

-RESEARCH ARTICLE-

EXPLORING TRENDS OF FINANCIAL LITERACY RESEARCH: A BIBLIOMETRIC & TOPIC MODELING APPROACH

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—Abstract—

Research on financial literacy has increased over time, particularly in light of the severe effects of the 2008 global financial crisis and the necessity of empowering individuals' financial well-being. This study employs bibliometric analysis to reaffirm the multidisciplinary nature of this topic. It displays the most influential authors, journals, articles, keywords, and time trends. In addition, using topic modeling, this study reveals the top ten sub-topics discussed in 2,538 Web of Science-extracted publications over the past quarter-century (1998-2022). Some sub-topics have persisted over time (e.g., financial education), whereas others were introduced much later (e.g., entrepreneurialism). Future research should use the findings of this study to categorize the relevant theories in financial literacy and investigate unexplored topics.

Keywords: Financial Literacy, Behavioral Finance, Bibliometric Analysis, Topic Modeling, Systematic Literature Review

JEL Codes: G51, G40, C88

1. INTRODUCTION

OECD (2009) and OECD (2018) define financial literacy as the knowledge of financial principles and the ability to apply them to make improved financial decisions confidently. After a lengthy period of different definitions, this OECD explanation is regarded as the most comprehensive (Huston 2010, Remund 2010, Goyal and Kumar 2021). The 2008 global financial crisis, the changes in pension plans, and the complexity of the financial markets have fueled a boom in the academic discourse on financial

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literacy over the past two decades (Bucher-Koenen and Lusardi 2011; Lusardi and Mitchell 2011; Lusardi and Mitchell 2014; Fernandes et al., 2014; Ricci and Caratelli 2017; Lusardi 2019; Wagner 2019). However, its significance has been recognized for centuries (Goyal and Kumar, 2021). Financial literacy's role in shaping sounder and healthier financial behaviors has been extensively discussed in the academic literature. Improved retirement planning (Lusardi and Mitchell 2011; Klapper and Panos 2011, Ricci and Caratelli 2017; Boisclair et al., 2017), increased participation in the financial markets (van Rooij et al., 2011; Aren and Zengin 2016; Hsiao and Tsai 2018; Li et al. 2020), and refraining from high-cost borrowing (Klapper et al, 2012; de Bassa Scheresberg 2013; Disney and Gathergood 2013) are some of such behaviors. According to research, financial literacy also increases financial inclusion, a crucial factor for a nation's economic development (Grohmann et al., 2018). Consequently, this relationship extends the benefits of enhancing financial literacy to improve national economies. As part of the life skills of the 21st century, financial literacy is essential to forming financially invested and tolerant individuals (Atkinson and Messy 2012; Potrich et al, 2018; Suri et al, 2022). Unfortunately, the outcomes of financial education and empowerment programs have been uneven. There are prominent research works on both sides of the argument, prompting one to question whether investing time, money, and effort in producing more is worthwhile. Nonetheless, a well-structured audience-centric financial education program rarely improves individuals' financial literacy (Fox et al., 2005; Walstad et al., 2010; Lusardi 2019). In addition, the success of such programs is contingent not only on their design but also on the methodologies employed during delivery and evaluation (Carpena et al. 2011; Fernandes et al., 2014).

This study examines the trends in financial literacy research over the past 25 years using bibliometric analysis and topic modeling on an extensive list of 2538 publications. Although analogous studies have been conducted in the past, their number is negligible (Ansari et al., 2022). It identifies the most influential authors, publications, and journals in financial literacy. It also demonstrates how researchers have utilized interdisciplinary methods to comprehend the factors influencing financial literacy and its effects on people's lives. This investigation aims to address three research questions:

1. How is financial literacy research archived in the publication type, language, and discipline?
2. Which are the most influential journals and publications, and who are the most influential authors in financial literacy?
3. What are the top 10 topics discussed in financial literacy research, and how did they evolve over the last 25 years?

This study introduces several novelties to the academic community to answer its research questions. As far as I am aware, this is the first bibliometric study that focuses solely on financial literacy. Previous research has considered interchangeable and synonymous terms in the absence of a concrete definition (Goyal and Kumar 2021; B. Singh 2021; Ingale and Paluri 2022; Ansari et al. 2022; Suri and Jindal 2022; B. Singh 2021; Ingale and Paluri 2022; Ansari et al. 2022; Suri and Jindal 2022; Ingale and Paluri 2022). This method is intelligible because the definition of financial literacy has not yet been standardized, and it permits the inclusion of all research works that may employ different terminologies. Nonetheless, this method can potentially alter the outcomes of bibliometric analysis, mainly if one of the terms is extensively discussed in academic circles. As research becomes increasingly sophisticated, academia has a more transparent comprehension of the various terminologies associated with financial literacy.

Consequently, it is possible to focus on a specific term. In addition, this study is the first to use topic modeling to identify the most frequently discussed financial literacy topics. Prior research concentrated on keyword analysis and publication clustering to accomplish the latter (Goyal and Kumar 2021; Ansari et al., 2022) The third originality of this study may be its inclusiveness, as it disregards distinctions in publication language and format. Fourthly, this study is supported by the largest body of research (2,538), lending credibility and global applicability to its claims and findings.

Consequently, one of this study's contributions to the academic community is revealing the existing knowledge on financial literacy and its related subtopics. It also demonstrates the sophistication of the academic discourse on these subjects. In addition, the list of the top ten dominant topics allows researchers to focus on topics that have yet to be disclosed in the academic world. This study's findings are essential for researchers working on this topic and policymakers wishing to improve people's financial savvy. It also functions as a starting point for anyone desiring an overview of the current trends in financial literacy research.

This research distinguishes itself from empirical works on financial literacy in that its primary objective is not to verify a hypothesis but to demonstrate a consensus on the most significant and prevalent topics in financial literacy research. As empirical research is predominately concerned with data collection through experiments, literature reviews draw connections between these studies to advance the leading theoretical positions. Thus, any researcher can situate their work within a broader context. To address its research questions, this study employs a post-empirical methodology. Therefore, a person interested in a particular topic would be better off reading this type of research than selecting a biased collection of publications.

The remaining sections of this research paper are as follows: Section 2 describes the research methodology in terms of data search, collection, and analysis. Section 3

discusses the results of the bibliometric analysis, which are divided into trends and top lists. Section 4 reveals the top 10 topics uncovered through topic modeling. Section 5 summarizes the research findings, discusses its limitations, and suggests future research.

2. RESEARCH METHODOLOGY

2.1 Data

Web of Science (WoS), a Clarivate Analytics platform and one of the most utilized sources for academic publications (Goyal and Kumar, 2021), was accessed to retrieve the essential data as abstracts from publications. This retrieval was conducted in late August 2022, and after applying the requisite filters, it yielded 2,836 publications. In contrast to many other bibliometric research works, the term "financial literacy" was searched in the publications' topics, titles, keywords, and abstracts with the "-" between "financial" and "literacy" to ensure that the full term is searched and not just one of the two words. Similar previous research has focused on running searches using terms synonymous with financial literacy, such as financial knowledge (Goyal and Kumar 2021; Ansari et al. 2022; Ingale and Paluri 2022), financial education (Goyal and Kumar 2021; Ansari et al. 2022), financial behavior (B. Singh 2021; Ingale and Paluri 2022), and financial capability (Goyal and Kumar 2021). However, the academic community now understands the distinctions between the previously synonymous terms. Therefore, the latter synonyms were disregarded to limit this study to financial literacy.

Further investigation of the retrieved abstracts revealed that only 2696 contained abstracts, of which 158 had publication dates that were not specified. Consequently, 2538 publications remained on the final list of retrieved abstracts, making this the bibliometric study on financial literacy with the largest pool of abstracts. This investigation considers journal articles (A), conference proceedings (C), books (B), and book chapters (S). Nevertheless, as shown in Figure 1, most abstracts are derived from peer-reviewed journal articles, followed by conference proceedings.



Figure 1: Publication Types

This study disregards the language of the publication, as WoS only provides abstracts in English, which is required for the current study. Despite this, 96.76 percent of publications are written in English. The remaining 17 languages are represented in [Figure 2](#), which reveals that Spanish, Russian, and Czech hold the top positions for non-English publications. This work is exhaustive due to its lack of publication type and language discrimination.

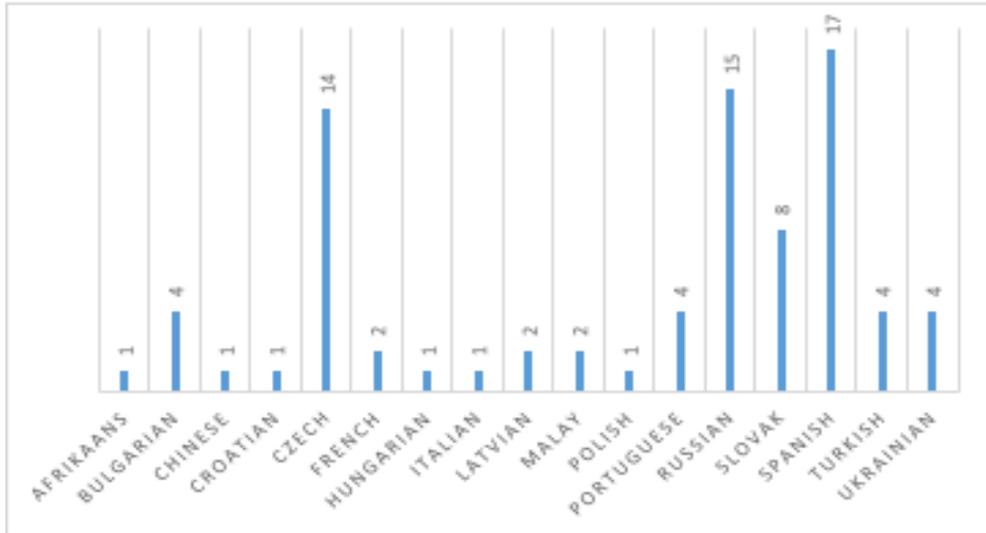


Figure 2: The Number of financial Literacy Research Works in Foreign Languages

2.2 Method of the Analysis

This study employs bibliometrics, word processing, and topic modeling to decipher financial literacy knowledge anatomy. [Singh and Dhir \(2019\)](#) define bibliometric analysis as using quantitative techniques to identify, map, and analyze trends in the previously published literature on a given topic. The steep increase in publications and the rise of interdisciplinary research works necessitate precisely mapping the principal subtopics addressed ([Ingale and Paluri, 2022](#)). Many researchers have adopted a multidisciplinary approach, resulting in the publication of bibliometric analyses spanning the various subfields of finance ([Ingale and Paluri, 2022](#)). Behavioral finance also contributed to bibliometric research. [Goyal and Kumar \(2021\)](#), [B. Singh \(2021\)](#), [Ansari et al. \(2022\)](#), [Ingale and Paluri \(2022\)](#), [Suri and Jindal \(2022\)](#), and [Ingale and Paluri \(2022\)](#) are the authors of the most recent bibliometric studies on behavioral finance and financial literacy, respectively. Only one of the five works, [Singh \(2021\)](#), has addressed "Behavioral Finance," whereas the others have primarily addressed "Financial Literacy." [Singh \(2021\)](#) is the only publication that obtained its data (abstracts) from Scopus rather than WoS. Although all publications were considered, only "English" and peer-reviewed articles were utilized extensively. The minimum 20-year time frame for each research paper, with the earliest extending back to 1973 and the most recent to 2022.

Publication	Topic	Publication Number	Publication Type	Tool	Language	Source	Keywords	Timeframe
Goyal & Kumar (2021)	Financial Literacy	502	Article	VOS Viewer Gephi	English	Web of Science	Financial Literacy Financial Knowledge Financial Education Financial Capability	2000-2019
Singh (2021)	Behavioral Finance	1739	Article Review	VOS Viewer	English	Scopus	Behavioral Accounting Behavioral Research in Accounting Behavioral Accounting Research Behavioral Finance	1973-2020
Ansari et al (2022)	Financial Literacy of Investors	2182	Article	VOS Viewer	English	Web of Science	Financial Literacy Investor Financial Knowledge Financial Education	2002-2022
Ingate & Paluri (2022)	Financial Literacy	1138	Article Review Book Chapter Early Access	Biblioshiny (Bibliometrix)	English	Web of Science	Financial Literacy Financial Behavior Financial Attitude Financial Knowledge	1985-2020
Suri & Jindal (2022)	Financial Literacy & Well-Being	1000	Article	VOS Viewer	English	Web of Science	Financial Literacy Well-Being	2001-2021

Table 1: Recent Bibliometric Analysis on Financial Literacy

Mallet was used for topic modeling, while Excel was used for data preparation and descriptive analytics. "Machine Learning for Language Toolkit" is a Java-based package for statistical natural language processing, document classification, clustering, topic modeling, information extraction, and other machine learning applications for text (McCallum 2002). The data preparation began with the export of all publication details to an Excel sheet, followed by their arrangement in reverse chronological order (oldest to newest). The abstracts were stripped of all punctuation, numerals, and symbols before being saved separately in.txt format. Each of these files was allocated a unique number between 1 and 2538. This was followed by the first topic modeling experiment on the entire dataset, conducted on Mallet with a limitation of ten topic words and 1000 iterations. This was performed three times until the topics became obvious. This has disclosed the top 10 financial literacy research topics discussed in academia, which were used to compare annual publication trends. To accomplish this, the publication abstracts of each year were separated into distinct folders, and topic modeling was performed separately for each year. From 1998 to 2008, there were fewer than ten publications, resulting in fewer new topics. After repeating the tests for each year using the default Mallet parameters, except for changing the topic words to 10, all the topics were identified by year and compared to the top 10 overall topics. In addition to hydropower (Jiang et al., 2016), semantic computing (Chen et al., 2022), and bioinformatics (Liu et al., 2016), other scientific fields have utilized topic modeling. Figure 3 illustrates the methodology I used to conduct this research.

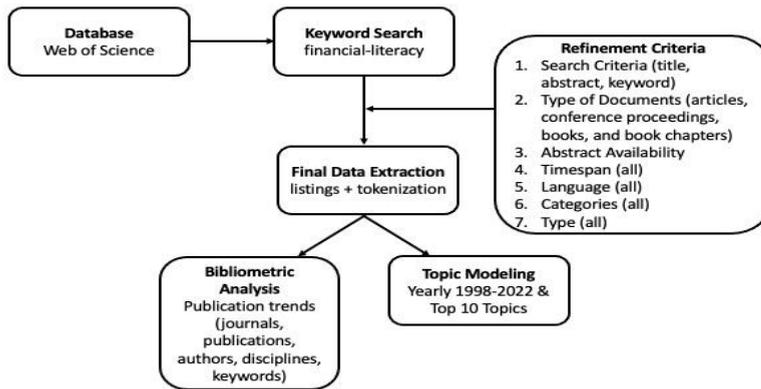


Figure 3: Research Methodology

3. FINDINGS

3.1 Trends: Publication Times

Figure 4 demonstrates that before the global financial crisis that began at the end of 2007, research on financial literacy was minimal, with a maximum of seven publications per year. Nonetheless, beginning in 2009, the number of publications increased, with a remarkable increase in 2017 that nearly doubled the total. These figures lend credence to the OECD's assertions that the crises were the wake-up call the global community needed to concentrate on enacting sound policies and mandates for financial education and consumer protection (OECD, 2009). Then, governments began formulating National Strategies for Financial Education to encourage healthy financial behaviors and a more engaged financial consumer (Goyal and Kumar, 202). Due to the retrieval date of August 2022, four months' worth of publications (September to December) are not included in the count for the year 2022, resulting in a decrease in the number of publications.

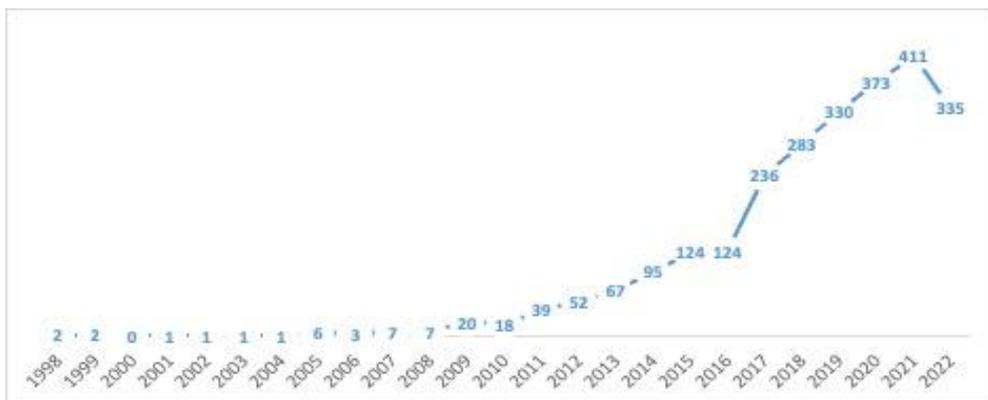


Figure 4: Annual Publication trend of 2538 Works between 1998 and 2022 Retrieved from WoS

3.2 Trends: Publication Outlets

The publications belong to a total of 1157 unique venues, 856 of which are peer-reviewed academic journals, 277 are conference proceedings, 16 are book chapters, and 8 are books. [Table 2](#) lists the 15 journals that published the most articles on financial literacy. Journal of Consumer Affairs has the most publications with 62, followed by the International Journal of Consumer Studies with 42 and the Journal of Pensions Economics & Finance with 46. Notable is that Wiley-Blackwell publishes the top two journals on financial literacy, but including 10 other publishers on the list demonstrates the topic's academic appeal. It is also noteworthy that the majority of the journals on the list have an H-index of 50 or higher, according to Scimago Journal Rankings, and an A or A* ranking from the Australian Business Deans Council (ABDC), indicating that the discussion of financial literacy occurs in journals with high academic standards and quality ([Goyal and Kumar 2021](#)).

NAME	NUMBER OF PUBLICATIONS	RANK	PUBLISHER	H-INDEX
JOURNAL OF CONSUMER AFFAIRS	62	1	Wiley-Blackwell	65
INTERNATIONAL JOURNAL OF CONSUMER STUDIES	47	2	Wiley-Blackwell	77
JOURNAL OF PENSION ECONOMICS & FINANCE	46	3	Cambridge University Press	30
INTERNATIONAL JOURNAL OF BANK MARKETING	42	4	Emerald Group Publishing	87
JOURNAL OF FINANCIAL COUNSELING AND PLANNING	37	5	Springer Publishing Company	45
SUSTAINABILITY	32	6	MDPI	109
JOURNAL OF BEHAVIORAL AND EXPERIMENTAL FINANCE	31	7	Elsevier	24
JOURNAL OF FAMILY AND ECONOMIC ISSUES	28	8	Springer International Publishing	49
FRONTIERS IN PSYCHOLOGY	28	9	Frontiers Media	133
JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION	27	10	Elsevier	122
JOURNAL OF BANKING & FINANCE	26	11	Elsevier	172
FINANCE RESEARCH LETTERS	20	12	Elsevier	62
JOURNAL OF ASIAN FINANCE ECONOMICS AND BUSINESS	20	13	Korea Distribution Science Association	20
INTERNATIONAL JOURNAL OF SOCIAL ECONOMICS	19	14	Emerald Group Publishing	41
APPLIED ECONOMICS	17	15	Taylor and Francis Ltd	91

Table 2: Top Journals Publishing on Financial Literacy

3.3 Trends: Publication Discipline

Based on the JEL classification codes of the American Economic Association, financial literacy (G53) is a subtopic of household finance within the financial economics theme ([American Economic Association 2022](#)). Therefore, one would anticipate that most publications addressing it would be in the business and economics fields. However, as shown in [Figure 5](#), research on financial literacy employs multidisciplinary and interdisciplinary approaches, with only 51% of publications originating from business and economics sources. In addition to these sources, financial literacy has been discussed in 84 other fields, which can be grouped into eight categories, as shown in [Figure 5](#). Appendix A contains a comprehensive listing of subcategories.

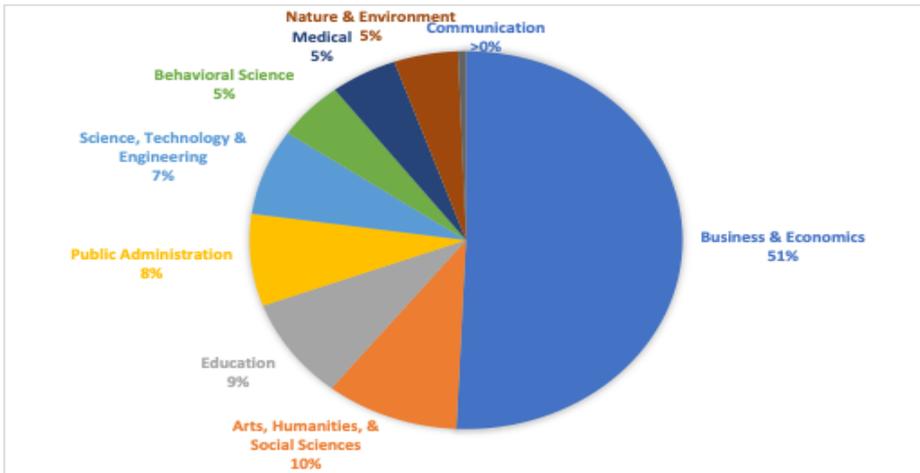


Figure 5: Pie-chart Showing the Disciplines of Financial Literacy Research

3.4 Top List: Authors

According to data extracted from WoS, the publications have 5969 authors (or co-authors) from various fields. Nonetheless, what concerns me the most is reviewing the top 15 relevant authors. This can be accomplished in two ways: based on total publications and citations. With 30 total publications, Olivia Mitchell is at the top of the list, followed by Annamaria Lusardi with 28 total publications and Patricia Boyle with 23 total publications. Annamaria Lusardi and Olivia Mitchell remain at the top of the list regarding total citations, with 5380 and 3681 total citations, respectively, followed by Rob Alessie (1,412 total publications) and Maarten van Rooij (1,410). Professors Lusardi and Mitchell are already regarded as the world's top two financial literacy experts (Goyal and Kumar, 2021) based on the number of publications and citations they have received. These outcomes are shown in Table 3

Author	TP	Rank	Author	TC	Rank
Mitchell, Olivia S.	30	1	Lusardi, Annamaria	5380	1
Lusardi, Annamaria	28	2	Mitchell, Olivia S.	3681	2
Boyle, Patricia A.	23	3	Alessie, Rob	1412	3
Bennett, David A.	22	4	van Rooij, Maarten	1410	4
Xiao, Jing Jian	21	5	Xiao, Jing Jian	829	5
Yu, Lei	20	6	Huston, Sandra J.	686	6
Cwynar, Andrzej	20	7	Lynch, John G., Jr.	648	7
Kadoya, Yoshihiko	19	8	Fernandes, Daniel	611	8
Khan, Mostafa Saidur Rahim	19	9	Netemeyer, Richard G.	611	9
Cwynar, Wiktor	14	10	Curto, Vilsa	586	10
De Witte, Kristof	13	11	Gathergood, John	453	11
Clark, Robert L.	12	12	Bennett, David A.	447	12
Gerrans, Paul	11	13	Boyle, Patricia A.	447	13
James, Bryan D.	10	14	Madrian, Brigitte C.	442	14
Kim, Kyoung Tae	10	15	Zia, Bilal	418	15

Table 3: Top Authors on Financial Literacy Based on Total Publications and Total Citations

3.5 Top List: Publications

According to the number of global citations, the top 15 publications were identified. This aids in comprehending which works are considered the foundational literature for any financial literacy research project. Lusardi and Mitchell have published 5 works together, and Lusardi has published 3 additional works with other scholars. It is also interesting to observe that two of the oldest publications in the main list of abstracts are included, namely [Lusardi & Mitchell \(2007\)](#) and [Norvilitis et al. \(2006\)](#), with the remaining thirteen publications having been published between 2010 and 2014. Furthermore, the fifteen most influential and prominent publications focus on particular topics, including the definition and measurement of financial literacy, financial behaviors, and financial education. However, what are the hottest topics in research on financial literacy, based on more than 2500 abstracts? This is addressed in the subsequent section using topic modeling. [Table 4](#) summarizes these findings.

Publication Name	Author(s)	Year	Total Citations
The Economic Importance of Financial Literacy: Theory and Evidence	Lusardi, Annamaria; Mitchell, Olivia S.	2014	1106
Baby Boomer retirement security: The roles of planning, financial literacy, and housing wealth	Lusardi, Annamaria; Mitchell, Olivia S.	2007	773
Financial Literacy, Financial Education, and Downstream Financial Behaviors	Fernandes, Daniel; Lynch, John G., Jr.; Netemeyer, Richard G.	2014	611
Financial literacy and stock market participation	van Rooij, Maarten; Lusardi, Annamaria; Alessie, Rob	2011	608
Measuring Financial Literacy	Huston, Sandra J.	2010	534
Financial literacy around the world: an overview	Lusardi, Annamaria; Mitchell, Olivia S.	2011	534
Financial Literacy among the Young	Lusardi, Annamaria; Mitchell, Olivia S.; Curto, Vilsa	2010	532
Financial Literacy, Retirement Planning and Household Wealth	van Rooij, Maarten C. J.; Lusardi, Annamaria; Alessie, Rob J. M.	2012	348
Financial Literacy, Financial Education, and Economic Outcomes	Hastings, Justine S.; Madrian, Brigitte C.; Skimmyhorn, William L.	2013	272
Financial literacy and retirement planning in the United States	Lusardi, Annamaria; Mitchell, Olivia S.	2011	270
Financial Literacy Explicated: The Case for a Clearer Definition in an Increasingly Complex Economy	Remund, David L.	2010	269
Self-control, financial literacy and consumer over-indebtedness	Gathergood, John	2012	232
Personality factors, money attitudes, financial knowledge, and credit-card debt in college students	Norvilitis, Jill M.; Merwin, Michelle M.; Osberg, Timothy M.; Roehling, Patricia V.; Young, Paul; Kamas, Michele M.	2006	210
Investment in financial literacy and saving decisions	Jappelli, Tullio; Padula, Mario	2013	194
Financial literacy and retirement planning in the Netherlands	van Rooij, Maarten C. J.; Lusardi, Annamaria; Alessie, Rob J. M.	2011	192

Table 4: Top Publications on Financial Literacy Based on Total Citations

3.6 Top List: Keywords

The data output from WoS enabled me to conduct a keyword analysis straightforwardly by separating the list of author keywords into distinct M.S. Excel cells, rearranging them into one column, forming a new list from which I removed all duplicates and then counting the repetitive keywords. This method typically enables the identification of the main themes addressed in the chosen publications (Goyal and Kumar, 2021). This list has generated 5111 distinct keywords across 2538 publications. Due to this list's length, I could identify the fifteen most repeated keywords by combining synonyms to form a single keyword. For instance, "financial literacy" has appeared 1,432 times in 73 unique forms, including adolescent financial literacy, digital financial literacy, Islamic financial literacy, and self-assessed financial literacy. Retirement (314 occurrences), financial behavior (244 occurrences), debt and credit (223 occurrences), and risk (217 occurrences) are the other most prevalent topics. This aligns with the primary research topics identified through topic modeling. Retirement, financial behavior, debt and credit, financial education, investment, gender, financial inclusion, and entrepreneurship are the eight subjects that appear in both the top keywords and top topics lists. Two topics are missing from the list: empowerment and socioeconomic effects. Yet, empowerment may be disguised as financial education, and most research on socioeconomic effects is primarily explanatory.

In contrast to the previous bibliometric analysis mentioned in the preceding sections, my results indicate that academics now have a clear understanding of financial literacy. The difference between its frequency and the second-most frequent keyword is more significant than 1100. Financial literacy does not appear in all publications (1,432 out of 2,538), possibly due to the multidisciplinary research conducted on the topic. This information is displayed in Table 5.

Keyword	Occurrence
Financial Literacy	1432
Retirement	314
Financial Behavior	244
Debt & Credit	223
Risk	217
Financial Education	215
Saving	186
Cognitive Abilities	169
Decision Making	158
Investment	150
Financial Knowledge	148
Gender	147
Personal & Household Finance	136
Financial Inclusion	110
Entrepreneurship	108

Table 5: Authors' Keywords

4. TOPIC MODELING

Hannigan et al. (2019); Blei (2012); Alghamdi and Alfalqi (2015); Hannigan et al. (2019) have all called for the introduction of new methods and tools to organize, search, index, and browse these massive textual data sets. Alghamdi and Alfalqi (2015) report that the technological sector reacted swiftly to these changes, utilizing machine learning to develop various natural language processing techniques for text extraction and word processing. Identifying the concepts discussed in a document is one of the most significant challenges of text mining (Vyansky and Kumar, 2020). Humans cannot read, study, and analyze the immense number of texts available online as more documents are uploaded daily (Blei, 2012; Vyansky and Kumar, 2020). The topic modeling technique was developed to make this feasible for computers (Vyansky and Kumar, 2020). Thus, topic modeling accomplishes tasks that are unfeasible to accomplish manually (Blei, 2012).

Topic modeling entails using algorithms to analyze a collection of documents by generating a list of the most frequently occurring topics (Hannigan et al., 2019). In contrast to other text mining methods, topic modeling disregards word order (Alghamdi and Alfalqi, 2015). In addition, topic modeling is quite helpful because it does not require any annotations or labeling of the documents before analysis (Blei, 2012). Despite this, a computer is given arbitrary words without describing the document's topic (Vyansky and Kumar, 2020). What method do computers use to identify topics? Latent Dirichlet Allocation (LDA) is an approach utilized by topic modeling (Hannigan et al., 2019) to extract the primary topics from a large body of text files retrieved from various online sources. This method emphasizes the co-occurrence frequency of two or more words in the same sentence (Hannigan et al., 2019). Even though LDA has existed for quite some time, it has gained popularity recently (Alghamdi and Alfalqi 2015; Vyansky and Kumar 2020). LDA is advantageous because it does not require prior knowledge of the subjects (Aziz et al., 2022). It also allows for lexical ambiguity because topics are not mutually exclusive. The exact keywords may appear in more than one topic due to various contextual meanings, thus allowing for the formation of topical clusters (Hannigan et al. 2019; Aziz et al. 2022).

Topic modeling has appeared in numerous business-related disciplines, such as management, organization research, human resource management, and marketing, although such works on finance-related topics are scarce (Aziz et al., 2022). I believe no topic modeling-based research has been conducted on financial literacy. This is one of this research paper's most original aspects. To answer the primary research questions of this study, I used Mallet to perform topic modeling on all 2,538 abstracts, followed by topic modeling on abstracts from the same year. The list of generated keywords, their corresponding topics, and the trends from 1998 to 2022 are shown in Table 6. Appendix B contains the unprocessed data.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Financial Inclusion	✓								✓			✓			✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
Investments												✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
Financial Education in Schools and Universities	✓	✓		✓				✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Entrepreneurship																✓		✓	✓			✓	✓	✓	✓	✓
Retirement Planning										✓				✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓
Debt											✓			✓	✓	✓	✓	✓	✓	✓			✓			
Gender												✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Empowerment				✓				✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Financial Behaviors											✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Socio-Economic Effects										✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 6: Top 10 Topics on Financial Literacy Generated by Topic Modeling

Table 6 demonstrates that financial education in schools and universities is the earliest and most-discussed topic regarding financial literacy. It has been discussed in 19 of the last 25 years. Entrepreneurship is the most recent addition to the roster, first discussed in 2013. Debt and gender no longer interest the researcher, as they have not been discussed in the past two years. Although gender is a demographic variable, it will continue to be one of the descriptive variables, albeit not the primary variable. The fact that four of the ten topics are related to financial behaviors (investments, retirement planning, debt, and financial behaviors) demonstrates its academic significance. In the subsequent sections of this research paper, each topic is analyzed in depth. The list of topics is not exhaustive, as I have limited myself to ten. Also, they are not ranked by importance, as topic modeling considers each topic an equal value.

4.1 Topic 1: Financial Inclusion

According to the literature, financial inclusion is a new topic in finance closely related to financial literacy research (Goyal and Kumar 2021; Lyons and Kass-Hanna 2021). However, Table 6 demonstrates that it has been discussed for a long time, gaining a permanent research focus in 2016. Regardless of when it was first discussed, financial inclusion remains a significant topic in research on financial literacy. Increasing a country's financial inclusion rate is one of the primary outcomes of enhancing financial literacy (Grohmann et al. 2018; Kodongo 2018; Koomson et al. 2020). Atkinson and Messy (2013) define financial inclusion as the process of having the knowledge and access to use financial products to improve one's financial well-being. The easiest way to achieve financial inclusion is to hold a bank account, which enables using debit or credit cards, mobile banking, and other financial services offered by various financial institutions (Grohmann et al. 2018; Koomson et al. 2020). There has been a remarkable increase in bank account ownership worldwide, but many remain financially excluded due to their inactivity in financial markets (Koomson et al., 2020). According to the OECD's definition, financial inclusion is one of the Sustainable Development Goals, which explains why policymakers and researchers are so interested in it (Klapper et al., 2016; Koomson et al., 2020; Ozili, 2021). However, financial inclusion is not a typical

economic growth stimulant. Researchers have discovered that it enhances people's socioeconomic well-being by reducing rural poverty, increasing employment, and rectifying people's expenditures (Grohmann et al. 2018; Lyons and Kass-Hanna 2021). This may explain why the poorest segments gain the most from its implementation (Ozili 2021; Lyons and Kass-Hanna 2021). Innovative financial market products have enabled previously unbanked individuals to become clients of the financial system (van Rooij et al., 2011). Nonetheless, this has produced a significant problem, as consumers hardly comprehend these new and relatively complex products (van Rooij et al., 2011). Atkinson and Messy (2013) state that most policy recommendations regarding expanding financial inclusion center on providing financial education to the populace.

Regulatory constraints, prohibitive market forces, physical barriers, and connectivity barriers are some factors that inhibit financial inclusion (Atkinson and Messy, 2013; Grohmann et al. 2018). Policymakers are currently drafting the necessary policies to reduce and eradicate these obstacles and make it simpler and more accessible for everyone to participate in the financial market (Grohmann et al. 2018; Ozili 2021). This endeavor is not as straightforward as it may appear because each nation must develop its policies based on practicability, integrity, and safety (Kodongo, 2018). Ozili (2021) presents a lengthy piece of writing describing the various circumstances each nation faces and how policymakers adapt their policies. The starting point for everyone continues to be financial education, which improves financial literacy and increases financial inclusion (Ozili 2021; Lyons and Kass-Hanna 2021). However, financial innovation and other interventions are required simultaneously for the more developed economies (Ozili, 2021).

4.2 Topic 2: Investments

van Rooij et al. (2011) is one of the most influential studies examining the role financial literacy plays in individuals' investment decisions. It may be the first research endeavor to establish a direct positive correlation between a person's financial literacy level and their likelihood of engaging in the financial markets. Additional research confirmed their findings and solidified the relationship (Aren and Zengin 2016; Hsiao and Tsai 2018; Li et al. 2020). Various research works have uncovered several underlying causes that explain the latter relationship. For example, Hsiao and Tsai (2018) and Li et al. (2020) discovered that financial literacy lowers a person's entry barriers when wishing to participate in the financial markets. Lack of knowledge about the financial products available to the public, the mechanisms that operate the financial systems, and the benefits that could be generated through it is an example of one of these barriers (van Rooij et al., 2011; Hsiao and Tsiao 2018). In contrast to traditional finance theories, which assume that individuals can make informed decisions and have easy access to financial data, research on financial literacy and investments demonstrates the opposite (van Rooij et al., 2011; Aren and Zengin, 2016; Li et al. 2020). Even if the latter were true, assert Li et al. (2020), most individuals cannot accurately analyze the available data.

Although financial literacy influences people's investment decisions the most, researchers concur that other factors also have a relative impact (Aren and Zengin, 2016). This is consistent with Kahneman and Tversky's (1979) argument regarding irrational investor behavior and the incorporation of psychological factors in the process. As an introduction, van Rooij et al. (2011) discuss financial socialization's positive effect on encouraging individuals to participate in financial markets. In addition, they assert that people's portfolio decisions correlate with the financial asset diversification methods employed by their counterparts. Regarding financial socialization, researchers also debate income and wealth status as factors influencing people's willingness to participate in the financial markets (van Rooij et al. 2011; Hsiao and Tsai 2018; Li et al. 2020). They assert that the wealthy have more discretionary income to invest in the financial markets; consequently, socialization occurs predominantly in the middle and upper-income brackets (Li et al., 2020). In addition, risk is a frequently discussed factor influencing people's participation rates in the financial market (Aren and Zengin, 2016; Li et al. 2020). Although risk tolerance is correlated with increased financial literacy (Almenberg and Dreber 2015; Hsiao and Tsai 2018), risk attitude plays an independent role in individuals' investment behavior (Aren and Zengin 2016; Anderson et al. 2017). Aren and Zengin (2016) argue that risk is a function of profits and losses, even though people overwhelmingly associate it with losses. People are typically unwilling to participate in the financial markets out of fear of losing everything they possess. However, Almenberg and Dreber (2015) found that the incurred losses are much more significant if individuals do not participate in the financial markets, as it allows them to generate significant income over time.

4.3 Topic 3: Financial Education

Researchers have yet to determine financial education's efficacy, despite it being one of the earliest and most frequently revisited topics in financial literacy research. Fox et al. (2005); Walstad et al. (2010); Lusardi (2003); Hastings et al. (2013), to name a few, demonstrate inconsistency in the outcomes of financial education programs provided in schools, universities, and workplaces throughout the globe. Even meta-analytic studies are equivocal (Kaiser and Menkhoff, 2017). This may be one of the reasons why so much high-quality experiential research has been conducted throughout history. The 2007-2009 global financial crisis, which revealed people's lack of comprehension of financial principles and demanded immediate drastic action to rectify the situation (Fernandes et al., 2014), may also be a contributing factor. Finance experts have urged the urgent drafting of National Strategies for Financial Education to prevent future financial crises through financial education. Among the numerous forms of financial education interventions, school, and university-based programs have received the most attention (Mandell and Klein, 2009; Wagner, 2019). Regardless of their minimally significant effects on students' financial behaviors, financial education is crucial to forming future financially savvy individuals (Lusardi & Wagner, 2019). Financial education programs at educational institutions have latent long-term benefits (Lusardi

2019), which is why advocates for financial literacy endorse the latter's initiation during a child's early school years and its continuation throughout their formal education (Alsegeest 2015). First, they teach students to make sound financial decisions based on prior knowledge (Lusardi, 2019). Second, they allow including individuals from diverse social, economic, and demographic backgrounds (Lusardi, 2019). Thirdly, their expenses are minimal compared to other financial education programs (Lusardi, 2019).

According to Remund (2010), the lack of an explicit definition is a significant issue. Before a decade ago, the terms financial education, financial literacy, and financial knowledge were used interchangeably, causing much confusion and misinterpretation in the academic community (Huston, 2010; Potrich et al., 2018). Therefore, this investigation will define it before proceeding. (Atkinson and Messy, 2012) The OECD defines financial education as the process by which people's comprehension of financial principles is enhanced, resulting in better financial decisions and greater financial well-being. (Fox et al., 2005) define a financial education program as any training that targets people's financial knowledge, behaviors, and/or attitudes. As these are the three primary financial literacy components, any financial education program must incorporate them all. Despite this, research indicates that attitude is rarely addressed (Atkinson and Messing, 2012).

A financial education program's design, delivery, and evaluation are crucial to its success (Fox et al., 2005; Walstad et al. 2010). The educational programs' content should correspond to the requirements of the students. As "one size does not fit all," Lusardi (2019) and van Rooij et al. (2011) emphasize the customization of content. Similarly, Walstad et al. (2010) contend that there is no reason why financial education would not influence students' financial knowledge if it is appropriately structured and implemented. A general financial education program typically covers a lengthy list of traditional finance topics, including budgeting, saving, retirement planning, and property ownership (Fox et al., 2005). However, it may occasionally provide specific information about a particular financial topic or product, such as rain insurance (Gaurav et al., 2011). For example, a course on investment knowledge considerably influenced the willingness of college students to save and participate in the financial markets.

In contrast, no significant results were observed in high school students (Wagner, 2019). The second component of a successful financial education program is delivering the curriculum by well-trained instructors. This is a significant issue in large-scale national financial education programs and may be the most inhibiting factor (Remund, 2010). Unfortunately, researchers focus solely on the student's academic performance (Walstad et al., 2010). In terms of delivery, the mode and manner are also crucial factors. The use of a video-based financial education program, for instance, increased the financial knowledge of American high school pupils by approximately 20% (Walstad et al., 2010). The third and most challenging step is evaluating the programs, which is also characterized by significant inconsistency (Fox et al., 2005). Fox et al. (2005) state that

the most significant challenge is to demonstrate quantitatively that they're improving the lives of individuals. [Fernandes et al. \(2014\)](#) conclude that the outcomes of an investigation are contingent on the methodology employed.

Consequently, [Carpena et al. \(2011\)](#) argue that the absence of significant changes in people's financial literacy due to financial education is due to a focus on numerically demanding concepts. Financial education programs primarily enhance people's knowledge of the various financial products and attitudes toward financial decisions ([Carpena et al., 2011](#)). It is also essential to note in the evaluation that the results of financial education programs for youth are rarely immediate. Financial literacy is a vital skill of the 21st century ([Atkinson and Messy, 2012](#); [Potrich et al., 2018](#)), but its effects may not be immediately apparent ([Wagner, 2019](#)). Based on previous longitudinal research, [Walstad et al. \(2010\)](#) contend that adults who took a high school course in personal finance have superior saving habits than those who did not.

4.4 Topic 4: Entrepreneurship

The academic discussion of the relationship between entrepreneurship and financial literacy is relatively new ([Anderson et al., 2018](#)). Modern research has shown that financial literacy is essential to a startup's success, growth, and survival ([Sucuahi, 2013](#); [Anderson et al., 2018](#)). This is supported by notable research works such as [Drexler et al. \(2014\)](#), who discovered that financial literacy enhances the financial management of entrepreneurs' businesses. As a result, numerous entrepreneurial boot camps and training programs have incorporated it into their curricula ([Riepe et al., 2022](#)). According to empirical research, those who receive financial education implement practices that improve business efficacy, such as lowering costs and increasing the output-to-input ratio ([Anderson et al., 2018](#)). Research indicates that a business plan contains more useful financial information if at least one of the founders has received financial education ([Seebeck and Wolter, 2022](#)). These research-based correlations have led potential investors to view entrepreneurial teams with at least one member with a solid financial education as more qualified and competent ([Seebeck and Wolbeck, 202](#)).

Due to its novelty, academics have not discussed this relationship extensively ([Riepe et al., 2022](#)). Recent research indicates that financial literacy moderates the relationship between a person's risk tolerance and the desire to become an entrepreneur ([Riepe et al., 2022](#)). A separate study discovered that a higher financial literacy rate increases a person's desire to become self-employed ([Cumurovic and Hyll 2019](#)), making financial literacy an essential skill to be taught in emerging markets where self-employment is prevalent ([Anderson et al., 2018](#)).

4.5 Topic 5: Retirement Planning

In the academic literature, the function of financial literacy in shaping retirement plans is evident ([Ricci and Caratelli, 2017](#)). As people's retirement security depends on their financial decisions and behaviors ([Lusardi and Mitchell 2011](#)), and as financial literacy

ameliorates the latter (Lusardi and Mitchell 2011; Bucher-Koenen and Lusardi 2011), researchers concur that financial literacy improves retirement preparedness. Volume 10 of the Journal of Pension Economics & Finance presents an extensive list of publications from around the world that address this topic. The United States of America (Lusardi and Mitchell, 2011), Germany (Bucher-Koenen and Lusardi, 2011), Japan (Sekita, 2011), Russia (Klapper and Panos, 2011), New Zealand (Crossan et al., 2011), and Sweden (Almenberg and Save-Soderberberg, 2011) are among the countries where research was conducted. Canada (Boisclair et al., 2017), Chile (Moure, 2016), Finland (Kalmi and Ruuskanen, 2018), and Italy (Ricci and Caratelli, 2017) have conducted additional research employing similar methodologies to those of the preceding studies. These studies conclude that financially literate individuals plan for retirement earlier and more effectively than their peers. This demonstrates that the relationship is not restricted to a particular country or region but is a universal truth. Nonetheless, this discussion faces obstacles.

The timing of retirement has long been a concern in academia (Clark et al., 2011). (van Rooij et al., 2011) Similar concerns have been expressed about the inefficiency of individuals' retirement savings plans. Very few models employing the life-cycle theory consider the lack of financial literacy among individuals (Clark et al., 2011). Especially now, when people worldwide are increasingly responsible for managing their finances (Lusardi and Mitchell, 2011; Bucher-Koenen and Lusardi, 2011). Many individuals lack a well-written retirement plan (Lusardi and Mitchell, 2011). In addition, the vast majority have never even considered how much wealth may be required for a comfortable retirement (Lusardi and Mitchell 2011; Bucher-Koenen and Lusardi 2011). It is essential to comprehend the types of knowledge required to enhance retirement preparedness. According to Lusardi and Mitchell (2011), risk diversification is crucial to retirement planning financial knowledge. However, they also assert that knowledge of the market's available financial products is essential. One of the reasons for the shift in financial responsibility is the rapid development of financial markets, with complex financial products now available to everyone (Bucher-Koenen and Lusardi, 2011; Ricci and Caratelli, 2017). Another significant factor is the evolution of global pension systems over the past decades (Bucher-Koenen and Lusardi, 2011).

4.6 Topic: 6: Debt

According to empirical research, low financial literacy can negatively impact people's credit behaviors (Bahovec et al., 2015; Cwynar et al., 2019). Inappropriate behaviors include difficulties in loan repayment (Gathergood and Disney, 2011), increased default rates (Gerardi et al., 2010), and borrowing from high-cost informal channels (Klapper et al., 2012; de Bassa Scheresberg, 2013; Disney and Gathergood, 2013). Following the findings of another study (Gathergood and Disney, 2011), financially illiterate people typically have a reduced net worth. Recent research on student debt found that students with low financial literacy anticipated a lower starting salary (Artavanis and Karra,

2020). These findings confirmed these findings. This study also discovered that students with low financial literacy underestimated their prospective student loan payments. Thus, imprudent borrowing affects an individual's financial well-being and the entire economic system (Gerardi et al., 2010; Cwynar et al., 2019). The magnitude of the repercussions of a lack of comprehension of debt-related financial principles prompted researchers to devote significant effort to comprehending the interrelated co-influencing factors and behavioral mechanisms. Gerardi et al. (2010) conclude that people's undeveloped cognitive abilities impede their ability to make sound financial decisions, such as selecting the best loan option and averting over-indebtedness. Bahovec et al. (2015) believe that gender is essential in the relationship between financial literacy and credit behavior. However, these two factors substantially influence financial literacy, either directly or indirectly. As a result, Disney et al. (2015) offer credit counseling as a solution for individuals with low levels of financial literacy. According to Disney et al. (2015), financially literate individuals disregard the need for financial counseling, whereas those who lack financial literacy would benefit significantly from it.

4.7 Topic 7: Gender

According to academic studies, financial literacy rates are low across the globe (Lusardi and Mitchell 2014; Fonseca et al. 2012; Stolper and Walter 2017). Even more astonishing is that these rates are even lower among women, particularly unmarried and widowed (Fonseca et al. 2012; Bucher-Koenen et al. 2017; Potrich et al. 2018). Numerous studies were conducted to determine the causes of this phenomenon and its resolution. (Bucher-Koenen et al., 2017) Regardless of the measurements, methodologies, and instruments utilized, the gender gap in financial literacy persists. Hasler and Lusardi (2017) and Stolper and Walter (2017) found that neither the country's level of economic development nor individual factors such as education, income, or culture influenced the gender disparity in financial literacy.

This is an important topic to discuss because women encounter unique financial obstacles. They spend more time in retirement, notably as widows (Hasler and Lusardi 2017; Bucher-Koenen et al. 2017; Fonseca et al. 2012; Bucher-Koenen et al. 2017). In addition, researchers have discovered that they rarely plan for retirement (van Rooij et al., 2011), rarely participate in the financial markets (van Rooij et al., 2011; Almenberg and Dreber, 2015), and do not engage in financially complex products (Hsiao and Tsai, 2018). As women are increasingly responsible for managing their family's finances as domestic heads (Potrich et al., 2018), their financial savvy is crucial for achieving financial stability (Bucher-Koenen et al., 2017).

Fonseca et al. (2012) discovered that men and women have distinct financial literacy production processes. According to Fonseca et al. (2012), the traditionally lauded decision specialization in the household, in which males are expected to know more about finances because they are responsible for making these financial decisions, is invalid. Generally, women have less financial knowledge than men (Lusardi et al., 2009;

Bucher-Koenen et al., 2017) and struggle more with financial calculations (Atkinson and Messy, 2012). Despite this, women are more conservative in their evaluations of their financial literacy (Stolper and Walter, 2017; Potrich et al., 2018). Women respond to financial literacy inquiries significantly less accurately than men, but they also respond more frequently with "do not know" (Lusardi and Mitchell 2011, Bucher-Koenen et al. 2017, Hasler and Lusardi 2017). This increases the optimism and willingness of policymakers to target financial education programs for women.

4.8 Topic 8: Empowerment

The changes in global pension plans, the increase in people's life expectancies, and the complexity of the financial markets have prompted many policymakers and academics to advocate for financial literacy (Lusardi and Mitchell 2011; Lusardi and Mitchell 2014; Lusardi 2019; Wagner 2019). Yet, the most significant awakening occurred when global financial markets collapsed in late 2007 (Henager and Cude, 2016; Goyal and Kumar, 2021), causing many businesses to fail and many more people to become unemployed or impoverished. After examining these extreme outcomes years later, researchers concluded that people's financial behavior was largely irrational and based on heuristics (Goyal and Kumar, 2021). As a result, numerous nations have drafted National Strategies for Financial Education to enhance individuals' financial knowledge, behaviors, and attitudes (Goyal and Kumar, 2021).

People instinctively associate financial education with teaching financial principles in various educational settings such as schools, colleges, and universities (Gale and Levine, 2011). They disregard the numerous initiatives, projects, and movements that promote financial literacy education outside the educational sector (Gale and Levine, 2011). Some segments, such as older people, women, and low-income citizens, need financial education most (Fernandes et al., 2014; Lusardi and Mitchell, 2016). In fact, after the financial crisis, employers became more concerned about their employees' financial well-being as they realized a general lack of understanding of financial concepts and financial transactions (Wagner, 2019). However, this does not imply that such programs began only after the crisis. A successful intervention could be exemplified by Lusardi's (2003) analysis of retirement seminars for individuals aged 50 and older, which resulted in an increase in their retirement preparedness, particularly among those with low education and income levels. These findings are consistent with those of Wagner (2019), who found that interventions in the form of financial education significantly enhanced the financial literacy of individuals with no college education. Mielitz et al. (2018) conducted a unique intervention program for incarcerated individuals. As they are the individuals with the greatest need, having been away from any financial transactions for an extended period, financial literacy education to empower their financial behaviors upon their return to society is essential (Mielitz et al. 2018). Hetling and Postmus (2014), who have regarded intimate partner violence (IPV) survivors as their target population, have produced a noteworthy study. They conclude that financial literacy, not receiving public assistance benefits, empowers victims economically.

As with financial education programs in schools and universities, interventions and empowerment programs should consider the audience's context (Lusardi, 2019). Mielitz et al. (2018) have implemented just-in-time teaching to ensure the success of their intervention. Their approach was based on the findings of Mandell and Klein (2009) and Fernandes et al. (2014) regarding the ineffectiveness of conventional teaching methods on the financial behaviors of economically, socially, and financially disadvantaged individuals. After a meta-analysis of over one hundred publications, Kaiser and Menkhoff (2017) conclude that financial education interventions influence people's financial behaviors and that increasing financial literacy is advantageous. Nonetheless, the effects of such programs and interventions are highly dependent on individual and national characteristics (income level, level of education, etc.) and the type of behavior being targeted (Kaiser and Menkhoff, 2017).

4.9 Topic 9: Financial Behaviors

People's financial behaviors have garnered considerable scholarly interest (Kaiser and Menkhoff, 2017). This is not a new topic, as it has been discussed for decades since the introduction of prospect theory by Kahneman and Tversky (1979). Yet, discussing financial behaviors through the lens of financial literacy is a relatively recent phenomenon. Suboptimal financial behaviors have been discussed (Stolper and Walter 2017), which typically have negative long-term consequences and are associated with low levels of financial literacy (Henager and Cude 2016; Stolper and Walter 2017). Several categories of financial behaviors have been discussed thus far in academic circles. According to Lynch et al. (2014), researchers have examined five main financial behaviors: emergency savings, retirement planning, investments, creditworthiness, and loan and bill repayment. They have replicated the primary research on these behaviors and confirmed that financial literacy predicts them significantly.

Similarly, de Bassa Scheresberg (2013) researched young adults considering three financial behaviors: high-cost borrowing, precautionary savings, and retirement planning. He found that financial literacy was a corrective and amplifying factor in these behaviors. The research of Grohmann (2017), which focused on middle-income countries, also revealed that financial literacy improves people's financial behaviors, as those with high financial literacy rates save more frequently, borrow more prudently, and purchase more sophisticated financial products.

This research has already discussed this topic and provided extensive discussions on several of them, such as participation in the financial markets (van Rooij et al., 2011), retirement planning (Bucher-Koenen and Lusardi 2011), high-cost borrowing (Klapper et al., 2012; de Bassa Scheresberg 2013; Disney and Gathergood 2013), and excessive debt accumulation and default (Gerardi et al., 2010). This demonstrates that making sound financial decisions has become increasingly crucial (Grohmann, 2017). However, the academic community has focused primarily on the financial behavior of industrialized nations (Lusardi and Mitchell, 2014), which may distort the research

results. [Kaiser and Menkhoff \(2017\)](#) state that research on people's financial behaviors varies based on the economic status of the country where the individuals reside. While researchers in advanced economies, for instance, are concerned with participation in financial markets and high-cost borrowing ([van Rooij et al., 2011](#); [Klapper et al., 2012](#); [de Bass Scheresberg, 2013](#); [Disney and Gathergood, 2013](#)), research in developing nations focuses on financial security and well-being ([Drexler et al., 2014](#)).

4.10 Topic 10: Socioeconomic Effects

Numerous socioeconomic variables impact financial literacy ([Lusardi and Mitchell 2011](#); [Atkinson and Messy 2012](#); [Bucher-Koenen et al. 2017](#)). No matter how thoroughly researchers examine the influence of financial knowledge, financial education, financial behaviors, and other psychological factors on financial literacy, they always discover a gap in their understanding of the distinctions. Formal education is one of the variables under consideration. Education and financial literacy have a strong positive correlation ([Lusardi et al. 2009](#); [Lusardi and Mitchell 2011](#); [Lusardi and Mitchell 2014](#); [Lotto 2020](#)). People with advanced degrees demonstrate a greater comprehension of financial principles, engage in more prudent financial behavior, and are more eager to participate in the financial markets ([Lusardi et al. 2009](#); [Lusardi and Mitchell 2011](#); [Lusardi and Mitchell 2014](#); [Lotto 2020](#)). The educational level of an individual's parents, particularly their females, is also found to influence their financial literacy rate. As mentioned previously, self-employment is also positively correlated with financial literacy ([Bucher-Koenen and Lusarden, 2011](#)). The self-employed have a higher level of financial literacy than their counterparts ([Bucher-Koenen and Lusardi, 2011](#)). A third variable is an individual's income (or wealth), which increases their financial literacy ([Lusardi and Mitchell, 2011](#)). According to [Lusardi and Mitchell \(2011\)](#), [van Rooij et al. \(2011\)](#), and [Alessie et al. \(2011\)](#), the fourth variable is age, which is represented by an inverted "U" shaped relationship. According to the researchers, this is because financial literacy reaches its zenith in middle age and is significantly lower in earlier ages due to a lack of knowledge and experience, as well as in older ages due to overconfidence or a lack of interest. [Lotto \(2020\)](#), one of the most recent research works addressing sociodemographic factors of financial literacy, finds that young adults have the maximum level of financial literacy, which declines over time. This difference is explained by the extensive educational interventions that public and private organizations implement to provide appropriate financial education ([Lotto 2020](#)). Financial knowledge, a financial literacy component, is positively correlated with an individual's family origin ([Lusardi et al., 2009](#)). [Lusardi et al. \(2009\)](#) discovered that those whose at least one parent worked in the financial industry better-understood risk diversification and inflation. As with the vast majority of other studies, they find that ethnicity and racial affiliation are correlated with financial literacy, with minority groups always being less literate. Cognitive abilities, numerical skills, and mathematical skills are also extensively discussed, with those who score higher on financial literacy assessments possessing more excellent numerical abilities.

5. CONCLUSION

This study offers significant insights into financial literacy research using two distinct methodologies, bibliometric analysis, and topic modeling. Evaluating the most influential authors, articles, and journals enables new and established researchers to identify the most significant information sources readily. The dataset was extracted from the Web of Science portal of Clarivate Analytics, resulting in 2538 publications after filtering. This is the most significant number of research works ever compiled for such a study. The duration is also lengthy, spanning 25 years between 1998 and 2022. The publication trend indicates that the academic research community's interest in this topic has increased dramatically. This study has also demonstrated that research on financial literacy is interdisciplinary. Approximately half of the publications do not pertain to business and economics. Education, the social sciences, the arts, and engineering were some fields of study that examined financial literacy.

This study is likely one of the most exhaustive in financial literacy. However, it has some restrictions. First, I require that the term "financial literacy" be included in a publication's title, abstract, or keywords. Because it is not the primary focus of the research, it may not appear in any of the three categories above. This reduces the number of documents that use this term rather than its synonyms or terms that are very closely related. In UK-based research, "financial capability" is used instead of "financial literacy" in the United States. Financial education, financial knowledge, and financial behavior are also examples of documents with a close relationship (Huston 2010, Remund 2010, Potrich et al. 2018). According to Ingale and Paluri (2022), the number of articles retrieved increases when multiple keywords are used in the search. Second, I restrict myself to a single data source, World of Science. Even though it possesses many publications, it does not contain all of the publications on financial literacy worldwide. The previous analysis revealed that English is the predominant language, with only a few publications in foreign tongues. The focus of financial literacy research depends on the target audience's social, economic, and demographic conditions (de Bassa Scheresberg 2013; Kaiser and Menkhoff 2017; Grohmann et al. 2018). A county, country, or region-based bibliometric analysis could be intriguing, especially if publications in multiple languages are considered. Even though this study identifies the top ten topics in financial literacy research, the discussion on each topic does not provide a holistic framework for drawing research inferences. Future research should concentrate on conducting separate meta-analyses on each topic to understand each better. Although topic modeling is beneficial for discovering frequently discussed keywords and topics in a collection of publications, it provides researchers with slightly different results depending on the number of iterations, keywords, topics, and other parameters. However, these distinctions exist within the same context and can be disregarded. However, it would be fascinating to compare the results of Mallet with other topic modeling software.

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Appendix A

Research Categories & Areas

<i>Category</i>	<i>Research Areas</i>
<i>Business & Economics</i>	Business & Economics Operations Research & Management Science
<i>Arts, Humanities, & Social Sciences</i>	Religion Social Sciences Family Studies Social Work Sociology Demography Social Issues Mathematical Methods in Social Sciences Women's Studies Arts & Humanities Anthropology Biomedical Social Sciences History History & Philosophy of Science Linguistics Literature Sport Sciences
<i>Education</i>	Education & Educational Research
<i>Public Administration</i>	Public Development Studies Public Administration Government & Law International Relations Urban Studies Area Studies Criminology & Penology Transportation Water Resources
<i>Science, Technology, & Engineering</i>	Engineering Architecture Science & Technology - Other Topics Computer Science Information Science & Library Science Mathematics Materials Science Energy & Fuels Physics Automation & Control Systems Food Science & Technology Mechanics Meteorology & Atmospheric Sciences
<i>Behavioral Sciences</i>	Psychiatry Psychology Cultural Studies Rehabilitation

Medical Geriatrics & Gerontology
Health Care Sciences & Services
General & Internal Medicine
Nursing
Neurosciences & Neurology
Surgery
Infectious Diseases
Pediatrics
Research & Experimental Medicine
Immunology
Nutrition & Dietetics
Veterinary Sciences
Nuclear Medicine & Medical Imaging
Obstetrics & Gynecology
Pharmacology & Pharmacy
Radiology
Biochemistry & Molecular Biology
Emergency Medicine
Life Sciences & Biomedicine - Other Topics
Oncology
Pathology
Respiratory System
Virology
Anatomy & Morphology
Dermatology
Ophthalmology
Orthopedics

Nature & Environment Environmental Sciences & Ecology
Environmental & Occupational Health
Agriculture
Biodiversity & Conservation
Forestry
Geography

Communication Communication
Telecommunications
Radio & Television
Film

Appendix B

Topic Modeling Keywords & Topic Extraction

Topic Id	Top Words...	Topics
0	inclusion services banking financial digital islamic study rural access banks	financial inclusion
1	credit debt households household loan consumers consumer loans mortgage consumption	debt
2	investment investors risk market stock decisions individual information participation find	investment
3	literacy business performance entrepreneurs entrepreneurial cognitive health smes decision older	entrepreneurship
4	students education learning school financial study university literacy student college	Financial education in schools and universities
5	retirement pension planning insurance savings individuals saving plan age life	Retirement
6	health intervention study training program interventions outcomes participants economic group	Empowerment
7	financial literacy research economic development education paper social article analysis	Socioeconomic influence
8	financial study literacy research behavior findings implications purpose influence factors	financial behavior
9	financial literacy knowledge education level study results data survey gender	gender