Age-Group-Based Study on Influencing Factors of Intention to Use Digital Reading (Postprint)

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Abstract

[Purpose/Significance] This study explores the influencing factors of digital reading usage intention across different age groups, providing a theoretical basis for personalized services in digital reading promotion. [Method/Process] Using the "digital native" classification criteria as the basis for age stratification, and employing Shannon's information transmission model and relevant theories of reading psychology as the foundation for constructing a model of factors influencing digital reading usage intention, this study utilizes questionnaire surveys and structural equation modeling to analyze age-related differences in factors affecting digital reading usage intention. [Results/Conclusion] The results demonstrate that factors influencing digital reading usage intention vary across age groups; usage intention is impacted by information source characteristics, motivation, and information content features; digital reading promotion services can leverage these differences to provide personalized services for readers across different age groups.

Full Text

Preamble

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Abstract

[Purpose/Significance] This study explores the factors influencing users' digital reading intention across different age groups, providing a theoretical basis for personalized services in digital reading promotion. **[Method/Process]** Using the "digital native" classification standard as the basis for age stratification and drawing on Shannon's information transmission model and reading

psychology theories, we constructed a model of digital reading intention factors. Through questionnaire surveys and structural equation modeling, we analyzed age-based differences in factors affecting digital reading intention. [**Results/Conclusions**] The findings reveal that factors influencing digital reading intention vary by age; usage intention is affected by source characteristics, motivation, and information content features. Digital reading promotion services can leverage these differences to provide personalized services for readers of all age groups.

Keywords: digital reading; usage intention; influencing factors; reading promotion; age
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Introduction

Nationwide reading is a crucial pathway for enhancing national cultural literacy, having been included in the government work report for five consecutive years since 2014 [1-2]. In 2018, Premier Li Keqiang once again advocated for nationwide reading in the government work report. Concurrently, with the parallel development of the internet and informatization, digital reading has gradually become a favored reading method among readers [3]. According to the *14th National Reading Survey Report*, China's digital reading rate has continuously increased for eight years [4], surpassing book reading rates for the first time in 2014. In the most recent survey, this figure continues to rise, exceeding 80% for the first time [5]. Figure 1 [Figure 1: see original paper] illustrates the national reading rate in China over the past decade, reflecting changes in reading patterns.

Current research emphasizes the disadvantages of digital reading in terms of comprehension effectiveness, while nationwide reading promotion services vigorously advocate for book reading. However, digital reading also represents a massive "market." Rather than resisting it outright, we should seek better ways and approaches to improve digital reading effectiveness, presenting new tasks and challenges for library and digital platform reading services. Digital reading promotion should serve as an integral component of reading promotion efforts, deepening personalized services by uncovering the underlying reasons for readers' digital reading choices and targeting the enhancement of digital reading effectiveness.

This study aims to explore users' digital reading usage intention to provide evidence for personalized and deepened development of digital reading promotion. Current research on digital reading intention is fragmented, mostly targeting university students, which does not represent the overall reading population in terms of age distribution. Moreover, most studies rely on TAM (Technology Acceptance Model) as their theoretical foundation, indicating a need for expanded research approaches. This study introduces the concept of "digital natives" to

group ages, comprehensively investigating influencing factors of digital reading intention across different age groups. Based on Shannon's information transmission model and reading psychology theories, we construct a theoretical model for factor analysis and employ structural equation modeling to conduct exploratory analysis of factors affecting digital reading intention across age cohorts. This research focuses on and attempts to address the following questions: What factors influence users' digital reading intention? Do these factors differ across age groups, and if so, how? How should digital reading promotion integrate these differences to serve readers of different ages?

Literature Review

Digital reading refers to the digitization of reading, encompassing two dimensions: first, reading content presented digitally, such as e-books, web browsing, and mobile device reading; second, using digital reading carriers like mobile phones, pads, and Kindles [6]. Emerging alongside internet and digital technology development, digital reading is gradually transforming traditional paper-based reading and interaction methods, becoming a mainstream approach for knowledge acquisition, emotional communication, and information sharing [7]. Digital reading typically employs non-linear, hypertext-based reading methods, primarily including e-books, e-journals, e-newspapers, email, web browsing, and social media usage. Movies and electronic games consumed through digital devices are not included in this category [8-9].

Since its emergence, digital reading has sparked intense theoretical research both domestically and internationally. Wu Jianhua's knowledge mapping analysis of reading research identified digital reading as a key current research direction in China [10]. To further understand domestic and international digital reading research, we first searched and reviewed foreign literature on digital reading in the Web of Science database. Although numerous digital reading studies exist, few address factors influencing digital reading intention, though relevant research provides valuable references. For instance, V. Cesário et al. used direct observation to study children's reading preferences, finding that 53% of children chose both paper and digital formats, while only 29% selected digital reading exclusively, possibly related to their curiosity [11]. K. Kurata et al. considered reading behavior and preferences as benchmarks for exploring reading modality shifts [12]. S. Benedetto et al. investigated the effects of screen brightness and ambient illumination on visual fatigue during prolonged digital reading (one hour or more) [13].

In domestic literature analysis, using CNKI database and "digital reading" as the search theme, we found research directions primarily focusing on digital reading promotion and services, digital reading education, and discussions on the relationship between digital reading and paper reading. Studies specifically targeting digital reading intention factors are relatively scarce. Huang Yukai used the butterfly catastrophe model, technology acceptance model, and planned behavior theory to analyze factors influencing e-book selection behav-

ior, constructing relationships among factors affecting consumers' digital reading intention and concluding that perceived behavioral intention and attitude are two primary factors [14]. Cui Wenhao surveyed university students' digital reading situations using questionnaires, analyzing factors influencing reading carrier selection, digital reading domain distribution, and the impact of information digitization on reading behavior, finding that information acquisition speed and cost drive digital reading selection, while visual experience differences lead to abandonment [15]. Yan Qiuyu analyzed the current state of university students' digital reading and its impact through literature and practice research, summarizing four main influencing aspects: external factors, reader device factors, personal factors, and digital content factors [16]. Yang Wenyong identified demographic, social, and psychological factors influencing highly educated elderly people's digital reading usage through sampling surveys and interviews [17].

Wei Yushan, Director of the China Press and Publication Research Institute, identified three reasons for the high attention to digital reading: first, rapid digital reading penetration with increasing year-over-year growth rates; second, fast-changing digital reading terminals, evident from mobile device evolution; third, significant impact on traditional reading methods, with digital reading gradually becoming readers' primary reading format [18]. In an era where digital reading is becoming mainstream, uncovering factors influencing readers' digital reading intention holds profound significance for nationwide reading promotion.

Analysis of Digital Reading Intention Factors and Model Construction

3.1 Age Stratification Basis: Digital Natives

M. Prensky first proposed the concepts of digital natives and digital immigrants in 2001. Digital natives refer to those born after 1980, a generation raised with digital reading, whose lives are saturated with computers, mobile phones, and other digital products, enabling unrestricted reading activities anytime and anywhere through networks and digital technology. Using 1980 as the boundary, Prensky defined digital immigrants as those born before 1980, who typically prefer traditional reading methods [19-22]. However, no unified classification standard exists for digital natives and immigrants. Later researchers such as L. Rainie used 1985 as the dividing point [23], while Zhao Yuxiang considered 1975 as the boundary [24]. This study adopts Prensky's standard, dividing readers into three groups: middle-aged group (post-70s), youth group (post-80s and post-90s), and teenage group (post-00s). Additionally, the *15th National Reading Survey Report* indicates that nearly 90% of adults with digital reading behavior are under 49 years old; therefore, this study excludes readers born before the 1970s.

3.2 Information Transmission Model and Its Four Elements

The digital reading process is fundamentally an information transmission process. Shannon's classic information transmission model contains four key elements (see Figure 2 [Figure 2: see original paper]): first, the source—the information sender. In digital reading, the source can be digital platforms like WeChat public accounts or archives and libraries conducting digital reading promotion services. Second, the information itself, which is the primary factor in the transmission process. Third, the channel—the pathway through which information is transmitted, such as computers and mobile devices used in digital reading. Fourth, the destination—the information receiver. These four elements constitute the basic information transmission process [25]. Digital reading is an important component of reading promotion services, which also involve four main entities: reading promotion subjects (planners, organizers, implementers, and managers), reading promotion content, reading promotion objects (information receivers), and reading promotion channels and methods—the approaches used to promote to users [26]. These four aspects align with the four elements in the information transmission process, making them essential for analyzing digital reading intention factors.

3.3 Reading Motivation Theory

Reading psychology theories and methods are widely applied in linguistics and education but have not been closely integrated with library science reading services. Reading motivation research began in the late 20th century. Guo Benyu's translations of H. Petri's *Motivation Psychology* and *Human Motivation* provide detailed studies of human motivation. Many foreign researchers have constructed reading motivation scales based on general motivation theories, which Ou Jihua et al. summarized. The earliest and most systematic domestic work on reading motivation is Zhang Biyin's *Reading Psychology*, which states that reading motivation is the internal drive propelling reading activities, elaborating on how intrinsic and extrinsic motivation affect reading. Intrinsic motivation includes self-achievement, self-identity, and self-regulation, while extrinsic motivation is primarily influenced by social environments like family and school [27]. This study references reading motivation research and theory, dividing motivation into internal and external motivation to analyze digital reading intention.

3.4 Research Hypotheses and Model Construction

Based on the four elements of the information transmission model—source, information, channel, and destination—and drawing on literature review, relevant theories, and this study's theme, we first constructed a hypothetical model of digital reading intention factors (see Figure 3 [Figure 3: see original paper]), then proposed the following research hypotheses:

Hypothesis H1: Source characteristics influence users' digital reading inten-

tion and exhibit age differences.
H1-1: Source characteristics influence users' digital reading intention.
H1-2: The influence of source characteristics on digital reading intention differs across age groups.

Hypothesis H2: Information content characteristics influence digital reading intention and exhibit age differences.
H2-1: Information content characteristics influence digital reading intention.
H2-2: The influence of information content characteristics on digital reading intention differs across age groups.

Hypothesis H3: Channel interference factors influence digital reading intention and exhibit age differences.
H3-1: Channel interference factors influence digital reading intention.
H3-2: The influence of channel interference factors on digital reading intention differs across age groups.

Hypothesis H4: Destination reading motivation influences digital reading intention and exhibits age differences.
H4-1: Destination reading motivation influences digital reading intention.
H4-2: The influence of destination reading motivation on digital reading intention differs across age groups.

3.5 Construction of Digital Reading Intention Factors Scale

Based on the hypothetical model, we constructed an influencing factors scale. Scales typically contain latent variables and observed variables. Latent variables reflect underlying phenomena that cannot be directly observed, while observed variables can be directly measured; thus, latent variables must be parsed into observable indicators.

3.5.1 Latent Variables The latent variables in the digital reading intention scale are source, information, channel, and destination. The source refers to the origin of reading information. Based on existing research, the source can be further decomposed into "source reliability and professionalism." C. Hovland and M. McGuire et al. consider source characteristics to include professionalism and reliability [28-29]. Information refers to reading content, which is generally organized linearly or non-linearly. While linear organization is considered unique to paper reading, many digital reading devices can also provide linear reading methods due to device diversification. Information content characteristics, as classification criteria for text reading, may differentially affect digital reading intention. Thus, the information latent variable can be decomposed into "information content characteristics" and "information organization methods." The channel refers to the pathway for reading information transmission. In Shannon's information transmission model, noise is a major factor in the information transmission process. In digital reading, interference factors are typical noise; therefore, channel is primarily manifested as interference factors.

The destination refers to users, i.e., readers. Zhang Biyin's *Reading Psychology* provides in-depth discussion of motivation's impact on reading. From a motivational psychology perspective, motivation can be divided into internal and external motivation—internal motivation is inherent, while external motivation exists outside the action. Therefore, the destination latent variable is expressed through external and internal motivation. Digital reading usage intention directly expresses user preferences, for which several usage intention decision indicators are proposed. Table 1 shows variable definitions and sources.

3.5.2 Observed Variables Based on source characteristics, information features, channel interference, and destination motivation features, we identified seven secondary latent variables. Each latent variable includes 2-6 questions corresponding to observed variables, forming a three-level digital reading intention influencing factors scale, as shown in Table 2 .

3.5.3 Moderating Variables When the relationship between variable Y and variable X is a function of variable M, M is called a moderating variable. This study uses age as the moderating variable to explore differences in digital reading intention across age groups.

Questionnaire Survey and Analysis

4.1 Questionnaire Design

Based on the previously designed digital reading intention factors scale, we developed a questionnaire divided into two parts: the first part collects readers' age information, and the second part uses a five-point Likert scale to measure each indicator's influence on digital reading intention, where "5" represents "strongly agree," "4" "agree," "3" "neutral," "2" "disagree," and "1" "strongly disagree." The questionnaire includes 25 questions: 5 questions for the source (source) dimension coded S1-S5; 8 questions for the information (message) dimension coded M1-M8; 3 questions for the channel dimension coded C1-C3; and 5 questions for the destination (receiver) dimension coded R1-R5.

4.2 Data Collection and Analysis

4.2.1 Data Collection This survey was conducted online using the "Wenjuanxing" platform from December 25, 2017, to January 7, 2018, collecting 821 questionnaires, with 684 valid responses (approximately 83% recovery rate). The middle-aged group contributed 214 valid responses (after excluding 9 invalid), the youth group 388 (after excluding 96 invalid), and the teenage group 219 (after excluding 32 invalid). The proportions of valid questionnaires across age groups were 30%, 43%, and 27% respectively, with post-80s and post-90s users in the youth group representing a slightly higher proportion than other groups.

4.2.2 Questionnaire Reliability and Validity Analysis We split the 684 collected questionnaires, using Excel for systematic sampling (selecting every tenth row), yielding 65 samples for reliability and validity analysis.

Reliability refers to consistency. We imported the 65 valid questionnaires into SPSS 22.0, obtaining the observation processing summary shown in Table 3 , reliability statistics in Table 4 , and dimension-specific reliability results in Table 5 . Cronbach's alpha values below 0.6 indicate insufficient reliability, 0.7-0.8 indicate acceptable reliability, and 0.8-0.9 indicate excellent reliability. Results show an overall alpha greater than 0.9, indicating excellent reliability; all dimension alphas exceed 0.7, demonstrating good scale reliability.

Validity refers to questionnaire effectiveness. We used SPSS 22.0 for KMO testing and Bartlett's sphericity test, with results shown in Table 6 . KMO values below 0.5 indicate unsuitability for factor analysis; 0.5-0.6 indicates poor suitability; 0.6-0.7 indicates moderate suitability; 0.7-0.8 indicates good suitability; and above 0.9 indicates excellent suitability. Bartlett's sphericity test determines variable independence. The analysis shows KMO above 0.7 with significance below 0.05, concluding that the questionnaire is suitable for factor analysis.

4.2.3 Preliminary Sample Analysis To preliminarily analyze age-based differences in digital reading intention factors, we compared collected samples across age groups. Since sample sizes differed by age, we used percentage comparisons.

Figure 4 [Figure 4: see original paper] shows that under the "strongly agree" level, age group differences are evident. Overall, the teenage group's 各项指标 are generally lower than the other two groups, while the middle-aged and youth groups show similar overall trends.

In Figure 5 [Figure 5: see original paper], all age groups show consistent overall trends under the "agree" level, with the teenage group showing relatively lower recognition that pop-up information (C1) and screen comfort (C3) affect digital reading.

Comparisons across "neutral," "disagree," and "strongly disagree" levels are shown in Figures 6 [Figure 6: see original paper], 7 [Figure 7: see original paper], and 8 [Figure 8: see original paper]. The three age groups show similar fluctuations at the "neutral" level. The youth and middle-aged groups demonstrate high recognition of information provider trust (S2), professional information reliability (S5), and hyperlinked reading methods (M2). The teenage group shows higher "strongly disagree" levels across nearly all indicators. However, quantities in these three recognition levels are relatively small across all age groups, indicating significant differences in digital reading intention across age groups that warrant further detailed verification.

4.2.4 Exploratory Factor Analysis Following reliability and validity analysis, we conducted factor analysis to verify factor extraction rationality. We imported the 65 samples into SPSS, using principal component analysis with varimax rotation. Factor loadings above 0.5 indicate substantial factor contribution and strong correlation with digital reading intention. After orthogonal rotation, we extracted factors with eigenvalues greater than 1 as core factors, with cumulative variance contribution exceeding 60% considered acceptable. Table 7 and Table 8 show the cumulative variance contribution and rotated component matrix.

Six core factors were extracted based on eigenvalues greater than 1, but some factors contained only one variable, which is problematic for analysis. After eliminating indicators with small loadings, we obtained five core factors that align well with the first-level latent variables in the influencing factors scale, indicating good preset scale structure. The first core factor (F1) was named source characteristic factor; the second (F2) content characteristic factor; the third (F3) interference factor; the fourth (F4) motivation factor; and the final one information organization method factor (F5). The revised scale is shown in Table 9 .

4.2.5 Moderating Variable Effect Analysis Following reliability, validity, and exploratory factor analyses that demonstrated data credibility, we used SPSS for linear regression analysis to further demonstrate the necessity of age grouping. Results are shown in Table 10 .

Table 10 shows that three regression equations across age groups are significant ($p < 0.01$), indicating that age has significant moderating effects.

Structural Equation Model of Age-Based Digital Reading Intention Factors

5.1 Model Construction and Assessment

We constructed a structural equation model of digital reading intention using Amos software. For clarity, we substituted pre-coded numbers into the model. We imported the other half of the split data (619 samples), ran the software, and obtained the initial model shown in Figure 9 [Figure 9: see original paper]. Examining the output yielded the unstandardized model in Figure 10 [Figure 10: see original paper]. Model assessment showed fit indices in Table 11 .

Commonly used fit indices include CFI, NFI, and IFI values that should exceed 0.9, and RMR values below 0.05. Referencing Modification Indices, the final results meet all criteria, indicating an acceptable model.

5.2 Comparison of Digital Reading Intention Factors Across Age Groups

After validating the structural equation model, we output age-specific models and standardized path coefficients. Selecting portions showing each factor's influence on digital reading intention, results are presented in Tables 12 , 13 , and 14 .

Combined with path coefficient significance analysis: (1) In the middle-aged group (post-70s), information content characteristics and motivation factors are significant at the 0.001 level, while source characteristic factors are significant at the 0.05 level (P = 0.039), indicating that information content characteristics, motivation factors, and source characteristics positively influence digital reading intention. (2) In the youth group (post-80s and post-90s), motivation factors and source characteristics are significant at the 0.001 level, indicating that source characteristics and motivation factors positively influence digital reading intention for these readers. (3) In the teenage group (post-00s), no data significantly show that any factors positively influence digital reading intention.

Discussion and Analysis

6.1 Hypothesis Verification

Comparing the three groups' results yields conclusions: (1) Source characteristic factors are significant in youth and middle-aged groups, indicating that source factors positively influence digital reading intention for post-70s through post-90s but not significantly for teenagers. Hypotheses H1-1 and H1-2 hold, therefore H1 is supported: source characteristics influence digital reading intention with age differences. (2) Motivation factors are significant at the 0.001 level in middle-aged and youth groups, indicating that motivation positively influences digital reading intention for these age groups. Hypotheses H4-1 and H4-2 hold, therefore H4 is supported: motivation influences digital reading intention with age differences. (3) Interference factors are not significant across any age group, indicating no significant influence on digital reading intention. Hypothesis H3 is not supported: interference factors do not significantly influence digital reading intention. (4) Information content characteristics are significant at the 0.001 level for middle-aged users, indicating positive influence on post-70s usage intention. Hypothesis H2-1 holds, but content characteristics are not significant for the other two age groups, indicating age differences in this factor's influence. Hypothesis H2-2 holds, therefore H2 is supported. (5) The newly added information organization method factor is not significant across age groups, indicating that information organization methods do not influence digital reading intention.

6.2 Result Analysis and Interpretation

Post-70s individuals are digital immigrants who did not grow up immersed in digital environments. Overall, this group is most resistant to digital reading, only choosing it when driven by strong motivation or specific information needs. Post-80s and post-90s are digital natives, the first generation to grow up in digital environments. Their development coincided with evolving digital technology, services, and environments, making them more receptive to digital reading than post-70s. They do not resist any information content acquisition but remain discerning about source reliability, while their digital reading choices are also motivated by internal and external factors. Post-00s are completely immersed in digital environments, born when digital reading technology, environments, and resources were already mature and abundant. They began handling mobile phones and iPads as toddlers and may naturally consider reading as a digital channel activity unless family and educational environments specifically emphasize paper reading cultivation. Their digital reading intention is not significantly influenced by external factors.

Surprisingly, interference factors do not significantly influence digital reading intention across age groups, contradicting research identifying screen comfort, pop-up information, and ubiquitous hyperlinks as digital reading deficiencies. Current digital reading forms like web novels, WeChat/Weibo reading, and news reading all contain varying interference levels, yet this study suggests common interference degrees do not affect digital reading choice. Users appear accustomed to such digital reading environments, aligning with the view that "digital reading reshapes and rewires the brain" [32]. Additionally, information organization methods do not significantly influence digital reading intention across age groups, contrary to common assumptions that content length or hyperlinked reading methods would affect intention. This may relate to the skimming approach typically adopted during digital reading.

6.3 Age-Based Digital Reading Promotion Strategies

This study explored digital reading intention factors across age segments and conducted comparative analysis, confirming that influencing factors indeed differ by age. This has implications for digital reading promotion, enabling targeted services for different age groups:

(1) Content characteristics, source characteristics, and reading motivation significantly influence post-70s readers. Therefore, digital reading promotion for this group should enhance content credibility, address their reading preferences, understand their reading motivations, and provide personalized reading services through content design and interactive features.

(2) Source and motivation factors influence post-80s and post-90s readers, indicating that this generation of digital natives demands high source reliability and professionalism when choosing digital reading. Platforms should increase information source reliability, authenticity, and professionalism

based on understanding their reading motivations to gain trust from this age group.

(3) Post-00s readers' digital reading choices are not significantly influenced by any factors, suggesting they have no resistance to digital reading or 纠结 over choosing between paper and digital formats. Digital reading promotion for this group requires deeper research from other perspectives.

Conclusion

This study examined digital reading intention factors, drawing on relevant theories and using structural equation modeling to design questionnaires and collect data, ultimately revealing differences in how source characteristics, information content characteristics, interference factors, motivation factors, and information organization methods influence digital reading intention across age groups. Digital reading is a vital component of reading promotion. As digital reading permeates national life, both libraries and digital platforms providing reading services should prioritize digital reading promotion. The most crucial aspect of digital reading promotion is addressing users' personalized needs. Providing age-specific digital reading promotion represents a key element of personalized services, and deeply understanding digital reading characteristics across age groups holds significant meaning for deepening reading services in the digital era.

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Author Contributions

Ma Jie: Proposed research questions, overall framework, paper revision and finalization;
Xu Xiaochen: Responsible for paper writing and revision;
Zhang Guangyuan: Revised key sections;
Zhao Tianyuan: Collected literature and translated English content.

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