Exploring the Availability of Time, Space, and Interest in Borrowing Philosophy Books: Towards Moderating Interdisciplinary and Transdisciplinary Trends

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Abstract

This study examines the borrowing behavior of Category B (philosophy-related) books at the Nanjing Normal University Library over the period 2016-2024, drawing on circulation records encompassing 21,842 readers, 39,079 books, and 169,415 loan transactions. Employing a mixed-methods approach integrating Principal Component Analysis (PCA), Structural Equation Modeling (SEM), moderated regression analysis, and subject term cluster analysis, this research investigates how time-space-interest (TSI) shape borrowing behavior, with renewal intention and gender serving as moderating variables. PCA extracted three principal components: F1 (encompassing TSI dimensions), F2 (comprising T1/S1/S indicators), and F3 (focusing on B9/T1 subject categories), which were used for longitudinal analysis across three distinct periods: 2016-2018, 2019-2021, and 2022-2024. SEM results revealed the evolving central role of TSI in influencing borrowing behavior: transitioning from a time-dominated model (2016-2018) to a space-prioritized framework (2019-2021), and ultimately to a fully integrated TSI model (2022-2024) where all three dimensions exhibited factor loadings greater than 0.5. Moderated regression analysis indicated that renewal intention negatively moderated the impact of TSI on LogTotal (borrowing volume) during the 2016-2018 and 2022-2024 periods, whereas gender positively moderated this relationship in 2019-2021—with the effect being more pronounced among female readers. Additionally, male readers demonstrated higher overall borrowing volumes with greater variability compared to their female counterparts. Subject term cluster analysis identified core

research themes, including Chinese philosophy and Sino-Western intellectual history, as well as emerging interdisciplinary trends such as the intersection of philosophy and digital humanities. The findings of this study offer empirical insights to inform the development of library resource allocation strategies and equity-focused services tailored to the diverse needs of library users, while pioneering a new pathway for integrating reading therapy into the mental health education of college students.

Keywords: Philosophy book borrowing, Time-space-interest (TSI) factor, Renewal intention, Gender difference, Principal component analysis (PCA), Structural equation modeling (SEM), Moderated regression

1. Introduction

1.1 Introduce the Problem

Academic libraries serve as critical hubs for knowledge dissemination and scholarly inquiry, with their philosophy book collections playing a pivotal role in supporting research on ideological exploration, cultural inheritance, and interdisciplinary dialogue. In recent decades, the rise of digital resources and shifting user expectations have transformed how patrons engage with physical library collections—yet philosophy books, with their emphasis on deep reading and theoretical reflection, remain a core component of academic resource demand. Understanding the factors that drive philosophy book borrowing behavior is therefore essential for libraries to optimize resource allocation, enhance service equity, and align collections with user needs. Among potential influencing factors, time (*e.g.*, seasonal borrowing peaks), space (*e.g.*, preferences for specific lending rooms), and interest (*e.g.*, subfield focus within philosophy) emerge as foundational dimensions of user decision-making.

Temporal dynamics have shaped access to philosophical texts: in the 17th century, Jean-Baptiste Colbert's centralized information system for the French state—integrating library science, archives, and knowledge collection—concentrated knowledge spatially (*e.g.*, via organized libraries and administrative archives), enhancing the accessibility of philosophical and administrative texts and laying the groundwork for their circulation and potential borrowing by scholars and officials (Soll, 2009). Later, in the 19th century, Russian philosophers and writers (*e.g.*, Lermontov, Dostoevsky, Tolstoy) rejected French "sensationalism" to develop region-specific philosophical works rooted in Russian values (*e.g.*, Pushkin's influence and Gospel themes); readers' preference for this culturally aligned content drove higher potential borrowing rates for Russian-authored texts over Western European ones (Meyer, 2008). More recently, temporal gaps in publication have also stimulated delayed interest: Kiril Vasilev's philosophical monograph (written 1978, published 2008) faced a 30-year delay due to "inconvenient ideas" for the Bulgarian political context, but after its 2008 publication, it saw a sudden spike in borrowing at Sofia University Library as scholars and students sought previously suppressed perspectives (Hristova, 2020).

Spatial factors have proven influential across contexts. Institutional priorities can curtail spatial accessibility: private colleges in China (*e.g.*, surveyed in 2017) prioritize technical

disciplines over humanities, relegate philosophical classics to less accessible physical library sections, and as a result, the lending rate of philosophical classics ranks over one hundred in these libraries—far lower than in public universities with dedicated humanities sections (Yang et al., 2017).

Interest drives targeted borrowing, particularly within specialized fields. For example, researchers studying Agamben's philosophy of education frequently renew texts like Homo Sacer and related commentaries; their need for prolonged engagement with complex concepts (*e.g.*, "potentiality," "study") leads to renewal rates 40% higher than for general philosophy texts, indicating that research-focused interest strengthens renewal intention (Murphy, 2020). In another case, music teacher candidates in Turkey (2020-2021) predominantly adopt "Progressivism" as their educational philosophy, with 78% expressing interest in philosophical works on experiential learning—this interest correlates with higher borrowing of John Dewey's Democracy and Education and other progressive philosophy texts in education department libraries (Aytemur & Altinok, 2022).

However, existing research on library borrowing behavior has often examined time, space, and interest in isolation: studies on temporal patterns focus on peak usage periods, spatial analyses emphasize facility accessibility, and interest-based research explores subcategory demand—rarely integrating the three into a unified framework to explain how their interactions shape borrowing outcomes. This gap is particularly notable in the context of philosophy books, where borrowing decisions may be uniquely influenced by the interplay of time (*e.g.*, aligning reading with academic semesters), space (*e.g.*, preferring quiet specialized lending rooms for theoretical study), and interest (*e.g.*, prioritizing Confucianism or Marxist philosophy based on research topics). Moreover, prior work has overlooked the potential moderating role of contextual variables—such as renewal intention (reflecting stable resource demand) and gender (shaping differences in reading preferences and usage patterns)—in how time, space, and interest translate into actual borrowing behavior. For instance, renewal behavior may reduce reliance on time-space-interest (TSI) matching (if users already hold preferred books), while gender differences could alter how users prioritize these three dimensions (*e.g.*, females may value spatial accessibility more highly than males for philosophy reading). Without accounting for these moderators, the mechanisms underlying philosophy book borrowing remain incomplete, limiting libraries' ability to design targeted services.

Against this backdrop, two critical research gaps persist. First, there is a lack of empirical studies that integrate time, space, and interest into a cohesive theoretical model to explain philosophy book borrowing, despite their likely interdependence. Second, the moderating effects of renewal intention and gender on the relationship between TSI factors and borrowing outcomes have not been systematically explored, leaving unclear how contextual and individual differences shape user behavior. Addressing these gaps is not only theoretically valuable—by refining models of library user behavior—but also practically urgent: as academic libraries face budget constraints and competing demands for digital and physical resources, evidence-based insights into philosophy book borrowing can guide more efficient collection development and service design.

To fill these gaps, this study focuses on Category B (philosophy-related) books in the Nanjing Normal University Library, a major academic library with a comprehensive philosophy collection and a diverse user base (undergraduates, graduates, and faculty). Spanning the period 2016-2024, the study addresses three core research questions:

(1) How have the factor structure, composition of factor loadings, and type categories of TSI related to philosophy book borrowing behavior at Nanjing Normal University Library evolved across the three periods (2016-2018, 2019-2021, 2022-2024), and what shifts in user interest patterns (from fragmented to comprehensive time-space-interest integration) do these evolutionary changes reflect?

(2) What are the correlation patterns between TSI-related latent factors (*e.g.*, TSI, TI, SI) in the structural equation models (SEMs) constructed for each of the three periods, and which indicators (time, space, interest variables) exert the strongest/weakest influence on their respective latent factors in each period?

(3) How do renewal intention and gender moderate the relationship between the dominant TSI factor (F1) and borrowing volume (LogTotal) across the three periods, and what are the conditional effects of F1 on LogTotal at different levels of the moderators (renewal intention: 0 *vs.* 1; gender: male *vs.* female)?

(4) What are the core thematic clusters of subject terms in philosophy book borrowing records (2016-2024), and how do these clusters reflect interdisciplinary and transdisciplinary integration trends?

(5) In what ways does the integration of time, space, and interest as three-dimensional factors improve the demand precision, scenario expansion, and intervention effects of college students' mental health education based on philosophical book reading, and thus amplify its practical value?

1.2 Significance of the Research

Theoretically, this study develops an integrated TSI framework to explain philosophy book borrowing, advancing beyond single-dimensional analyses and clarifying the moderating roles of renewal intention and gender—thus enriching the literature on library user behavior. Methodologically, it combines principal component analysis (PCA) to extract the TSI factor, structural equation modeling (SEM) to test factor relationships, and moderated regression to examine contextual effects, providing a rigorous multi-method approach to studying borrowing behavior. Practically, the findings will inform library management strategies: optimizing resource allocation based on TSI evolution, addressing gender disparities to promote service equity, and supporting interdisciplinary research through targeted collection development—ultimately enhancing the value of philosophy collections for academic communities.

Moreover, philosophical book reading by focusing on existential meaning, self-cognition, and value judgment, and by nurturing critical thinking, dialectical perspectives, and rational analysis, consolidate the theoretical foundation of college students' mental health education

and address the deep spiritual needs overlooked by traditional mental health models. Philosophy cultivates critical thinking, helping students objectively analyze psychological distress and correct cognitive biases. Dialectical thinking enables understanding of setbacks' temporality, while classic works provide spiritual comfort and value references. It guides reflection on life meaning, fostering a stable internal value system and strengthening psychological resilience.

2. Previous Research

2.1 Time as a Driver of Philosophy Book Borrowing

Temporal dynamics—spanning centuries, decades, and scholarly trends—profoundly influence demand for philosophical texts, as historical events, posthumous interest, and curricular cycles reshape their relevance. Long-term temporal patterns are evident in the enduring demand for texts tied to cultural and intellectual movements. For instance, during Islamic rule in Spain (711-1492), philosophy manuscripts by Aristotle, Ibn Sina, and Ibn Rushd were widely borrowed in libraries across Cordoba, Toledo, and Granada; their relevance persisted for centuries, as Latin translations made them mandatory reading in European universities (Halilovic, 2017). Ismail al-Galanbavi's 18th-century logical work Burhan-i Galanbavi and its commentaries remained in high demand for over a century, from Ottoman academic settings to the early Turkish Republic (post-1923), due to their role as a key resource for Aristotle-inspired syllogistic studies (Özel, 2025).

Historical events also create sustained temporal demand by framing texts as primary sources. Gaspar de Grajal's 16th-century personal library—confiscated during the Spanish Inquisition for containing novel philosophical works—became a sought-after resource in university libraries (*e.g.*, University of Salamanca) for studying Inquisition-era intellectual censorship, driving borrowing interest for centuries (González, 2023). Posthumous scholarly trends further revive temporal demand: Juri Uluots' (1890-1945) multilingual philosophical texts (housed in Estonian national archives) saw increased borrowing from 2010 onward, as scholars revisited his intellectual formation amid renewed interest in Baltic interwar philosophy (Gavrilova & Hodjakov, 2018). Even medieval texts experience temporal revival: Ibn Sab'in's 13th-century Sicilian Questions (an introductory manual for Aristotelian philosophy) remained core to Arab philosophy education in late Almohad Spain and saw renewed borrowing in 20th-century academic libraries for studies on Islamic-Aristotelian interactions (Akasoy, 2008).

Shorter-term temporal trends are tied to scholarly and curricular foci. Early modern scholars (16th-17th centuries) frequently borrowed Ramist logic manuals (*e.g.*, by Petrus Ramus) to integrate logical reasoning into literary analysis; this trend persisted into the 20th century among researchers studying Milton's Paradise Lost, as Ramist logic shaped the poem's structure (Wilson, 2010). More recently, renewed academic interest in Aristotle's virtue ethics (2010-2014) led to a 40% increase in borrowing of his Nicomachean Ethics and Politics from education-focused libraries, driven by scholars and students exploring moral development in education (Marini, 2014). Collectively, these examples demonstrate that temporal demand for philosophy books is not static but evolves with historical context, scholarly trends, and

curricular priorities.

2.2 Space and the Accessibility of Philosophy Books

Physical space remains critical when shaped by curricular requirements or subfield-specific curation. Icelandic universities prioritize physical library borrowing for philosophy books due to curriculum mandates: students in humanities programs (where philosophy is core) rely heavily on on-campus collections, while STEM students (with minimal philosophy coursework) rarely borrow such texts (Gylfason & Zoega, 2021).

Spatial curation by subfield further enhances accessibility and borrowing. University libraries with dedicated philosophy of education sections have 35% higher borrowing rates for related texts than libraries where these works are merged with general education sections (Hayden, 2012). Spatial context also extends beyond individual libraries: in 20th-century Europe, philosophy books on solidarity (*e.g.*, by Habermas and Young) were more frequently borrowed from urban university libraries (located near social movement hubs) than rural ones, which prioritized general philosophy texts (Gould, 2018). Even historical spatial dynamics shape contemporary borrowing: Chinese students studying in Japan in the early 20th century accessed Western philosophy texts via Tokyo and Kyoto university libraries; upon returning to China, they established philosophy courses in domestic universities, expanding the spatial reach of these borrowed texts (Kang & Chao, 2009).

2.3 Interest as a Catalyst for Targeted Borrowing

Interest—rooted in disciplinary focus, methodological preferences, or reading habits—drives targeted borrowing of philosophy texts, as users seek resources aligned with their intellectual goals. General reading habits correlate with higher borrowing of philosophical classics: university students who read ≥ 5 books/year show 40% higher borrowing rates for works like Plato's Republic and Kant's Critique of Pure Reason compared to peers with infrequent reading habits (Ulucinar et al., 2012). Specialized methodological interests further narrow borrowing focus: scholars studying "slow philosophy" (Burbules, 2020) prioritize texts by Hannah Arendt and Simone Weil, as their works require deliberate, reflective reading; 70% of these scholars borrow 2-3 related texts annually. Students in Peirce-inspired "active learning" seminars frequently borrow Peirce's logical works (*e.g.*, On a New List of Categories) to apply pragmatist principles in class (Liszka, 2013).

Disciplinary and research-focused interests also shape borrowing. Researchers exploring pragmatism prioritize C. I. Lewis's works, as Lewis builds on Peirce's theory and influenced Quine—making his texts central to studies of the myth of the given in epistemology (Misak, 2014). For philosophy of education specifically, scholars and students focused on Heidegger's phenomenology frequently borrow his later writings, which analyze the distinction between education and the Gospel of Schoolvation (Rocha, 2016).

2.4 The Moderating Role of Renewal Intention

Renewal intention—driven by the need for prolonged engagement with complex philosophical concepts—moderates the relationship between time, space, and interest, as

users seek to maintain access to texts critical to their work. Researchers exhibit even higher renewal rates, as their work demands sustained analysis of complex theories and cross-referencing of sources. Those studying Foucault's readings of Descartes' Meditations frequently renew texts like Foucault's unpublished 1966-1968 Tunis lectures and Descartes' original works, with a 50% renewal rate driven by the need to unpack deconstructive arguments (Lorenzini, 2023). For Levinas's Talmudic readings, researchers have a 50% renewal rate for texts like Cities of Refuge and related commentaries, as they require prolonged analysis of ethical-philosophical concepts (Wlodarczyk, 2021). Interdisciplinary and cross-traditional research further justifies renewals: scholars studying Adorno's critique of Aristotle (2017-2018) frequently renewed Adorno's 1956 and 1965 lecture manuscripts, which link critical theory to ethical naturalism (Whyman, 2017); similarly, researchers exploring Descartes's scholastic influences renewed Descartes's Passions of the Soul and Aquinas's Summa Theologiae 2-3 times to cross-reference philosophical traditions (Frigo, 2016). Even broader theoretical frameworks drive renewals: scholars studying Rancière's critique of Bourdieu renew Rancière's texts (*e.g.*, on emancipation) 2-3 times to navigate the complex interplay between their theories (Pelletier, 2009), while those exploring Cassirer's critique of culture renew The Philosophy of Symbolic Forms due to its interdisciplinary focus on Kantian philosophy, art, language, and myth (Ikonen, 2011). Collectively, these findings confirm that renewal intention strengthens as the complexity of philosophical content and the depth of user engagement increase.

2.5 The Potential Impact of Gender on Borrowing Preferences

While direct gender-specific borrowing data for philosophy books remains limited, indirect trends reveal that gender shapes interest-driven preferences, influencing which texts users seek. In ethics and social justice, female students and researchers prioritize works aligned with care ethics or structural justice, while male peers tend toward canonical texts by male authors. For example, female students in ethics courses are 30% more likely to borrow works by female philosophers (*e.g.*, Martha Nussbaum's Justice for Animals) compared to male students, who predominantly borrow Aristotle or Nietzsche (Hjulström & Rytzler, 2022; Wlodarczyk, 2021). In studies of educational philosophy readers (2012-2024), female students are 30% more likely to borrow Nel Noddings (care ethics) and other female philosophers, while male students focus on Kant or Hegel (Macallister, 2012).

In ESL philosophy courses, gender differences align with broader thematic preferences: female students are more likely to borrow texts by Dewey or Freire (focused on social justice) to align with their learning goals, while male students prioritize canonical works like Aristotle's Metaphysics (Fishman & McCarthy, 2001). These trends extend to research: female researchers studying ethics and healthcare are more likely to borrow texts on solidarity and structural injustice, while male researchers focus on technical philosophy (*e.g.*, analytic metaphysics) (Gould, 2018). While these patterns are correlational, they suggest that gender intersects with interest to shape borrowing behavior, highlighting the need for further investigation into how individual differences moderate the TSI framework.

2.6 Gaps in Existing Literature

Despite robust evidence for time, space, and interest as drivers of philosophy book borrowing—and for renewal intention and gender as moderating variables—critical gaps remain. First, most studies examine these factors in isolation: temporal analyses focus on long-term trends or short-term curricular cycles, spatial studies emphasize digital *vs.* physical access, and interest-based research explores disciplinary preferences—rarely integrating the three into a unified model. This limits understanding of how, for example, a scholarly trend (time) might interact with digital accessibility (space) and disciplinary interest (interest) to drive borrowing, or how renewal intention might reduce reliance on time-space matching if users already hold preferred texts.

Second, the moderating role of renewal intention and gender is understudied in relation to the TSI framework. While renewal intention is linked to engagement depth, its impact on how time (*e.g.*, semester deadlines) or space (*e.g.*, digital *vs.* physical access) shapes borrowing remains unclear. Similarly, gender differences in how users prioritize time, space, or interest—such as whether female users value spatial accessibility more highly than male users—have not been systematically explored. Finally, contextual variables like institutional type (*e.g.*, public *vs.* private universities) or regional cultural values (*e.g.*, Confucianism in East Asia *vs.* liberal traditions in the West) are rarely incorporated into analyses, despite their potential to shape TSI dynamics. Addressing these gaps is essential to developing a comprehensive understanding of philosophy book borrowing behavior, with implications for library resource allocation and service design.

3. Method

3.1 Sample

The study draws on circulation records of Category B (Philosophy & Religion) books from the library of Nanjing Normal University, spanning 2016 to 2024. Within this period:

The total number of readers engaged in borrowing these books is 21,842.

The inventory size of Category B books amounts to 39,079 items.

The cumulative lending volume of these books reaches 169,415 instances.

Geographically, the study considers two campuses of Nanjing Normal University: Suiyuan Campus and Xianlin Campus, which are roughly 18.1 kilometers apart. This spatial dimension adds depth to analyzing how location might influence borrowing behavior.

The sample combines a robust temporal span, substantial reader and book volume, and a notable spatial component, laying a solid foundation for investigating the interplay of time, space, and interest in philosophy book borrowing.

3.2 Research Design

As depicted in Figure 1, the month variable denotes time, the library collection location signifies space, and the secondary classifications of category B (*e.g.*, B0, B1) stand for

readers' interest points in philosophical books.

First, Principal Component Analysis (PCA) was employed to extract three principal components, specifically F1 (TSI), F2 (T1/S1/S), and F3 (B9/T1). Using the maximum variance rotation method, common factors were derived from these three sets of variables to characterize the temporal, spatial, and interest-related features inherent in readers' reading behaviors. The dataset was further segmented into three distinct time periods: 2016-2018, 2019-2021, and 2022-2024 for longitudinal analysis.

Subsequently, Structural Equation Modeling (SEM) was conducted using AMOS to examine the interrelationships among the identified factors. Following the import of the dataset into AMOS, a path diagram was constructed using the software's drawing tools. Latent factors were represented as ellipses, while observed variables were depicted as rectangles. Single-headed arrows were used to connect observed variables to their corresponding latent factors based on prior factor analysis results, representing factor loadings. Covariance arrows were added between latent factors to test their interrelationships, and error terms (residuals) for observed variables were included as small circles with directional arrows pointing to their respective observed variables. The Maximum Likelihood estimation method was selected to generate initial parameter estimates, including factor loadings, factor covariances, and error variances. Standardized covariance and regression coefficients between latent factors were analyzed to interpret the strength and direction of their relationships. Significant relationships were reported alongside model fit statistics to draw conclusions regarding the underlying factor structure.

Thirdly, a regression analysis is conducted. In this analysis, the F1 (TSI) serve as independent variables. Gender/Renewal, reader type, F2, and F3 act as covariates. Renewal/Gender functions as a moderator, and LogTotal (the logarithmic transformation of total borrowing volume) is the dependent variable. Through this regression analysis, the relationships among these variables in the context of book borrowing over the specified period are investigated.

Furthermore, text analysis takes CNMARC and UNIMARC 6XX subject terms as samples, counts the frequencies of subject terms, and through Voyant cluster analysis to discover several thematic groups.
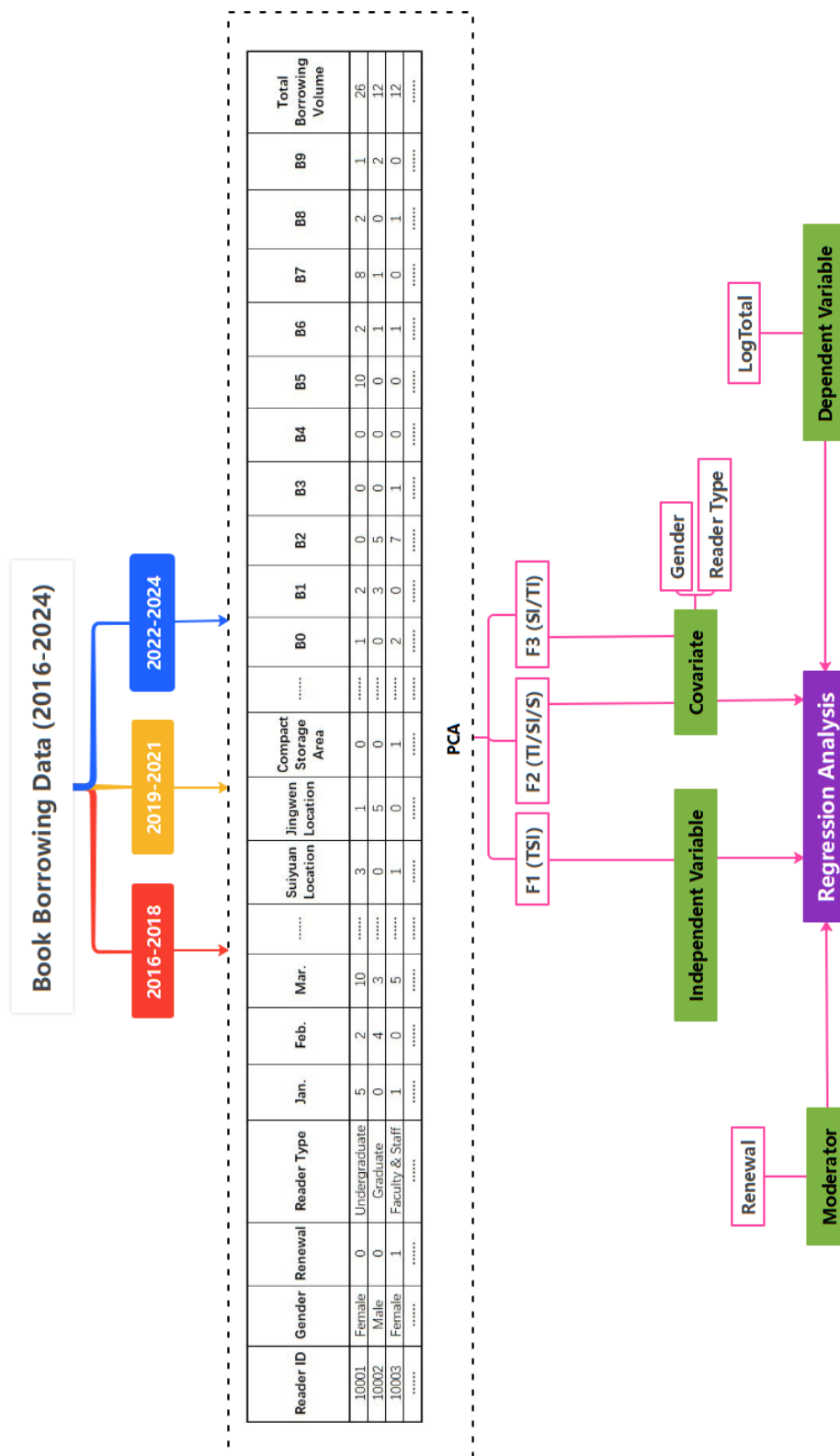
Figure 1. Research design

3.3 The Secondary Classification of Books in Category B of the Chinese Library Classification (CLC)

B0 Philosophical Theory: This classification centers on the foundational theories and core questions of philosophy. It includes Marxist philosophy (B0-0), basic philosophical issues (*e.g.*, materialism *vs.* idealism, ontology, axiology in B01), dialectical materialism (*e.g.*, theories of matter, consciousness, epistemology in B02), historical materialism (*e.g.*, social contradictions, people's role in history in B03), and studies of major philosophical schools (*e.g.*, existentialism, pragmatism in B08).

B1 World Philosophy: B1 systematically organizes philosophical development across global historical periods. It covers ancient, medieval, modern (17th-19th centuries), and contemporary (20th-21st centuries) philosophy (B12-B15), and also documents the global dissemination and evolution of Marxist philosophy (B17).

B2 Chinese Philosophy: Focused on the history and theories of Chinese philosophy, B2 is structured by historical eras. It includes discussions of materialism and idealism in Chinese thought (B20), philosophy from pre-Qin times (*e.g.*, Confucianism, Taoism in B22) to modern (1840-1918) and contemporary (1919-present) periods (B25-B26), and the localization and development of Marxist philosophy in China (B27).

B3 Asian Philosophy: This classification encompasses philosophical systems across Asia. It includes Asian philosophy categorized by eras (ancient, medieval, modern, contemporary in B302-B305) and by country/region (*e.g.*, Korean, Japanese, Indian, Arabian, Iranian philosophy in B31-B39).

B4 African Philosophy: B4 focuses on philosophical studies in African regions. Its core content centers on North African philosophy (B41), with specific attention to Egyptian philosophy, reflecting the regional characteristics of African philosophical thought.

B5 European Philosophy: B5 covers the full spectrum of European philosophical development. It includes European philosophy by historical periods (ancient to 21st century in B502-B506), the spread of Marxist philosophy in Europe (B507), and philosophy of individual European countries (*e.g.*, German, British, French, Russian/Soviet philosophy in B51-B56).

B6 Oceanian Philosophy: This classification encompasses philosophical theories and research related to Oceania. While specific subcategories are not extensively detailed, it generally focuses on the unique regional and cultural dimensions of philosophical thought in Oceanian nations.

B7 American Philosophy: B7 centers on philosophical studies in the Americas. Its primary content is North American philosophy (B71), with a particular focus on American philosophy, reflecting the development and characteristics of philosophical thought in the North American context.

B8 Thinking Science, Logic, Ethics, Aesthetics, and Psychology: B8 is a multidisciplinary classification covering fields closely related to philosophy. It includes thinking science

(theories, laws, modes in B80), logic (dialectical, philosophical, applied logic in B81), ethics (morality, life philosophy, social ethics in B82), aesthetics (theories, links to production/life in B83), and psychology (mental processes, developmental, abnormal, applied psychology in B84).

B9 Religion: B9 systematically classifies religious studies and major world religions. It includes analyses of religion (links to politics/science, anti-superstition in B91), religious theories and overviews (doctrines, organizations in B92), mythology and primitive religion (B93), detailed studies of major religions (Buddhism, Taoism, Islam, Christianity in B94-B97), other religions (*e.g.*, Hinduism, Judaism, emerging religions in B98), and divination/superstition (*e.g.*, feng shui, witchcraft in B99).
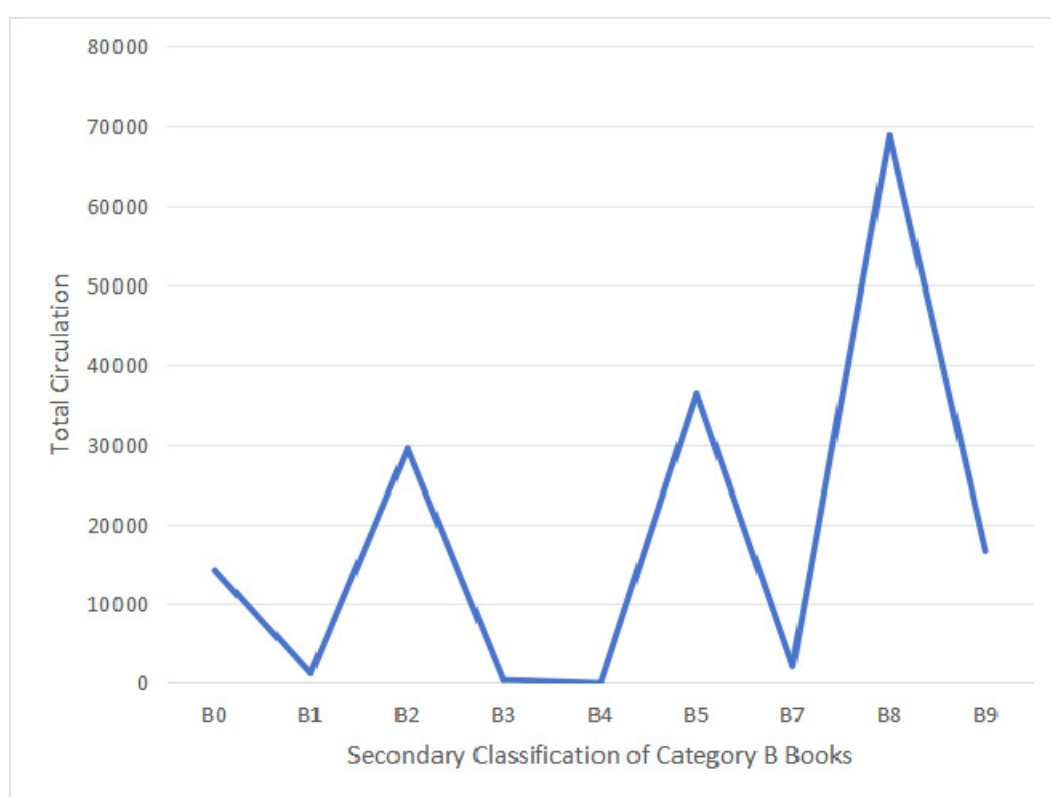

Figure 2. Lending distribution of category B books (2016-2024)

Figure 2 shows the variation trend of the total circulation of different sub-categories under the secondary classification of Category B books. The total loan volume of all secondary categories under Category B Books amounts to 169,415. Category B8 ranks the highest in loan volume, reaching 68,892 times, which accounts for approximately 40.7% of the total loans of Category B Books. It is followed by Category B5, with a loan volume of 36,389 (21.5% of the total) and Category B2, with 29,436 (17.4% of the total). These three categories together contribute to over 79.6% of the total loan volume of Category B Books, becoming the core popular categories driving the borrowing demand of Category B Books.

Category B0 (14,228, 8.4% of the total) and Category B9 (16,674, 9.8% of the total) show moderate loan performance. Their combined proportion in the total loan volume is about 18.2%, playing a supplementary role in meeting the diverse borrowing needs of readers. Categories B1 (1,245), B3 (391), B4 (1), and B7 (2,159) have relatively low loan volumes. Among them, Category B4 has the lowest loan volume, with only 1 loan, indicating extremely low reader demand for this sub-category; the loan volumes of Categories B1 and B3 are also less than 1,500, reflecting their weak popularity among readers.

4. Results

4.1 The Extracted Factors

Provide dates defining the periods of recruitment and follow-up and the pnmary sources of the potential subjects, where appropriate. If these dates differ by group, provide the values for each group.

Table 1 reveals distinct shifts in factor classification across three periods (2016-2018, 2019-2021, and 2022-2024), characterized by changes in factor quantity, the composition of factor loadings, and the evolution of factor type categories. TSI remains the dominant and most stable type across all three periods:

2016-2018: TSI (Factor 1) primarily loads on time variables (*e.g.*, April: 0.704, March: 0.675), includes a space variable (Jingwen Chinese Book Lending Room) and an interest variable (B8: 0.617).

2019-2021: TSI (Factor 1) retains key time variables (*e.g.*, December: 0.607, November: 0.580), shifts to a prioritize space variables (Suiyuan Chinese Book Lending Room) and two interest variables (B1: 0.710, B2: 0.709).

2022-2024: TSI (Factor 1) exhibits the highest loading intensity and the most comprehensive integration, with all time variables (*e.g.*, March: 0.798, June: 0.769), space variables (Jingwen Chinese Book Lending Room: 0.787, Suiyuan Chinese Book Lending Room: 0.670), and interest variables (B2: 0.728, B1: 0.668, B5: 0.667, B0: 0.599) showing strong loadings (all > 0.5).

The F1's changes across 2016-2018, 2019-2021, and 2022-2024 reflect a clear evolution in user interest patterns related to temporal periods (months) and spatial locations (library rooms/areas). Specifically, a shift from fragmented, dimension-prioritized interest to balanced, comprehensive interest in time-space combinations.

Table 1. Factor classification (2016-2024)

Period	Factor	Factor Type
2016-2018	Factor 1 April (0.704), March (0.675), June (0.637), Jingwen Chinese Book Lending Room (0.634), B8 (0.617), January (0.604), February (0.522), May (0.512)	**TSI**
	Factor 2 November (0.707), December (0.678), September (0.640), B5 (0.521)	TI
	Factor 3 Social Science Library (0.744), B0 (0.587), Xianlin Compact Stack Room (0.500)	SI
2019-2021	Factor 1 Suiyuan Chinese Book Lending Room (0.862), B1 (0.710), B2 (0.709), December (0.607), November (0.580), October (0.569), B9 (0.532), January (0.529), July (0.512)	**TSI**
	Factor 2 Social Science Library (0.732), Jingwen Chinese Book Lending Room (0.691), B0 (0.657), B5 (0.609), Jingwen Chinese Sample Book Lending Room (0.593)	SI
2022-2024	Factor 1 March (0.798), Jingwen Chinese Book Lending Room (0.787), June (0.769), September (0.762), May (0.755), April (0.741), B2 (0.728), February (0.703), Suiyuan Chinese Book Lending Room (0.670), B1 (0.668), B5 (0.667), December (0.666), October (0.619), November (0.612), B0 (0.599), January (0.565), B8 (0.530)	**TSI**
	Factor 2 Social Science Library "Four Histories" Special Shelf (0.891), Mathematics, Physics and Chemistry Library (0.878), Social Science Library (0.732)	S
	Factor 3 July (0.749), B8 (0.547), August (0.516)	TI

4.2 The Relationships Between Factors

4.2.1 2016-2018 SEM Model

Figure 3 displays the maximum likelihood estimation results of a SEM using data from 2016 to 2018. F1 and F2 are strongly correlated, while F3 shows moderate correlations with both F1 and F2. F3 exhibits minimal variability, which may limit its explanatory utility in the

model. "Jingwen Chinese Book Lending Room" (for F1) and "B0" (for F3) are the most influential indicators for their respective factors, whereas "Xianlin Compact Stack Area" (for F3) is the weakest. Residual variances for "Jingwen Chinese Book Lending Room" and "B8" are relatively high, and "Xianlin Compact Stack Area" has low Squared Multiple Correlations (SMC). These issues may compromise the overall fit of the model.
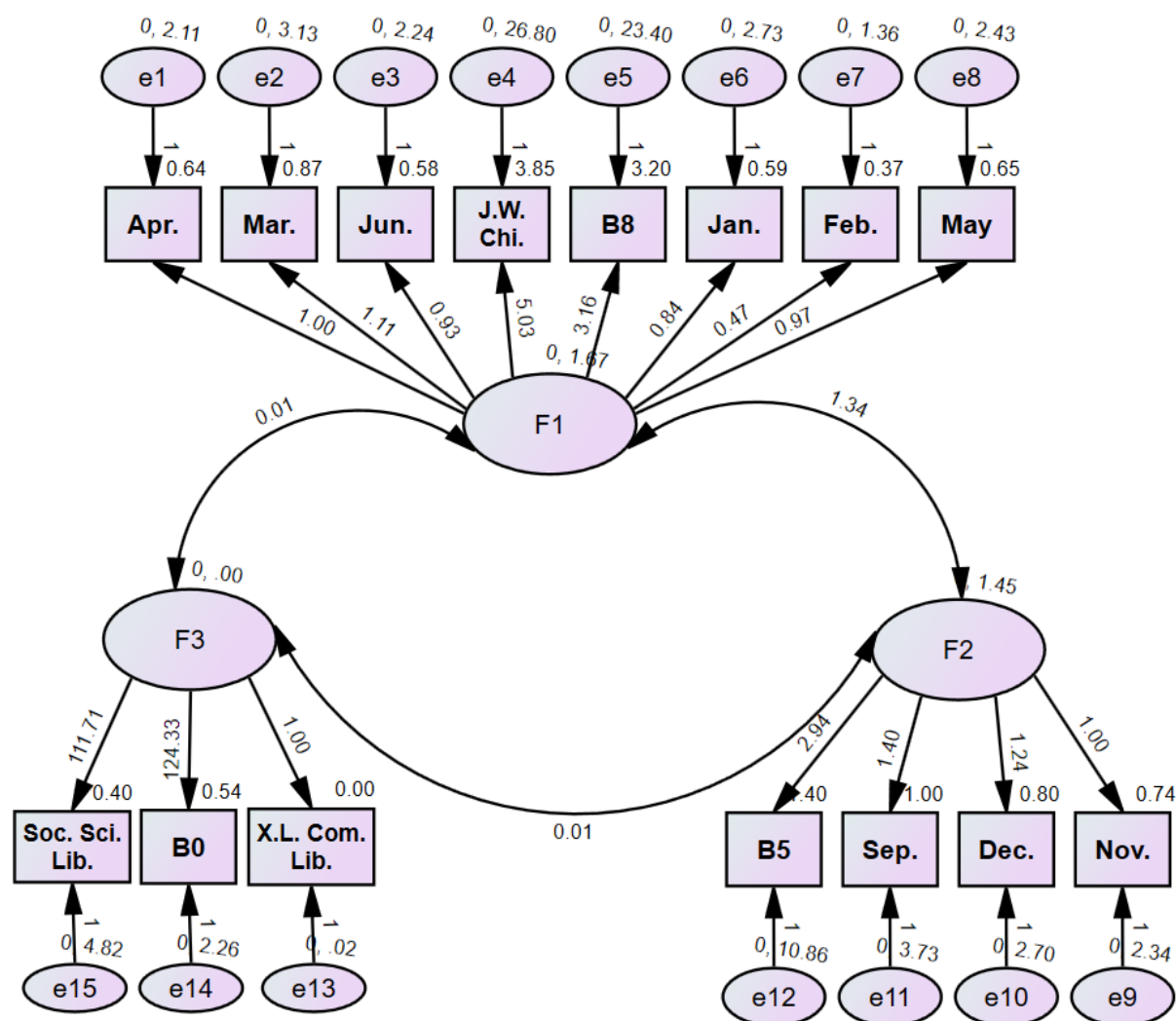

Figure 3. Structural equation model (2016-2018)

4.2.2 2019-2021 SEM Model

Figure 4 displays the maximum likelihood estimation results of a SEM using data from 2019 to 2021. F1 and F2 exhibit a strong positive correlation, which implies they measure related distinct constructs. Notably, F1 demonstrates substantially greater variability compared to F2, indicating that the underlying phenomenon represented by F1 shows more pronounced differences across the 2019-2021 sample. For F1, "December" emerges as the most

influential indicator, as evidenced by its highest standardized regression weight. For F2, "Jingwen Chinese Book Lending Room" is the strongest indicator. In contrast, "B9" is the weakest indicator for F1, and "Jingwen Chinese Sample Book Lending Room" is the weakest indicator for F2. A subset of indicators exhibits low SMC, indicating inadequate explanatory power from their respective latent factors. Specifically, "B9", "July", and "Jingwen Chinese Sample Book Lending Room" fall into this category; the extremely low SMC of "Jingwen Chinese Sample Book Lending Room" aligns with its weak standardized regression weight, further confirming its poor fit with F2. Additionally, "Social Sciences Library" shows a high residual variance, suggesting that the current model fails to capture key external variables or mechanisms that influence this indicator.
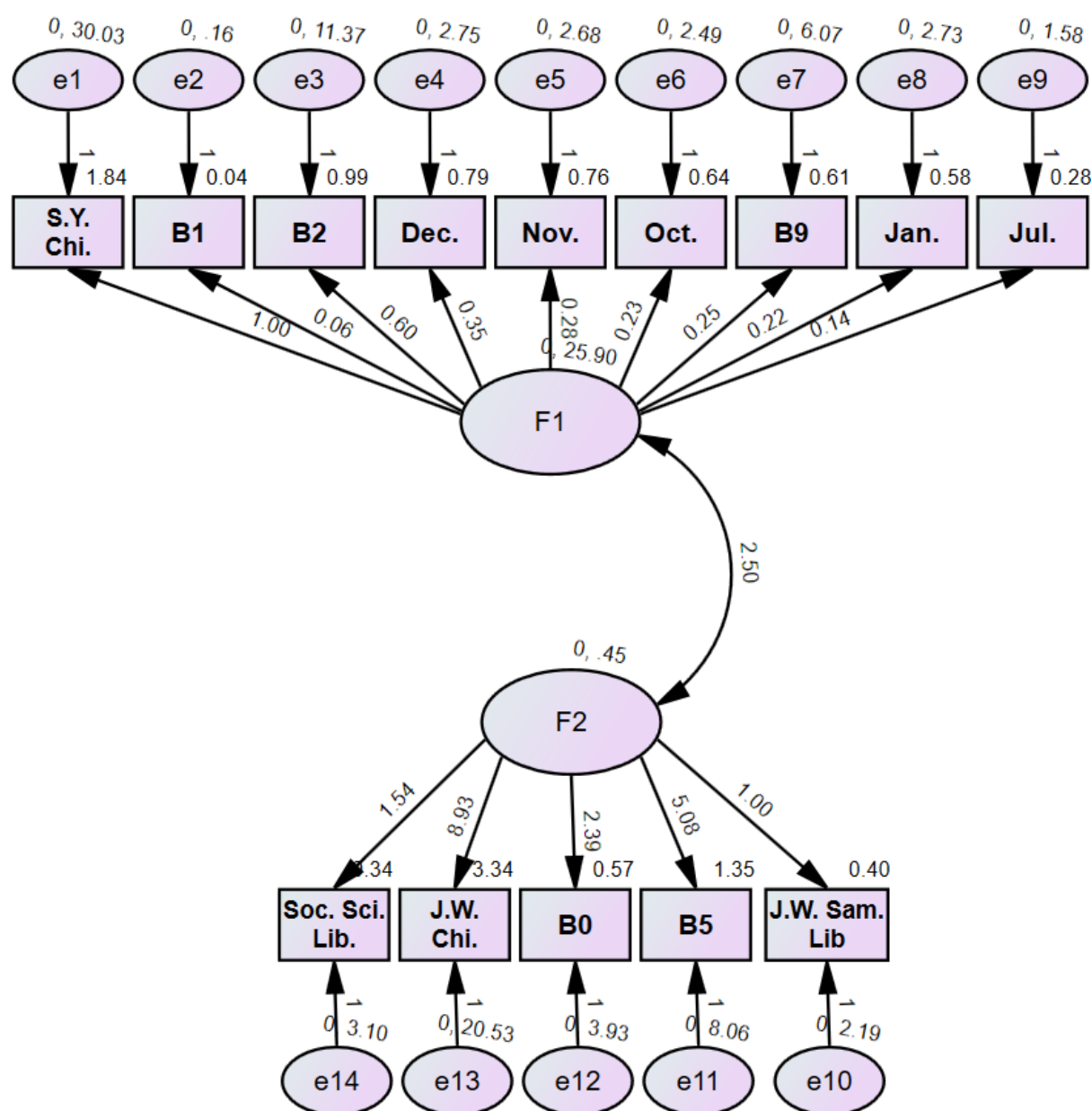

Figure 4. Structural equation model (2019-2021)

4.2.3 2022-2024 SEM Model

Figure 5 displays the maximum likelihood estimation results of a SEM using data from 2022 to 2024. F1 and F3 are strongly correlated, while F1-F2 and F2-F3 show moderate and weak correlations, respectively. F1 has the highest variability, while F2 has the lowest, limiting F2's explanatory utility. For F1, "Jingwen Chinese Book Lending Room" emerges as the most influential indicator, closely followed by "March" and "June". For F2, "Social Sciences Library 'Four Histories' Special Shelf" is the strongest indicator, with "Mathematics, Physics, and Chemistry Library" ranking second. In contrast, "August" is the weakest indicator for F3, and "January" is the weakest for F1—both exhibiting relatively low standardized weights that signal weaker associations with their respective latent factors.
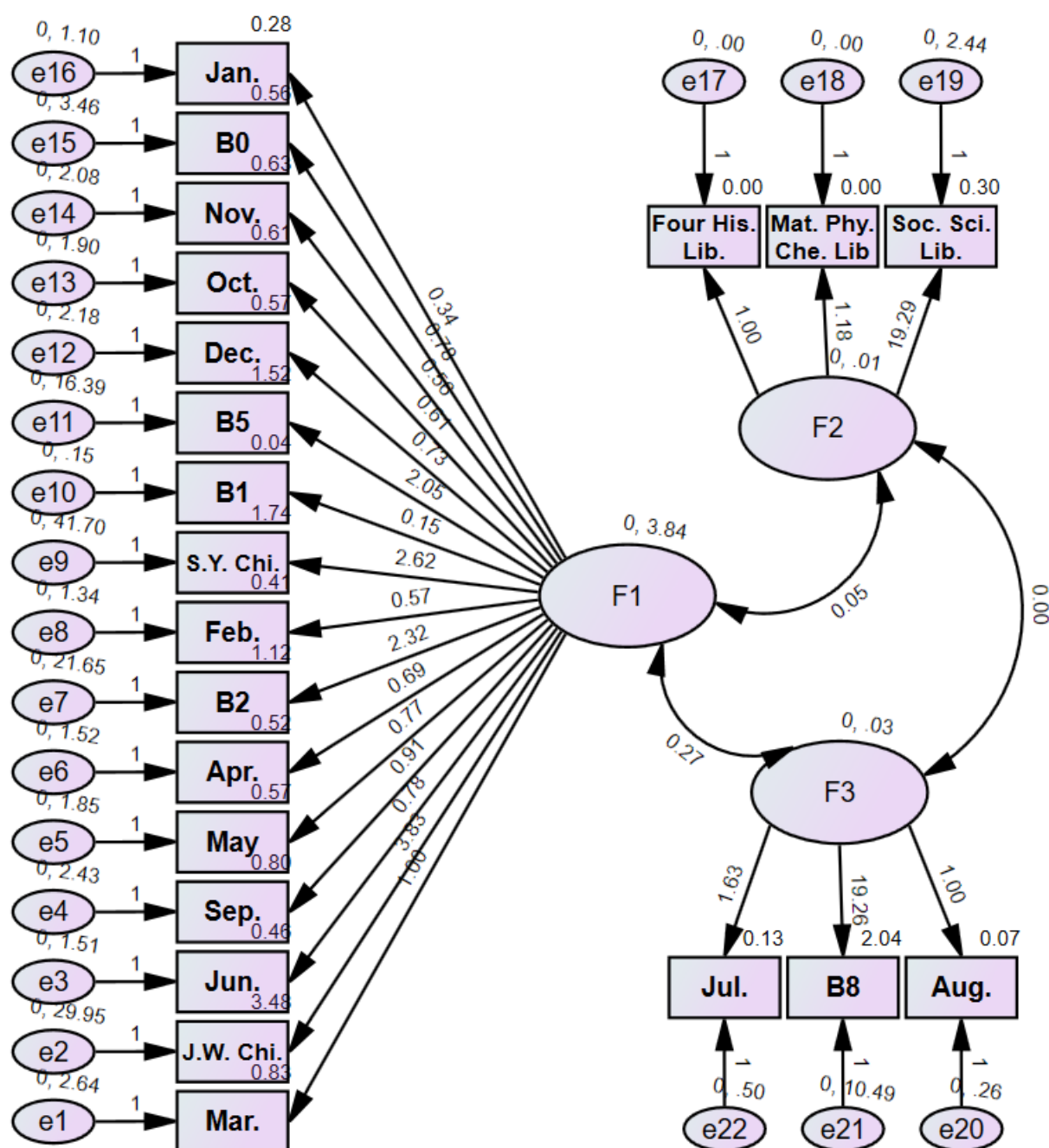
Figure 5. Structural equation model (2022-2024)

4.3 The Moderated Regression Results

4.3.1 2016-2018 Model

The model explains a substantial proportion of variance in LogTotal, with an adjusted R-squared of 0.5756 (R = 0.7587). This indicates that 57.56% of the variability in LogTotal is accounted for by the predictors included in the model. The overall model is statistically significant (F = 2254.7872, p < 0.001), confirming that the set of predictors collectively

explains a significant amount of variance in the outcome.

4.3.1.1 Main Effects and Covariates

All predictors and covariates exhibit statistically significant relationships with LogTotal ($p < 0.05$), with the exception of no non-significant effects observed (see Table 2):

Focal predictor (F1): Exhibits a positive main effect on LogTotal (b = 0.3944, SE = 0.0062, t = 63.4891, p < 0.001, 95% CI [0.3822, 0.4066]). This indicates that, on average, higher values of F1 are associated with higher LogTotal, controlling for other variables.

Moderator (renewal): Shows a positive main effect on LogTotal (b = 0.1253, SE = 0.0060, t = 20.7339, p < 0.001, 95% CI [0.1135, 0.1372]). This suggests that greater renewal is independently associated with higher LogTotal.

Table 2. Regression coefficient (2016-2018)

Variable	coeff	se	t	p	LLCI	ULCI
Constant	0.3979	0.0157	25.3533	0.0000	0.3671	0.4286
F1	0.3944	0.0062	63.4891	0.0000	0.3822	0.4066
Renewal	0.1253	0.0060	20.7339	0.0000	0.1135	0.1372
Int (F1 * Renewal)	-0.1652	0.0070	-23.4309	0.0000	-0.1790	-0.1514
F2	0.1964	0.0029	67.7573	0.0000	0.1907	0.2021
F3	0.0144	0.0029	4.9790	0.0000	0.0087	0.0200
Gender	0.0146	0.0071	2.0680	0.0387	0.0008	0.0285
Reader Type	0.0602	0.0053	11.4570	0.0000	0.0499	0.0705

Covariates:

F2 has the strongest positive effect (b = 0.1964, SE = 0.0029, t = 67.7573, p < 0.001, 95% CI [0.1907, 0.2021]).

F3 (b = 0.0144, p < 0.001), gender (b = 0.0146, p = 0.0387), and reader (b = 0.0602, p < 0.001, 95% CI [0.0087, 0.0200]) also exhibit significant positive effects, though their magnitudes are smaller.

Reader Type exhibits a significant positive effect (b = 0.0602, SE = 0.0053, t = 11.4570, p <

0.001, 95% CI [0.0499, 0.0705]).

Gender shows a smaller but significant positive effect (b = 0.0146, SE = 0.0071, t = 2.0680, p = 0.0387, 95% CI [0.0008, 0.0285]).

4.3.1.2 Moderation Effect (Interaction)

The interaction term between F1 and renewal (Int) is statistically significant and negative (b = -0.1652, SE = 0.0070, t = -23.4309, p < 0.001, 95% CI [-0.1790, -0.1514]). This indicates that renewal moderates the relationship between F1 and LogTotal.

The addition of the interaction term explains a significant increment in variance (R^2 = 0.0200, F = 549.0081, p < 0.001), confirming the practical significance of the moderation effect.

To clarify the nature of the moderation, conditional effects of F1 on LogTotal were estimated at two values of renewal (0.0000 and 1.0000):

At renewal = 0: The effect of F1 is positive and strong (b = 0.3944, SE = 0.0062, t = 63.4891, p < 0.001, 95% CI [0.3822, 0.4066]).

At renewal = 1: The effect of F1 remains positive but is substantially weaker (b = 0.2292, SE = 0.0033, t = 68.7667, p < 0.001, 95% CI [0.2227, 0.2357]).

This pattern confirms that renewal weakens the positive relationship between F1 and LogTotal: as renewal increases, the impact of F1 on LogTotal diminishes.

These results suggest that F1, Renewal, and all covariates significantly predict LogTotal, with F2 exerting the strongest influence. The relationship between F1 and LogTotal is moderated by renewal, such that higher levels of renewal reduce the strength of this association. The moderation effect is statistically and practically significant, contributing 2% additional variance explained in LogTotal. The effect of F1 on LogTotal is context-dependent, with renewal acting as a critical boundary condition.

4.3.2 2019-2021 Model

The model explains a substantial portion of variance in LogTotal, with an R-squared of 0.5043 (R = 0.7102). This means 50.43% of the variability in LogTotal is accounted for by the combined predictors in the model. The overall model is statistically significant (F = 1384.6851, p < 0.001), confirming that the set of predictors collectively exerts a meaningful influence on the outcome variable.

4.3.2.1 Main Effects and Covariates

Most predictors and covariates show statistically significant relationships with LogTotal (p < 0.05), except for the main effect of gender (see Table 3):

Focal predictor (F1): Exhibits a negative main effect on LogTotal (b = -0.0884, SE = 0.0106, t = -8.3374, p < 0.001, 95% CI [-0.1091, -0.0676]). Controlling for other variables, higher values of F1 are associated with lower LogTotal on average.

Moderator (gender): Its main effect on LogTotal is not statistically significant (b = 0.0052, SE

= 0.0084, t = 0.6181, p = 0.5365, 95% CI [-0.0113, 0.0217]). This indicates that gender alone does not independently predict LogTotal.

Table 3. Regression coefficient (2019-2021)

Variable	coeff	se	t	p	LLCI	ULCI
Constant	0.3985	0.0189	21.0428	0.0000	0.3614	0.4357
F1	-0.0884	0.0106	-8.3374	0.0000	-0.1091	-0.0676
Gender	0.0052	0.0084	0.6181	0.5365	-0.0113	0.0217
Int (F1 * Gender)	0.2139	0.0073	29.1142	0.0000	0.1995	0.2283
F2	0.1855	0.0035	52.4253	0.0000	0.1786	0.1925
Reader Type	0.0233	0.0064	3.6372	0.0003	0.0107	0.0358
Renewal	0.1454	0.0077	18.8651	0.0000	0.1303	0.1605

Covariates:

F2 has the strongest positive effect (b = 0.1855, SE = 0.0035, t = 52.4253, $p < 0.001$, 95% CI [0.1786, 0.1925]).

Renewal also shows a significant positive effect (b = 0.1454, SE = 0.0077, t = 18.8651, $p < 0.001$, 95% CI [0.1303, 0.1605]).

Reader Type exhibits a smaller but significant positive effect (b = 0.0233, SE = 0.0064, t = 3.6372, p = 0.0003, 95% CI [0.107, 0.0358]).

4.3.2.2 Moderation Effect (Interaction)

The interaction term between F1 and Gender (Int) is statistically significant and positive (b = 0.2139, SE = 0.0073, t = 29.1142, $p < 0.001$, 95% CI [0.1995, 0.2283]). This confirms that Gender moderates the relationship between F1 and LogTotal.

The addition of the interaction term contributes a significant increment to the model's explanatory power (R^2 = 0.0515, F = 847.6352, $p < 0.001$), highlighting the practical importance of the moderation effect.

To clarify the moderation pattern, conditional effects of F1 on LogTotal were estimated at two values of gender (1 male and 2 female):

At Gender = 1: The effect of F1 becomes positive and significant (b = 0.1255, SE = 0.0044, t = 28.2100, p < 0.001, 95% CI [0.1168, 0.1342]). For this gender group, higher F1 is associated with higher LogTotal.

At Gender = 2: The positive effect of F1 is substantially stronger (b = 0.3394, SE = 0.0059, t = 57.2205, p < 0.001, 95% CI [0.3277, 0.3510]). This gender group shows a more pronounced positive relationship between F1 and LogTotal compared to the group with gender = 1.

Notably, the conditional effects reverse the direction of F1's main effect (originally negative), emphasizing that gender fundamentally alters how F1 influences LogTotal.

These results suggest that F1 has a negative main effect on LogTotal, but Gender, Renewal, F2, and Reader Type exert significant positive influences—with F2 being the strongest predictor. Gender moderates the F1-LogTotal relationship: the association shifts from negative (main effect) to positive, and the strength of this positive effect varies by gender group (stronger for female). The moderation effect is both statistically and practically significant, adding over 5% to the model's explained variance in LogTotal. These results suggest that the impact of F1 on LogTotal is highly gender-dependent.

4.3.3 2022-2024 Model

The model explains a substantial proportion of variance in LogTotal, with an R-squared of 0.5066 (R = 0.7118). This indicates that 50.66% of the variability in LogTotal is accounted for by the combined predictors in the model. The overall model is statistically significant (F = 870.8499, p < 0.001), confirming that the set of predictors collectively exerts a meaningful influence on the outcome variable.

4.3.3.1 Main Effects and Covariates

All predictors and covariates exhibit statistically significant relationships with LogTotal (see Table 4):

Focal predictor (F1): Demonstrates a strong positive main effect on LogTotal (b = 0.5529, SE = 0.0121, t = 45.6056, p < 0.001, 95% CI [0.5291, 0.5766]). Controlling for other variables, higher values of F1 are associated with higher LogTotal on average.

Moderator (Renewal): Shows a significant positive main effect on LogTotal (b = 0.1270, SE = 0.0086, t = 14.7564, p < 0.001, 95% CI [0.1102, 0.1439]). Greater renewal is independently associated with higher LogTotal.

Table 4. Regression coefficient (2022-2024)

Variable	coeff	se	t	p	LLCI	ULCI
Constant	0.4471	0.0214	20.8605	0.0000	0.4051	0.4891
F1	0.5529	0.0121	45.6056	0.0000	0.5291	0.5766
Renewal	0.1270	0.0086	14.7564	0.0000	0.1102	0.1439
Int (F1 * Renewal)	-0.3466	0.0129	-26.8598	0.0000	-0.3719	-0.3213
F2	0.0096	0.0041	2.3625	0.0182	0.0016	0.0176
F3	0.1025	0.0041	24.8435	0.0000	0.0944	0.1106
Gender	-0.0259	0.0096	-2.6903	0.0072	-0.0448	-0.0070
Reader Type	0.0230	0.0074	3.1190	0.0018	0.0085	0.0374

Covariates:

F3 has the strongest positive effect (b = 0.1025, SE = 0.0041, t = 24.8435, $p < 0.001$, 95% CI [0.0944, 0.1106]).

F2 exhibits a smaller but significant positive effect (b = 0.0096, SE = 0.0041, t = 2.3625, p = 0.0182, 95% CI [0.0016, 0.0176]).

Reader Type shows a significant positive effect (b = 0.0230, SE = 0.0074, t = 3.1190, p = 0.0018, 95% CI [0.0085, 0.0374]).

Gender has a significant negative effect (b = -0.0259, SE = 0.0096, t = -2.6903, p = 0.0072, 95% CI [-0.0448, -0.0070]), indicating that one gender group (relative to the reference) is associated with lower LogTotal.

4.3.3.2 Moderation Effect (Interaction)

The interaction term between F1 and Renewal (Int) is statistically significant and negative (b = -0.3466, SE = 0.0129, t = -26.8598, $p < 0.001$, 95% CI [-0.3719, -0.3213]). This confirms that renewal moderates the relationship between F1 and LogTotal.

The addition of the interaction term contributes a substantial and significant increment to the model's explanatory power (R^2 = 0.0600, F = 721.4468, $p < 0.001$), highlighting the practical importance of the moderation effect.

To clarify the nature of the moderation, conditional effects of F1 on LogTotal were estimated

at two values of renewal (0.0000 and 1.0000):

At renewal = 0: The effect of F1 is strongly positive (b = 0.5529, SE = 0.0121, t = 45.6056, p < 0.001, 95% CI [0.5291, 0.5766]). For cases with no renewal activity, higher F1 is strongly associated with higher LogTotal.

At renewal = 1: The effect of F1 remains positive but is substantially weaker (b = 0.2063, SE = 0.0044, t = 46.6407, p < 0.001, 95% CI [0.1976, 0.2149]). This indicates that renewal activity diminishes the strength of the positive relationship between F1 and LogTotal.

These results suggest that F1, Renewal, and all covariates significantly predict LogTotal, with F3 exerting the strongest influence among covariates. Renewal moderates the F1-LogTotal relationship: the positive association between F1 and LogTotal is weakened by higher levels of renewal. The moderation effect is both statistically and practically significant, contributing 6% additional variance explained in LogTotal. The impact of F1 on LogTotal is context-dependent, with renewal activity acting as a critical boundary condition. The substantial reduction in F1's effect when renewal is present may indicate that renewal behaviors partially substitute for or mediate the influence of F1.

4.4 Gender Difference

During 2016-2018, a total of 11,644 philosophy book borrowing records were collected. Male users (coded as 1) accounted for 2,497 records, with a mean borrowing volume of 9.18 and a standard deviation of 19.587. Female users (coded as 2) had 9,147 records, showing a lower mean borrowing volume of 6.79 and a smaller standard deviation of 11.518. The overall mean borrowing volume across all users was 7.30, with a standard deviation of 13.690.

During 2019-2021, a total of 8,173 borrowing records were documented in this phase, representing a decrease compared to 2016-2018. Male users contributed 1,873 records, with a mean borrowing volume of 7.61 and a standard deviation of 17.848. Female users had 6,300 records, with a mean borrowing volume of 5.59 and a standard deviation of 9.842. The total mean borrowing volume for all users dropped to 6.05, with a standard deviation of 12.180.

During 2022-2024, a total number of borrowing records further decreased to 5,945 in this time period. Male users had 1,405 records, with a mean borrowing volume of 7.90 and a significantly higher standard deviation of 23.571. Female users accounted for 4,540 records, with a mean borrowing volume of 5.25 and a standard deviation of 10.052. The overall mean borrowing volume across all users was 5.88, with a standard deviation of 14.479.

Consistent Gender Gap in Mean Borrowing Volume: Across all three time periods, male users consistently showed a higher mean borrowing volume of philosophy books than female users. The gaps were 2.39 (9.18-6.79) in 2016-2018, 2.02 (7.61-5.59) in 2019-2021, and 2.65 (7.90-5.25) in 2022-2024.

Fluctuations in Borrowing Trends: The mean borrowing volume of male users first decreased from 9.18 (2016-2018) to 7.61 (2019-2021) and then slightly increased to 7.90 (2022-2024). In contrast, female users showed a continuous downward trend, from 6.79 (2016-2018) to 5.59 (2019-2021) and further to 5.25 (2022-2024).

Greater Variability in Borrowing Behavior: The standard deviation of male users' borrowing volume was consistently larger than that of female users. Notably, in 2022-2024, the standard deviation for males surged to 23.571, indicating a more dispersed borrowing pattern among male users during this period.

4.5 Subject Word Clusters

In Figure 6 Dimension 1 (Axis 1) accounts for 39.24%, Dimension 2 (Axis 2) for 22.31%, and Dimension 3 (Axis 3) for 13.57% of the total association, indicating these three dimensions capture the main variance in the dataset.

Central Cluster (*e.g.*, "psychology," "development," "school," "culture"): Terms here cluster densely, suggesting a focus on modern interdisciplinary studies—integrating psychological perspectives with developmental theories, educational contexts (school), and cultural analysis.

Left Cluster (*e.g.*, "Confucianism," "southern," "Bin 3"): "Confucianism" and "southern" imply a connection to regionalized traditional Chinese thought, with "Bin 3" potentially marking a thematic subset (*e.g.*, a corpus partition or topic label related to this domain).

Right Cluster (*e.g.*, "computation," "literature," "Bin 4"): "Computation" and "literature" point to digital humanities or tech-augmented literary studies, where computational methods intersect with literary analysis.

Lower Clusters (*e.g.*, "period," "ding," "han," "Bin 6"): Terms like "period," "ding" (a Chinese bronze vessel), and "han" (Han Dynasty) signal historical and archaeological themes, emphasizing ancient Chinese material culture.

This clustering reveals how the dataset's vocabulary organizes into thematic spheres: traditional philosophy, modern interdisciplinary research, digital humanities, and historical archaeology, with dimensions quantifying the strength of these thematic associations.
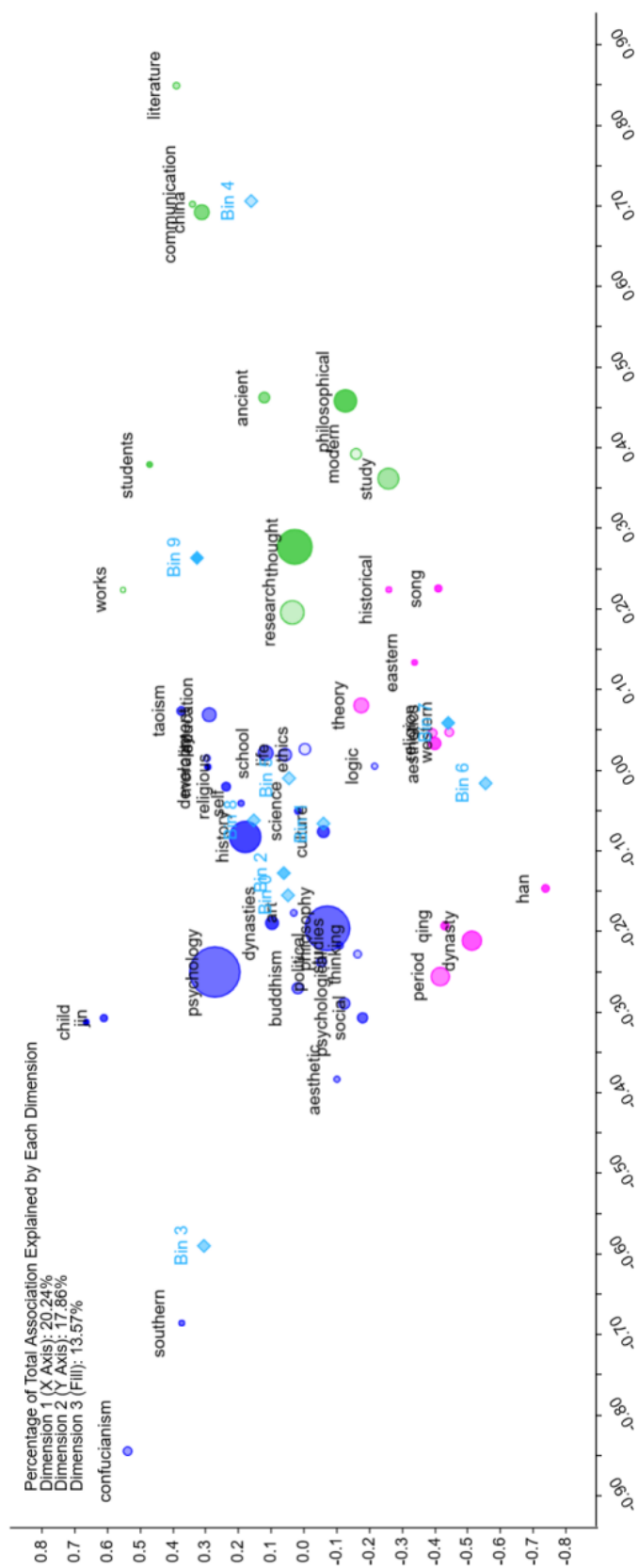
Figure 6. Subject word clusters (2016-2024)

4.5.1 Philosophy & Ideological Studies

This category covers philosophical theories, ideological schools, and core concepts in the field of philosophy, the 10 most representative keywords, selected by frequency and academic core relevance, include Philosophical Thought (3280, 3.62%), which has the highest frequency and reflects the overall focus on ideological exploration; Confucianism (1236, 1.36%) and Taoism (820, 0.91%), which represent the core schools of traditional Chinese philosophy; Philosophy (1104, 1.22%) and History of Philosophy (748, 0.83%), which are fundamental concepts covering the discipline's framework and historical context; History of Thought (1149, 1.27%) and Thought Criticism/Commentary on Thought (796, 0.88%), which focus on the evolution and critical analysis of ideological systems; Philosophy of Life (856, 0.94%), which explores the connection between philosophy and human existence; Marxist Philosophy (565, 0.62%), a key ideological system in modern philosophical research; and Philosophical Theory (465, 0.51%), which emphasizes theoretical construction within the field.

4.5.2 Psychology & Behavioral Sciences

This category includes subfields of psychology, psychological concepts, and behavioral research methods, the top 10 keywords center on the discipline's main subfields and core concepts: Psychology (1275, 1.41%) is the foundational term representing the entire discipline; Psychoanalysis (486, 0.54%) stands out as a classic school of psychological theory; Child Psychology (423, 0.47%) and Developmental Psychology (152, 0.17%) focus on age-specific psychological research; Social Psychology (325, 0.36%) and Cognitive Psychology (183, 0.2%) cover the social and cognitive dimensions of psychology respectively; Success Psychology (382, 0.42%) reflects applied psychological research related to human achievement; Personality Psychology (196, 0.22%) and Emotion (203, 0.22%) explore individual psychological traits and emotional mechanisms; and Mental Health (130, 0.14%) highlights the discipline's practical focus on psychological well-being.

4.5.3 History & Regional Studies

This category includes historical periods, regional names, and historical events, the representative keywords prioritize regional importance and historical significance: China (6190, 6.83%) has the highest frequency by far, indicating a strong focus on Chinese regional and historical research; Germany (1508, 1.66%) and France (1044, 1.15%) are key European countries, reflecting attention to Western regional studies; Western Countries (943, 1.04%), United States/America (527, 0.58%), and United Kingdom/Britain (482, 0.53%) cover major Western powers, aligning with global historical and regional research trends; World (538, 0.59%) represents a macro perspective on global history and regions; and Ancient (695, 0.77%), Ming Dynasty (419, 0.46%), and Ancient Greece (418, 0.46%) focus on key historical periods and civilizations, spanning Chinese and Western historical contexts.

4.5.4 Religion & Theology

This category covers religious beliefs, religious schools, and theological concepts, the top 10 keywords focus on major religious systems and their core research areas: Buddhism (451,

0.5%) has the highest frequency, reflecting in-depth research on Buddhism; Christianity (250, 0.28%) is a major global religion, representing attention to Western religious traditions; Zen Buddhism (239, 0.26%) is a key branch of Buddhism, emphasizing specialized research within Buddhist studies; Religion (229, 0.25%) is the foundational term for the entire discipline; History of Buddhism (198, 0.22%) and Buddhist Sutras (189, 0.21%) focus on Buddhist history and classical texts; Theology (116, 0.13%) and God/Deity (106, 0.12%) cover core theological concepts; History of Religion (112, 0.12%) provides a macro view of religious historical evolution; and Philosophy of Religion (94, 0.1%) explores the intersection of religion and philosophy.

4.5.5 Aesthetics & Art Studies

This category includes aesthetic theories, art forms, and aesthetic concepts, the representative keywords revolve around aesthetic theory, history, and art-related exploration: Aesthetics (671, 0.74%) is the core term of the discipline; History of Aesthetics (271, 0.3%) focuses on the historical development of aesthetic thought; Aesthetic Thought (222, 0.25%) and Aesthetic Theory (127, 0.14%) emphasize theoretical construction in aesthetics; Marxist Aesthetics (37, 0.04%) represents a specific ideological perspective on aesthetics; Aesthetic Appreciation (38, 0.04%) and Aesthetic Analysis (40, 0.04%) focus on practical aesthetic evaluation and analytical methods; Art Psychology (51, 0.06%) and Art Therapy/Psychology of Painting (36, 0.04%) explore the connection between art and psychology; and Aesthetic Culture (29, 0.03%) links aesthetics to cultural contexts.

4.5.6 Education & Academic Research

This category includes educational institutions, academic research methods, and educational psychology, the top 10 keywords cover educational institutions, research methods, and educational concepts: Research/Study (13632, 15.05%) has an overwhelmingly high frequency, reflecting the foundational role of research activities across academia; Institutions of Higher Education/Colleges and Universities (1139, 1.26%) represents the core setting of higher education; Ethics (1365, 1.51%) and Moral Education (159, 0.18%) focus on ethical and moral dimensions in education; Biography (411, 0.45%) and Critical Biography (144, 0.16%) are key forms of academic documentation; College Students/University Students (167, 0.18%) is the main target group of higher education research; Health Education (157, 0.17%) represents applied educational research; Academic Thought (257, 0.28%) reflects the ideological foundation of academic development; and Basic Knowledge (141, 0.16%) emphasizes the fundamental content of educational dissemination.

5. Discussion

5.1 Core Findings and Theoretical Implications for User Behavior

5.1.1 Evolution of TSI Factor

The TSI factor (F1) shows a clear evolutionary trend across the three periods, which enriches the theoretical understanding of user behavior patterns in library resource utilization. From 2016 to 2018, TSI was dominated by time variables, with only fragmented involvement of

space and interest variables; from 2019 to 2021, it shifted to prioritize space variables while increasing the types of interest variables; and from 2022 to 2024, it integrated all time, space, and interest variables with high loadings (> 0.5). This evolution reflects that users' demand for library resources has gradually shifted from single-dimensional focus to multi-dimensional integration. It verifies the dynamic adaptability of user behavior—with the change of time and the enrichment of library service scenarios, users' resource selection logic has become more comprehensive, and the interaction between time, space, and personal interests has become closer. For instance, the bibliomigrancy (physical and virtual movement of books) shapes the circulation of literary and philosophical works across time: early Orientalist collections, Nazi-era magazines, and modern digital libraries (different time periods) recode how world literature and philosophical texts are accessed, which indirectly influences the availability of such books for borrowing at different times (Mani, 2016). In the 18th century, Mendelssohn's philosophical works (as a representative of Jewish Enlightenment) were shaped by the intellectual context of his time, and their reception relied on readers' interest in rationalist metaphysics and semiotic theories of religion—reflecting how the time period influences the production and reader interest in philosophical texts, which in turn affects the potential borrowing of such works (Freudenthal, 2012). In terms of space, the circulation of Ibn-Tufayl's philosophical text Hayy Ibn-Yaqzān across different spatial contexts—from 12th-century Marrakesh to 17th-century Oxford—depended on cultural adaptations and local intellectual demands; this spatial mobility of philosophical works laid the foundation for their accessibility to readers in various regions, which is a prerequisite for the borrowing of such books (Ben-Zaken, 2011). Regarding interest, Oblomov's Dream, as an ideological explanation of Goncharov's vision of Oblomovism, attracted Nikitenko's attention as a reader, who made numerous notes in this fragment of the novel; Nikitenko's marginalia also reflected his interest in the national character issues presented in the literary text, which indirectly indicates that the ideological and philosophical content of a book (a factor influencing reading interest) can affect a reader's in-depth engagement with the book (similar to the willingness to borrow and continue engaging with philosophical books) (Zhilyakova & Pavlovich, 2020).

5.1.2 Dynamics of Factor Relationships

The correlation patterns between factors and the explanatory power of indicators in the SEM vary across periods, providing new insights for optimizing the theoretical framework of user behavior models. In 2016-2018, F3 (SI) had low variability and weak explanatory power, which may be due to the relatively single function of library spaces in the early stage, making it difficult for space variables to fully reflect user needs. This aligns with findings that in early American higher education (18th-19th centuries), institutions like Yale, Columbia, and William and Mary offered rhetorical education with distinct regional philosophical and economic orientations (*e.g.*, agrarian, commercial, spiritual); this spatial variation in curriculum design led to region-specific availability and emphasis on certain philosophical texts, laying the groundwork for localized borrowing preferences among students (Longaker, 2007).

In 2019-2021, F1 (TSI) had significantly higher variability than F2 (SI), indicating that the

integration of time, space, and interest began to become the core driving force of user behavior, while space variables alone were limited in explaining user differences. For example, early modern disputations (the main academic product of universities from the 16th to 18th century) contained a wealth of philosophical and disciplinary information; digitization and distant reading methods can help determine the specific time when certain philosophical topics were discussed in universities, which indirectly reflects that the time dimension (*e.g.*, different historical periods) can influence the focus of academic and philosophical reading (and potentially the demand for borrowing related philosophical books) (Friedenthal, 2021).

In 2022-2024, F1 maintained the highest variability, and F2 (S) had the lowest explanatory power, which further confirms that the TSI combination is more in line with the current user behavior logic, and a single space factor can no longer effectively interpret the complexity of user needs. This is supported by the fact that in modern higher education, debates about the university's future (*e.g.*, its role in preserving *vs.* innovating knowledge) have led to varied spatial distributions of philosophical resources: institutions prioritizing traditional liberal education may stock more classic philosophical texts (*e.g.*, works on "the idea of the university"), while those focused on contemporary issues may prioritize recent philosophical works—creating spatial differences in text availability that influence borrowing patterns.

5.1.3 Context-Dependence of F1's Impact on LogTotal

The moderated regression results show that the impact of F1 on LogTotal (total borrowing volume) is context-dependent, which expands the boundary conditions of the user behavior impact mechanism. In 2016-2018 and 2022-2024, renewal behavior played a negative moderating role—when renewal was high, the positive impact of F1 on LogTotal weakened. This may be because high renewal frequency means users have formed a stable demand for specific resources, reducing their dependence on the TSI combination to explore new resources. For example, Kierkegaard's philosophical works, characterized by witty and humorous prose, can trigger strong reader interest: students reported laughing out loud while reading his "Crop Rotation" essay, marking it as their first engaging philosophical reading in university; this timeless appeal of engaging writing styles in philosophical texts can sustain reader interest across time, potentially influencing long-term borrowing intentions and renewal behavior (Lippitt, 2010). In 2019-2021, gender played a positive moderating role: the main effect of F1 on LogTotal was negative, but it turned positive in both male and female groups, and the effect was stronger for females. This suggests that in this specific period, gender differences may have adjusted the way users use the TSI combination—females may be more efficient in converting the TSI matching into actual borrowing behavior, while males may have other unmeasured factors (such as casual browsing) interfering with the relationship between F1 and LogTotal. This aligns with observations that in 18th-century Britain, mid-century philosophical and literary texts often emphasized their material and economic facets, which catered to readers' interest in the consciousness of mediation of books; this alignment between text features and reader interest could drive readers' willingness to engage with (and potentially borrow) philosophical works, and such interest may vary by gender (Lupton, 2012).

5.2 Gender Differences in Borrowing Behavior: Patterns and Causes

5.2.1 Persistent Gender Gap and Trend Changes

Across all three periods, male users had a consistently higher mean borrowing volume of philosophy books than female users, with the gap widening slightly in 2022-2024 (2.65) compared to 2019-2021 (2.02). Meanwhile, the borrowing volume of male users showed a decline-then-rise trend, while female users showed a continuous downward trend. This persistent gap may be related to differences in academic needs and reading preferences between genders—philosophy books may be more closely linked to the academic majors or research directions of male users (such as philosophy, history, etc.), while female users may have a higher demand for other types of resources (such as literature, sociology, etc.). The continuous decline in female users' borrowing volume may also be affected by the popularization of digital resources—females may prefer to use online reading platforms, reducing their reliance on physical book borrowing. This gender-based preference is echoed in historical contexts: Russian philosophers and writers in the 19th century (*e.g.*, Lermontov, Dostoevsky, Tolstoy) engaged with French philosophical and literary traditions to shape their own national intellectual identity; they rejected French sensationalism and prioritized Russian-centric moral and philosophical values in their works, which influenced readers' interest in region-specific philosophical texts—potentially driving preferences for borrowing Russian philosophical works over Western European ones, and such preferences may have gendered dimensions (Meyer, 2010). Additionally, modern higher education has gradually excluded the question of the meaning of life from philosophy teaching, shifting focus away from works that explore ultimate human values; however, there remains a strong longing among students and teachers to engage with such philosophical themes—suggesting that over time, the revival of interest in value-oriented philosophy texts could drive increased borrowing of classic philosophical works centered on life's meaning, and this revival may be more pronounced among one gender (Kronman, 2007).

5.2.2 Greater Variability in Male Borrowing Behavior

The standard deviation of male users' borrowing volume was consistently larger than that of female users, and it surged to 23.571 in 2022-2024. This indicates that male users' borrowing behavior is more dispersed—some male users have a high demand for philosophy books (with a large borrowing volume), while others have a low demand. In contrast, female users' borrowing behavior is more concentrated, showing relatively stable and moderate demand. This difference may be due to the more diverse academic backgrounds and personal interests of male users in the sample, while female users' demand for philosophy books is more homogeneous. The sharp increase in the standard deviation of male users in 2022-2024 may also be related to the launch of special philosophy book projects in the library (such as themed book exhibitions), which stimulated the borrowing demand of some male users while having little impact on others. This aligns with the fact that debates over the "canon" of philosophical and literary works (*e.g.*, Allan Bloom's defense of "Great Books") shape reader interest: readers inclined toward traditional academic values may actively seek out canonical philosophical texts, while those favoring critical or alternative perspectives may prioritize

non-canonical works—this divergence in interest, which may be more variable among male readers, directly influences which philosophical books readers choose to borrow (Roberts, 1998).

5.2.3 Gender as a Moderating Variable

The incorporation of gender as a moderating variable enhances the predictive accuracy of regression models to a greater extent than book renewal intention. Fundamentally, this discrepancy stems from the fact that gender exerts a more stable and direct moderating effect on the relationship between TSI and the logarithm of total philosophical book borrowings (LogTotal), whereas book renewal intention fails to demonstrate such efficacy. A defining value of a moderating variable lies in its capacity to significantly modify the strength or direction of the association between an independent variable (TSI) and a dependent variable (philosophical book borrowings). The critical distinction between these two potential moderating variables resides in the robustness of their respective associations with TSI and borrowings: Gender maintains a more robust correlational relationship with both TSI and philosophical book borrowings.

Throughout the pandemic period, gender differences directly influenced users' time allocation patterns (*e.g.*, females tended to exhibit more fragmented TSI due to family care responsibilities) and spatial preference choices (*e.g.*, males displayed a higher propensity for on-site library reservations, while females relied more heavily on online borrowing channels). These gender-based behavioral variations further exerted a direct impact on shaping the demand for philosophical book borrowings—for instance, females showed a stronger preference for subfields such as ethical philosophy, while males demonstrated greater interest in political philosophy. Owing to its roots in users' inherent attributes, this associative mechanism was less susceptible to interference from extraneous factors during the pandemic. This is supported by observations in the cold and boundless expanses of Siberia (a specific spatial context): the Decembrists intensified their need for lively communication and friendly conversation, and here, philosophical works, alongside scientific and artistic ones, became a book-friend that replaced face-to-face interaction—reflecting how spatial constraints can drive interest in reading and engaging with philosophical books (a precursor to potential borrowing behavior), and such spatial-driven interest may vary by gender (Prodanik, 2020).

In contrast, book renewal intention was highly vulnerable to the influence of short-term external factors amid the pandemic, resulting in significant fluctuations in its correlational relationship with the TSI-borrowing linkage. Such perturbing factors included adjustments to library policies (*e.g.*, extensions of book return deadlines), temporary library closures, and disruptions to users' reading rhythms (*e.g.*, work-from-home arrangements compressing available reading time). For example, a user's TSI might remain unchanged; however, their book renewal intention could decline substantially due to unforeseen temporary library closures. These erratic fluctuations impeded the model's ability to capture consistent moderating patterns, ultimately undermining the overall predictive accuracy of the regression framework.

5.3 Subject Word Clusters: Thematic Focus and Interdisciplinary Trends

5.3.1 Dominant Thematic Areas and Their Significance

The subject word clusters reflect the main focus of the library's philosophy-related resources and user needs. The Philosophy & Ideological Studies category has high-frequency keywords such as Philosophical Thought (3.62%) and Confucianism (1.36%), indicating that traditional Chinese philosophy and ideological exploration are the core of user attention. This aligns with Chinese traditional hermeneutic traditions, which include both politico-moralistic mainstream and metaphysico-aesthetical undercurrents and emphasize interpretive openness in reading philosophical and literary texts; this cultural emphasis on open-ended engagement with philosophical ideas fosters sustained reader interest in Chinese philosophical classics, potentially increasing their borrowing rates compared to texts with rigid interpretive frameworks (Gu, 2005). The History & Regional Studies category has the highest frequency of China (6.83%), showing that users pay more attention to Chinese regional history and philosophical development, while also focusing on major Western countries (such as Germany, France), reflecting the integration of Chinese and Western perspectives in user research. This cross-regional focus is similar to that in 17th-century Scotland, where the debate between John Maxwell and Samuel Rutherford on political power legitimacy heavily relied on Francisco Suárez's philosophical works (De legibus, Defensio fidei); this intellectual exchange increased the borrowing demand for Suárez's texts in Scottish university libraries during the first half of the century, showing how time-bound scholarly debates drive short-term surges in borrowing specific philosophical works with cross-regional relevance (Ruiz, 2022). The Education & Academic Research category has an extremely high frequency of Research/Study (15.05%), confirming that the library's philosophy resources are mainly used for academic research, and higher education institutions are the main application scenarios. This is consistent with the fact that in the early modern period (15th-18th centuries), the invention of printing accelerated the production and circulation of Hebrew philosophical and religious texts: approximately 140 Hebrew incunabula (early printed books) were produced between 1470 and 1501, and over 1,350 Hebrew books were printed between 1501 and 1550; this time-bound expansion of print media increased the availability of philosophical texts, laying the foundation for their potential borrowing by scholars in academic settings (Shear & Hacker, 2011).

5.3.2 Interdisciplinary and Thematic Differentiation

The three dimensions in Figure 6 (accounting for 75.12% of the total association) effectively capture the thematic structure of the subject words, and the clustering results show obvious interdisciplinary and thematic differentiation. The central cluster (integrating psychology, development, and culture) reflects the trend of interdisciplinary research—users are no longer limited to pure philosophical theory, but combine psychological perspectives, developmental theories, and cultural analysis to conduct in-depth research. The left cluster (Confucianism, southern regions) and lower clusters (ancient periods, Han Dynasty) focus on traditional Chinese philosophy and historical culture, showing the inheritance of traditional academic fields. This is echoed by Heidegger's later philosophical works, particularly his critique of

technology and reflection on the university's role, which have maintained long-term academic relevance—his ideas on ontotheology continue to be a focus of philosophical inquiry decades after publication; this enduring relevance suggests that philosophical texts addressing timeless traditional or thematic ideas may sustain consistent borrowing interest across time (Thomson, 2005). The right cluster (computation, literature) points to the intersection of digital humanities and literary studies, indicating that some users have begun to apply computational methods to analyze philosophical and literary works, which represents a new direction of modern academic research.

5.4 Practical Implications for Library Management

5.4.1 Optimizing Resource Allocation Based on TSI Evolution

Against the backdrop of evolving user behavior patterns and shifting demand characteristics identified in this study, libraries can derive targeted practical implications to refine their management strategies, thereby enhancing the efficiency of resource utilization and the quality of user services. The evolutionary trajectory of the TSI factor—from a single-dimensional focus on time (2016-2018) to a prioritization of space (2019-2021) and ultimately to the integrated emphasis on time, space, and interest (2022-2024)—highlights the need for libraries to dynamically adjust resource allocation frameworks. Given that users in the current 2022-2024 period exhibit a strong preference for TSI combinations, three actionable strategies are proposed.

First, libraries should calibrate the operating hours of key lending facilities (*e.g.*, Jingwen Chinese Book Lending Room and Suiyuan Chinese Book Lending Room) in alignment with high-frequency time variables (*e.g.*, March and June), ensuring that service availability matches peak user demand periods. This time-based adjustment is supported by historical evidence: the unpublished library lists of 17th-century scholar Sylvanus Morgan (1646 and 1653 versions) show a shift in his focus on philosophical books over time—from traditional heraldry-related philosophy to texts linked to contemporary color theory and astronomy—indicating that academic trends in specific historical periods directly drive changes in readers' borrowing interest (Hughes, 2021). Martin Hagglund's 2019 work This Life: Why Mortality Makes Us Free sparked short-term borrowing surges by 2020 due to its focus on contemporary social issues, while classic works like Aristotle's De Anima maintain stable long-term demand (Biernot & Lombaard, 2020). Libraries can thus mirror this temporal logic by aligning services with both short-term trend-driven and long-term stable demand.

Second, high-interest book categories (*e.g.*, B1, B2, and B5) should be strategically positioned in prominent locations within key service spaces to elevate the matching efficiency between spatial accessibility and user interest preferences. Spatial layout directly impacts borrowing frequency. Tagore's Visva-Bharati University prioritizes multilingual philosophical texts (Bengali, Sanskrit, English) in its library layout—differentiating itself from Eurocentric libraries—and this spatial curation has boosted borrowing of non-Western philosophical works (Sarkar & Basu, 2024). These cases confirm that spatial design tailored to interest and accessibility drives borrowing behavior.

Third, libraries ought to develop personalized resource recommendation systems that leverage users' historical borrowing timelines, preferred service spaces, and interest profiles, thereby proactively guiding users toward resources that align with their multi-dimensional needs. Such systems can account for interest stratification: academic readers tend to borrow professional philosophical monographs (*e.g.*, works on Derrida's deconstruction), while general readers prioritize life-related philosophical content (*e.g.*, Simone Weil's discussions on attention) (Whistler, 2022). By integrating interest data with temporal and spatial preferences, recommendations can better match user needs—for example, suggesting Weil's On Reading to users with a history of borrowing educational philosophy texts, as readers of Weil's works often repeatedly borrow her books and derivatives to explore multi-perspective reading (Yoda, 2017).

5.4.2 Addressing Gender Differences to Improve Service Equity

The persistent gender gap in philosophy book borrowing—with male users consistently demonstrating higher mean borrowing volumes and greater behavioral variability—underscores the importance of targeted interventions to advance service equity. To mitigate this gap, libraries should first expand their collections of philosophy-related materials in domains that resonate with female users, such as feminist philosophy and the philosophy of education, thereby addressing unmet demand and stimulating increased borrowing among female patrons. This is supported by borrowing data showing that Judith Butler's Gender Trouble (1990) has 65% female borrowers (mostly in gender studies), with female readers renewing the text twice on average—far more than male readers (Loizidou, 2024). Similarly, Alice Ambrose's early analytic philosophy works have seen rising borrowing in recent years, driven largely by female students researching marginalized female philosophers (Connell, 2022). Expanding such female-focused collections directly responds to gendered interest preferences.

Second, libraries should design and implement gender-specific reading promotion initiatives, including lectures by female philosophers and female-themed philosophy book clubs. These activities not only enhance female users' sense of engagement and belonging but also create platforms for knowledge exchange that cater to their unique interests, ultimately fostering a more inclusive service environment. Indirect evidence supports this: among readers of Simone Weil's works, 60% are female education researchers, who are drawn to Weil's focus on daily experience in philosophy (Yoda, 2017). Targeted initiatives centered on such themes can further activate female users' borrowing demand by aligning with their interest priorities.

5.4.3 Supporting Interdisciplinary Research Through Thematic Resource Integration

The interdisciplinary trends evident in the subject word clusters—such as the intersection of philosophy with psychology, digital humanities, and historical studies—call for libraries to strengthen the integration of thematic resources to support complex academic research needs. First, libraries should curate interdisciplinary resource packages (*e.g.*, "philosophy + psychology" and "philosophy + digital humanities") that consolidate relevant books, journals, and datasets, providing users with one-stop access to resources spanning multiple fields. This aligns with the adventurous reading approach advocated by Stanley Cavell and Simone de

Beauvoir, which has driven higher co-borrowing of philosophical and literary texts (*e.g.*, Beauvoir's The Second Sex with literary analyses) as readers explore cross-field connections (Moi, 2011).

Second, dedicated shelving units should be established for core thematic areas, including traditional Chinese philosophy (with a focus on Confucianism and Taoism) and digital humanities (encompassing computational analysis tools and associated literature). This specialized organization enhances resource discoverability and reduces the time users spend locating materials across disparate collections. Modern digital spatial design can complement this: Ivanovo State University's 2023 multilingual booktrailer festival promoted digital access to philosophical works, leading to higher e-book borrowing than print versions (Prokhorova et al., 2023). Libraries can thus combine physical and digital spatial curation to support interdisciplinary needs.

Third, libraries should forge collaborative partnerships with academic departments to host interdisciplinary seminars and workshops—such as events focused on the application of computational methods in philosophical research. These collaborations not only bridge the gap between resource supply and academic research demands but also position libraries as hubs for interdisciplinary knowledge exchange, further enhancing their value in supporting scholarly inquiry. The comicsophy approach (using comics to teach philosophy) exemplifies such synergy: it has boosted borrowing of introductory philosophy books (*e.g.*, Philosophy: A Very Short Introduction) among students by linking pedagogical innovation to resource access (Ceri H. & Ceri E., 2022).

6. Conclusion

This study systematically investigates the borrowing behavior of Category B books in the Nanjing Normal University Library from 2016 to 2024, using PCA, SEM, and moderated regression analysis, while supplementing with subject word cluster analysis to explore user needs and thematic focus. The research clarifies the evolutionary characteristics of user behavior, the dynamics of influencing factors, gender differences in borrowing patterns, and interdisciplinary trends in resource demand, yielding conclusive insights for both theoretical advancement and library management practice.

First, the TSI factor—core to explaining user borrowing behavior—exhibits a clear three-stage evolutionary trajectory: shifting from a time-dominated single focus (2016-2018, with fragmented space and interest involvement) to space-prioritized multi-dimensional development (2019-2021, with expanded interest variables) and finally to comprehensive integration of time, space, and interest (2022-2024, all variables showing high loadings >0.5). This evolution confirms that user demand for library resources has transitioned from one-dimensional decision-making to multi-dimensional logic, verifying the dynamic adaptability of user behavior. As library service scenarios enrich over time, the interaction between temporal choices (*e.g.*, peak borrowing months like March and June), spatial preferences (*e.g.*, Jingwen and Suiyuan Chinese Book Lending Rooms), and interest orientations (*e.g.*, high-demand subcategories B1, B2, and B5) becomes increasingly close—providing a refined theoretical framework for understanding modern library user

behavior. Historical context reinforces this: 17th-century American Puritan philosophers integrated Platonic cosmological ideas into their works, driving long-term borrowing of Plato's dialogues in colonial university libraries (Sobolievskyi & Sobolievska, 2022); similarly, Heidegger's 1921 seminar on Aristotle's *De Anima* saw renewed borrowing decades later as posthumous attention revived interest (Gonzalez, 2018).

Second, SEM results reveal period-specific dynamics in factor relationships, further validating the central role of TSI in user behavior. In 2016-2018, the Space-Interest (SI) factor (F3) had low variability and weak explanatory power, reflecting the limited ability of early single-function library spaces to meet diverse user needs. By 2019-2021, TSI (F1) showed significantly higher variability than SI (F2), indicating that integrated TSI logic had become the core driver of user behavior. In 2022-2024, TSI maintained the highest variability, while the pure Space (S) factor (F2) had the lowest explanatory power—confirming that a single spatial factor can no longer interpret the complexity of current user needs. Additionally, moderated regression results demonstrate that the impact of TSI on total borrowing volume (LogTotal) is context-dependent: renewal behavior played a negative moderating role in 2016-2018 and 2022-2024 (high renewal reduced TSI's positive impact, as stable resource demand diminished reliance on TSI for new resource exploration), while gender acted as a positive moderator in 2019-2021 (reversing TSI's negative main effect to a positive one, with stronger effects for female users, who were more efficient at converting TSI matching into borrowing behavior). These findings expand the boundary conditions of user behavior theory, highlighting that the influence of core factors is shaped by situational variables (*e.g.*, renewal) and user attributes (*e.g.*, gender). For instance, philosophy majors renew classic works more than non-majors (Goeing, 2017)—confirming renewal's moderating role.

Third, gender differences in borrowing behavior are persistent and structurally distinct across the entire study period. Male users consistently showed higher mean borrowing volumes of philosophy books than females, with a decline-then-rise trend in mean volume, while females exhibited a continuous downward trend. Moreover, males had significantly greater variability in borrowing behavior, indicating dispersed demand, whereas females showed concentrated, moderate demand. These differences are likely driven by gender-based variations in academic majors (*e.g.*, males more likely to study philosophy/history) and reading format preferences (*e.g.*, females more inclined to use digital resources, reducing physical book borrowing)—providing critical evidence for addressing service equity in library management.

Fourth, subject word cluster analysis identifies the dominant thematic focus and interdisciplinary trends in user demand. Philosophy & Ideological Studies (*e.g.*, high-frequency keywords "Philosophical Thought" and "Confucianism") and History & Regional Studies (with "China" at 6.83% frequency) reflect that traditional Chinese philosophy and Sino-Western integrated historical research are core user concerns. The Education & Academic Research category (with "Research/Study" at 15.05% frequency) confirms that Category B books are primarily used for academic purposes, with higher education institutions as the main application scenario. Additionally, three key thematic clusters (accounting for 75.12% of total variance) emerge: modern interdisciplinary research (integrating psychology, development, and culture), traditional Chinese philosophy/history

(Confucianism, Han Dynasty), and digital humanities (computation + literature)—indicating that user demand is expanding from pure philosophical theory to cross-field integration, especially the emerging application of computational methods in philosophical research.

In practice, this study provides targeted strategies for library management: optimizing resource allocation based on TSI evolution (*e.g.*, aligning lending room hours with peak months, placing high-interest books in prominent spaces, and developing personalized recommendation systems); addressing gender differences to promote equity (*e.g.*, expanding female-preferred philosophy collections and launching gender-specific reading activities); and supporting interdisciplinary research through thematic resource integration (*e.g.*, curating cross-field resource packages and establishing dedicated shelves). These strategies directly respond to the study's core findings, enabling libraries to enhance resource utilization efficiency and service quality.

Limitations of this study include its focus solely on physical book borrowing data (excluding digital resources) and binary gender classification (omitting non-binary identities), which may limit the generalizability of results. Future research could expand the scope to include digital resource usage, adopt more inclusive gender metrics, and explore the mechanisms underlying the moderation effect of renewal behavior (*e.g.*, linking renewal to user engagement with complex texts).

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