 0024, 0.0004, and -0.0092, respectively, the correlation coefficients between other variables are all below 0.01, indicating that there is a typical relationship between the variables. Correlation analysis considers the relationship between single variables and dependent variables, while regression analysis tests the combined effects of multiple variables on dependent variables. Therefore, this paper considers that these dependent variables and independent variables does not affect the significance of the regression results.

Table 3 Correlation coefficient

Var	tc	u1	u2	as	an	cg	cc	fn	nf	kn	th	pt	pn
tc	1.0000												
u1	0.3311***	1.0000											
	0.0000												
u2	0.5583***	0.6226***	1.0000										
	0.0000	0.0000											
as	0.3146**	0.2671***	0.2506***	1.0000									
	0.0000	0.0000	0.0000										
an	0.2567***	0.0648***	0.1121***	0.1088***	1.0000								
	0.0000	0.0000	0.0000	0.0000									
cg	0.2717***	0.0920***	0.1543***	0.1423***	0.8382***	1.0000							
	0.0000	0.0000	0.0000	0.0000	0.0000								
cc	0.2986***	0.0890***	0.1497***	0.1583***	0.6440***	0.8247***	1.0000						
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000							
fn	0.0807***	0.0758***	0.0426***	0.0590***	0.2753***	0.2477***	0.2674***	1.0000					
	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000						
nf	0.1271***	0.1984***	0.2199***	0.0380**	0.0486***	0.0765***	0.0842***	0.0710***	1.0000				
	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000					
kn	−0.0255**	0.0805***	0.0462***	−0.0570***	−0.0526***	−0.0077	0.0212**	−0.0375***	0.0780***	1.0000			
	0.0185	0.0000	0.0000	0.0000	0.0000	0.4742	0.0496	0.0005	0.0000				
th	−0.0024	−0.0024	0.0004	−0.0285***	−0.0256**	−0.0092	−0.0216**	−0.0348***	−0.0448***	0.2226***	1.0000		
	0.8255	0.8219	0.9675	0.0083	0.0179	0.3930	0.0461	0.0013	0.0000	0.0000			
pt	0.3462***	−0.1985***	0.2171***	0.0093	0.0288***	0.0410***	0.0646***	−0.0815***	−0.0948***	−0.1392***	0.0360***	1.0000	
	0.0000	0.0000	0.0000	0.3910	0.0078	0.0002	0.0000	0.0000	0.0000	0.0000	0.0009		
pn	−0.0266**	−0.0181*	−0.0103	−0.0526***	−0.0122	−0.0116	−0.0062	−0.0202*	−0.0077	0.0293***	0.0108	−0.0096	1.0000
	0.0141	0.0943	0.3415	0.0000	0.2592	0.2842	0.5677	0.0615	0.4754	0.0067	0.3179	0.3737	

Notes : *** , ** , * signify that the statistical test are significant at the 1% , 5% , and 10% levels respectively.

Regression model analysis

Correlation analysis shows that the correlation between variables is significant. This paper will use a linear correlation model to dig deep into the main influencing factors of Tc, U1, U2 and As. Based on the strong correlation between variables, this study uses multiple linear regression models. All independent variables of the literature in the WoS data will be

analyzed by the regression model to analyze the factors affecting the frequency of introduction (Tc), number of uses (U1), (U2) and Altmetric Attention Score (As), as shown in Table 4.

Table 4 Linear regression results table

	(1)	(2)	(3)	(4)
	m1	*m2*	*m3*	*m4*
VARIABLES	*tc*	*u1*	*u2*	*as*
an	0.303***	–0.0172	–0.109*	–0.217
	(0.0383)	(0.0107)	(0.0617)	(0.160)
cg	–0.138*	0.0594***	0.616***	0.616**
	(0.0713)	(0.0200)	(0.115)	(0.298)
cc	1.304***	0.0540*	0.164	2.956***
	(0.109)	(0.0306)	(0.176)	(0.456)
fn	0.131	0.0634***	0.231*	0.395
	(0.0800)	(0.0224)	(0.129)	(0.334)
nf	0.0942***	0.0300***	0.237***	0.0694**
	(0.00667)	(0.00187)	(0.0108)	(0.0279)
kn	0.102*	0.0639***	0.590***	–1.325***
	(0.0598)	(0.0167)	(0.0963)	(0.250)
th	–0.00133	0.000356	–0.00541	–0.0125
	(0.00314)	(0.000881)	(0.00507)	(0.0131)
pt	3.947***	–0.524***	4.206***	–0.213
	(0.111)	(0.0311)	(0.179)	(0.464)
pn	–0.00202**	–0.000485*	–0.000979	–0.0188***
	(0.000974)	(0.000273)	(0.00157)	(0.00407)
Constant	–11.16***	1.805***	–5.621***	3.552
	(0.534)	(0.150)	(0.861)	(2.230)
Observations	8,538	8,538	8,538	8,538
R–squared	0.224	0.083	0.126	0.033

Notes:* Indicates significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level

Standard errors in parentheses

The regression model shows that the nine factors and four models of the Chinese social science open-access influence regression analysis. The regression model analysis results are as follows:

Firstly, Model 1 is an analysis of the impact factors of variables on the times cited. Except for the subject heat (Th) and fund number (Fn) variables, all other dependent variables showed a significant positive correlation at the 1% level. The times cited (Tc) of the paper has a significant positive correlation with the number of authors (An), the amount of cooperation between countries (Cc), the number of references (Nf), and the publication time lag (Pt), which indicates that the larger the number of authors, the amount of cooperation between countries, the number of references, and the number of publication time lags, the greater the impact on the times cited. In addition, the times cited (Tc) has a negative correlation with the number of agency cooperation (Cg), subject heat (Th), and page number (Pn), and the coefficients are -0.138*, -0.00133, -0.00202**, which indicates that the variable Tc becomes smaller as the number of organization cooperation (Cg), subject heat (Th), and page number (Pn) increases, and their directions of change are opposite.

Secondly, Model 2 analyzes the impact factors of the variables on the number of uses (U1).

The number of uses (U1) in the last 180 days and the number of institutional cooperation (Cg), the number of funds (Fn), the number of references (Nf), and the number of keywords (Kn) showed a significant positive correlation at the 1% level, Indicating the higher the number of cooperation (Cg), the number of funds (Fn), the number of references (Nf), and the number of keywords (Kn), the more the number of uses. It shows that the number of institutional cooperation, the number of funds, the number of references and the number of keywords have a greater impact on the number of uses in the short term; however, there is a significant negative correlation with the publication time lag (Pt) at the 1% level. It shows that the longer the publication time lag, the less the number of uses. This is consistent with the expected results.

Again, Model 3 analyzes the influence factor of the variable on the number of uses (U2). The number of uses (U2) from 2013 to the present has a significant positive correlation with the number of institutional cooperation (Cg), the number of references (Nf), the number of keywords (Kn), and the publication time lag (Pt) at the 1% level. the number of references (Nf), the number of keywords (Kn), and publication time lag (Pt) have a strong influence on U2. That is, the higher the number of institutional cooperation, the number of references, the number of keywords, and the number of publication lags, the greater the impact on U2, and the direction of their changes is the same. In addition, U2 has a significant negative correlation with the number of authors (An), theme heat (Th), and page number (Pn), but the significant negative correlation is not apparent. Only the number of authors (An) is -0.109*. It is better to say that the number of authors (An), theme heat (Th), and page number (Pn) have little effect on U2.

Finally, Model 4 analyzes the influence factors of variables on the Altmetric Attention Score (As). The Altmetrics Attention Score is positively correlated with the number of institutional cooperation (Cg), the number of cooperation between countries (Cc), and the number of references (Nf). The number of cooperation between countries (Cc) is only 1%. A significant positive correlation is shown, which indicates that the number of cooperation between countries and reference texts has a significant impact on the total score of social media. The higher the number of cooperation between countries, the greater the impact on the total score of social media. However, it has a significant negative correlation with An, kn, and Pn. Among them, Kn and Pn showed stronger negative correlations, and all showed significant negative correlation at 1% level. That is, the total score of social media is exactly the opposite of the number of keywords and the number of pages. The more key times and the longer the number of pages, the lower the total score of social media.

Conclusion and discussion

In this paper, 8538 open-access (OA) papers from China Social Sciences (2013-2017) were collected in the WoS database as data samples, and the Altmetric Attention Score (As) evaluation data of these papers were obtained at Altmetric.com. Then, the in-depth analysis and comparison of the influential factors of Chinese social science OA papers in the past five years are conducted. Firstly, through multivariate linear regression model analysis, the above factors have an impact on the times cited, the number of uses(U1, U2), Altmetric Attention Score (As), and influence on Chinese social science open-access (OA) papers. The main factors are the number of authors (An), the amount of cooperation between countries (Cc), the number of references (Nf), and the publication time lag (Pt). The impact on the times cited (Tc) is significant; the number of institutions (Cg), funds, the number of (Fn), the number of

references (Nf), and the number of keywords (kn) have a significant influence on the number of uses (U1); the number of institutional collaboration (Cg), the number of references (Nf), the number of keywords (kn) and the publishing delay (Pt) have significant effects on U2; the amount of cooperation (Cc) between countries has a significant effects on the score of Altmetric Attention Score (As).

However, the amount of cooperation between countries (Cc) is an important common factor in the times cited (Tc) and Altmetric Attention Score (As). With the rapid development of science and technology, the scientific and technological cooperation between countries has become more and more remarkable. To a certain extent, it represents the labeling of continuous innovation and development of science and technology, which will become the main factor of influence, such as papers. The number of institutional cooperation (Cg) is a common and important factor in the number of uses (U1) and the number of uses (U2). Reference number (Nf) and publication time lag (Pt) are the common impact factors of the frequency of citation (Tc), number of uses (U1), and number of uses (U2). The number of keywords (kn) is an important common factor in the number of uses (U1) and the number of uses (U2). The publication time lag (Pt) has a crucial influence on the times cited, the number of uses (U1), and the number of uses (U2). It also shows that if the time difference between the publication time lag of the OA paper and the present day is longer, the times cited may be higher. This is consistent with the findings of Didegah and Thewall (2013).

Finally, among the above impact factors, number of references (Nf), number of institutional cooperation, and number of cooperation between countries are the important influences of times cited (Tc), number of uses (U1), number of uses (U2), and Altmetric Attention Score (As). The factor, followed by the number of keywords (kn) has a strong influence on the number of uses (U1) and the number of uses (U2), and the publication time lag (Pt) has a strong influence on the times cited and the number of uses (U2). Based on the above analysis, this paper considers that the number of references (Nf), the number of institutions (Cg), the number of cooperation between countries (Cc), the number of keywords (Kn), and the publication time lag (Pt) are the 5 main factors affecting Chinese social sciences the open-access (OA) papers. Among the 5 main factors, the number of references (Nf) is a more important factor.

The conclusions of this study have certain innovative value in both theory and practice. In theory, the traditional literature index combined with the Altmetrics index to study the impact factors, found that the number of institutional cooperation (Cg), the number of cooperation between countries (Cc) and the number of references (Nf) have a higher score on social media. Significantly, the number of inter-country cooperation (Cc) has the strongest impact. Among them, the number of references (Nf) has a significant positive relationship with the cited frequency (Tc), number of uses (U1), number of uses (U2), and has a significant negative relationship with Altmetric Attention Score (As). In practice, the conclusions of this paper also negate the phenomenon that academic papers published in international academic circles in recent years have overemphasized certain factors to improve the influence of the paper.

Of course, due to the limitations of research data and methods, this paper also has some shortcomings. Some explorations need to be made in future research. With the rapid development of big data technology, artificial intelligence and the Internet, social media has become more and more popular, the dissemination of scientific knowledge and technological innovation have been affected by many aspects. Therefore, the impact of Chinese social sci-

ence open-access (OA) papers will become more complex, diverse, and dynamic. The research on the impact factors of the paper needs further improvement. In this study, we only selected China Social Science open-access (OA) paper in WoS (SSCI), and only selected (2013-2017) WoS citation data. In addition, Open-access (OA) papers are limited. In order to arrive at a more credible conclusion, in later studies we will use a larger sample data set, as well as Altmetrics relevant data, to obtain more valuable research results through comparative studies in China and the United States or other countries.

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