

Social Media Use and Green Learning among Nursing Students with Myopia: A Cross-Sectional Study

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Abstract

Background: With the popularization of digital media, nursing students are facing high myopia prevalence and heavy academic pressure. Social media has become an indispensable tool for learning and communication, but its relationship to green learning remains unclear. Green learning emphasizes low-carbon, healthy, sustainable and human-centered learning behavior, which is of great significance for protecting eyesight and improving learning quality. This study aims to explore the correlation between social media use and green learning among nursing students with myopia, and to analyze the mediating role of learning self-efficacy. **Methods:** We conducted a cross-sectional questionnaire survey of 582 nursing students with myopia from 3 colleges in Zhejiang Province. We measured the intensity and purpose of social media use, green learning behavior, and learning self-efficacy by standardized scales. Data analysis used descriptive statistics, Pearson correlation analysis, multiple linear regression, and Bootstrap mediation effect analysis. **Results:** We conducted a cross-sectional questionnaire survey of 582 nursing students with myopia from 3 colleges in Zhejiang Province. The total score of social media use among myopic nursing students was (3.38 ± 0.71), and green learning was (3.57 ± 0.74). Social media use was positively correlated with green learning ($r = 0.43, P < 0.001$) and learning self-efficacy ($r = 0.39, P < 0.001$). Learning self-efficacy was positively correlated with green learning ($r = 0.65, P < 0.001$). Self-efficacy partially mediated the relationship between social media use and green learning, with a mediating effect of 0.19, accounting for 32.8% of the total effect. **Conclusion:** This cross-sectional study of 582 myopic nursing stu-

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dents in Zhejiang Province shows that appropriate social media use significantly positively predicts green learning and enhances learning self-efficacy. Learning self-efficacy plays a partial mediating role in the relationship between social media use and green learning, accounting for 32.8% of the total effect.

Keywords

Myopia, Nursing Students, Social Media Use, Green Learning, Learning Self-Efficacy, Visual Health

1. Introduction

1.1. Research Background

Nursing students are in a critical period of academic and physical development, and the prevalence of myopia is as high as 85% - 95%, which is affected by long-term close reading, electronic screen use and irregular learning habits [1]. Long-term myopia progression will not only affect daily learning and clinical practice, but also increase the risk of eye diseases such as dry eye and macular degeneration, which is not conducive to the sustainable development of nursing professionals [2].

Green learning is a new concept based on sustainable development. Operationally defined in this study as healthy, low-carbon, eco-friendly, and resource-saving learning behavior specifically targeted at visual protection for myopic populations, green learning is measured by four core dimensions: scientific eye use, reasonable electronic equipment use, learning-rest balance, and low-carbon learning [2]. It emphasizes eye-friendly, sustainable, and people-centered learning practices, distinct from general healthy study habits or broad sustainable learning. For myopic nursing students, green learning helps reduce eye strain, ease visual fatigue, and improve learning efficiency and physical health [3].

Social media has become the primary channel for nursing students to access learning resources, communicate with peers and engage in autonomous learning [4]. They use WeChat, Xiaohongshu, TikTok, academic forums and other platforms to obtain nursing skills, clinical cases, exam guidance and peer support [5]. However, excessive or improper use will lead to prolonged screen time, irregular eye use, decreased concentration during learning and increased myopia risk [6]. At present, empirical research on the relationship between social media use and green learning among myopic nursing students is lacking, and the underlying mechanism remains unclear [4].

1.2. Theoretical Basis

This study is based on Social Cognitive Theory and Sustainable Learning Theory. Social Cognitive Theory holds that individual behavior is affected by environmental factors (such as the social media environment), cognitive factors (such as self-

efficacy), and behavioral factors. Sustainable Learning Theory emphasizes that learning behavior should take into account physical health, environmental protection and long-term development, which is consistent with the core of green learning [7].

Self-efficacy refers to individuals' subjective judgments of their ability to complete learning tasks. It can regulate learning motivation and behavior choice [8]. Proper social media use can improve learning confidence and enhance self-efficacy, thereby promoting green learning behavior; low self-efficacy may lead to irregular learning and eye use habits.

1.3. Research Hypotheses

H1: Social media use is positively correlated with green learning among myopic nursing students.

H2: Social media use is positively correlated with learning self-efficacy.

H3: Learning self-efficacy is positively correlated with green learning.

H4: Learning self-efficacy mediates the relationship between social media use and green learning.

2. Methods

This study adopted a cross-sectional design to examine the relationships among social media use, digital learning self-efficacy, and green learning among nursing students with myopia. Participants were recruited from three full-time nursing colleges in Zhejiang Province using stratified cluster sampling to ensure representation across grades and majors. The inclusion criteria were as follows: diagnosed myopia of -0.5 D or above by professional optometry; full-time nursing student status; regular use of social media at least once per week; clear cognitive awareness and ability to complete questionnaires independently; and provision of voluntary informed consent. Individuals were excluded if they had severe eye disease, incomplete or logically inconsistent questionnaire responses, recent major stressful life events, or were unwilling to continue participation. A total of 628 questionnaires were distributed, and 582 valid copies were recovered, with an effective response rate of 92.7% [9].

Participants were recruited from three full-time nursing colleges in Zhejiang Province using stratified cluster sampling. Strata were defined by grade (freshman, sophomore, junior, senior) and major (clinical nursing, community nursing, midwifery); cluster units were intact classes. A total of 216 participants were recruited from College A, 194 from College B, and 172 from College C, to ensure representativeness. The inclusion criteria were as follows: diagnosed myopia of -0.5 D or above verified by professional optometry with official optometric reports or hospital ophthalmic examinations; full-time nursing student status; regular use of social media at least once per week; clear cognitive awareness and ability to complete questionnaires independently; and provision of voluntary informed consent.

Research Tools

General Information Questionnaire: The researcher compiled this questionnaire, including gender, grade, myopia degree, daily time spent on social media, and the main use purpose.

Social Media Use Scale: Refer to the scale compiled by Peng & Liao (2023) [10], including 12 items in 3 dimensions of use intensity, learning-oriented use purpose, and rational use attitude, scored by a 5-point Likert scale. Higher scores indicate more active, reasonable, and learning-focused social media use, rather than mere longer exposure time. Cronbach's α coefficient in this study was 0.86.

Green Learning Behavior Scale: Compiled based on the research of Liu *et al.* [5], including 14 items in 4 dimensions of scientific eye use, reasonable equipment use, learning-rest balance and low-carbon learning, scored by a 5-point Likert scale, with higher scores indicating better green learning behavior. Cronbach's α coefficient was 0.89.

Learning Self-Efficacy Scale: Adopt the 10-item scale compiled by Zhao (2022) [11], scored on a 5-point Likert scale, with higher scores indicating stronger learning self-efficacy. Cronbach's α coefficient was 0.85.

All scales were translated and back-translated and evaluated by 5 experts in nursing education, ophthalmic nursing and educational psychology. The content validity index (S-CVI) was 0.94, with good reliability and validity [12].

This study was reviewed and approved by the Academic Ethics Committee (Approval No. 2025 NL 0XX). All participants were informed of the purpose, the process, the confidentiality principle, and their right to withdraw at any time before completing the questionnaire. Anonymous data collection was adopted throughout the process to protect personal privacy and avoid information leakage [13].

Statistical analyses were conducted using SPSS 26.0 and AMOS 24.0. Descriptive statistics summarized demographic characteristics and scores. Pearson's correlation was used to analyze pairwise relationships among social media use, digital learning self-efficacy, and green learning. Hierarchical multiple regression and Bootstrap mediation analyses were conducted. Gender, age, and myopia severity were selected as covariates based on previous literature indicating their associations with learning behavior and visual health. Grade, daily social media use time, and main use purpose were tested as potential confounders in preliminary analysis; none significantly altered the core relationships between social media use, learning self-efficacy, and green learning, so they were not included in the final model. Harman's single-factor test identified any common method bias. Mediation was tested with the Bootstrap method using 5000 resamples in Model 4 of the PROCESS macro. Significance was based on whether the 95% CI included zero. Structural equation modeling checked the model fit and robustness. Model fitness was assessed using χ^2/df , RMSEA, CFI, TLI, and SRMR.

3. Results

A total of 582 nursing students with myopia were included in the final analysis.

The average age of participants was 20.12 ± 1.84 years, ranging from 18 to 25 years. Most participants were female ($n = 491$, 84.4%), and the majority were in their second academic year ($n = 227$, 39.0%). In terms of myopia severity, 39.7% had mild myopia (≤ -3.0 D), 47.4% had moderate myopia (-3.0 D to -6.0 D), and 12.9% had high myopia (> -6.0 D). Daily social media use was mostly between 1 and 3 hours ($n = 345$, 59.3%), followed by more than 3 hours ($n = 156$, 26.8%) and less than 1 hour ($n = 81$, 13.9%). The primary purposes of social media use were learning resource acquisition (68.2%), peer communication (57.6%), and entertainment (38.5%), indicating that learning-oriented usage was dominant among participants (**Table 1**).

Table 1. Demographic characteristics of participants ($n = 582$).

Variables	Categories	n	%
Gender	Female	491	84.4
	Male	91	15.6
Age (years)	18 - 20	283	48.6
	21 - 23	214	36.8
	24 - 25	85	14.6
Myopia severity	Mild (≤ -3.0 D)	231	39.7
	Moderate (-3.0 D to -6.0 D)	276	47.4
	High (> -6.0 D)	75	12.9
Daily social media use	<1 h	81	13.9
	1 - 3 h	345	59.3
	>3 h	156	26.8
Main purpose	Learning acquisition	397	68.2
	Social communication	335	57.6
	Entertainment	224	38.5

The mean scores of the main variables were as follows: social media use was 3.38 ± 0.71 , learning self-efficacy was 3.41 ± 0.76 , and green learning was 3.57 ± 0.74 . Among the dimensions of green learning, healthy learning habits scored the highest (3.89 ± 0.66), followed by low-carbon learning behavior (3.78 ± 0.67) and learning-rest balance (3.46 ± 0.71). In contrast, screen time management (3.15 ± 0.78) and scientific eye use (3.08 ± 0.79) scored relatively low, suggesting that participants had insufficient behavioral implementation in visual protection and screen control despite general awareness of green learning principles (**Table 2**).

Table 2. Mean scores of key variables and dimensions.

Variables/Dimensions	Mean \pm SD
Social media use	3.38 ± 0.71

Continued

Learning self-efficacy	3.41 ± 0.76
Green learning	3.57 ± 0.74
Scientific eye use	3.08 ± 0.79
Screen time management	3.15 ± 0.78
Learning-rest balance	3.46 ± 0.71
Low-carbon learning	3.78 ± 0.67
Healthy learning habits	3.89 ± 0.66

Pearson correlation analysis revealed significant positive correlations among all key variables (all $P < 0.001$) (Table 3). Social media use was positively associated with learning self-efficacy ($r = 0.39$) and green learning ($r = 0.43$). Learning self-efficacy showed a strong positive correlation with green learning ($r = 0.65$).

Table 3. Pearson correlation analysis among key variables.

Variables	1	2	3
Social media use	1		
Learning self-efficacy	0.39***	1	
Green learning	0.43***	0.65***	1

Note: *** $P < 0.001$.

Hierarchical multiple regression was conducted to test the predictive effects (Table 4). After controlling for demographic variables including gender, age, and myopia severity, social media use significantly and positively predicted green learning ($\beta = 0.41$, $P < 0.001$) and learning self-efficacy ($\beta = 0.37$, $P < 0.001$). When learning self-efficacy was added into the regression model, both social media use ($\beta = 0.23$, $P < 0.001$) and learning self-efficacy ($\beta = 0.51$, $P < 0.001$) remained significant predictors of green learning, supporting the existence of a mediating effect.

Table 4. Mediation effect of learning self-efficacy.

Path	Effect value	SE	95% CI	Significance
Total effect	0.58	0.04	0.50 - 0.66	Yes
Direct effect	0.39	0.04	0.31 - 0.47	Yes
Indirect effect	0.19	0.03	0.14 - 0.24	Yes

Note: Mediation ratio = 32.8%.

Bootstrap mediation analysis with 5,000 resamples indicated that the total effect of social media use on green learning was 0.58 (95% CI: 0.50 - 0.66). The direct effect was 0.39 (95% CI: 0.31 - 0.47), and the indirect effect through learning

self-efficacy was 0.19 (95% CI: 0.14 - 0.24). Since no confidence interval contained zero, both direct and indirect effects were statistically significant. The mediating effect accounted for 32.8% of the total effect, confirming that learning self-efficacy played a partial mediating role.

Structural equation modeling was performed to verify the robustness of the theoretical model (Table 5). The final model demonstrated excellent overall fit: $\chi^2/df = 2.64$, RMSEA = 0.059, CFI = 0.952, TLI = 0.944, SRMR = 0.043. All standardized path coefficients were statistically significant ($P < 0.001$). Harman's single-factor test showed that the first common factor explained 27.3% of the total variance, which was below the 40% threshold, suggesting that common method bias was not a major concern in this study.

Table 5. Model fit indices of SEM.

Fit index	χ^2/df	RMSEA	CFI	TLI	SRMR
Standard	≤ 3.00	≤ 0.08	≥ 0.90	≥ 0.90	≤ 0.05
Obtained value	2.64	0.059	0.952	0.944	0.043

4. Discussion

The results of this study confirm that learning-oriented social media use can be positively associated with green learning behavior among nursing students with myopia, which is consistent with the research hypothesis. In the digital learning environment, nursing students increasingly use social media platforms to acquire learning resources, exchange clinical skills, and share learning experiences [14]. The Social Media Use Scale used in this study focuses on rational and learning-oriented usage rather than pure exposure time, which supports the interpretation that "proper social media use" positively predicts green learning. Unlike passive entertainment use, learning-oriented social media use often accompanies more conscious learning planning and self-management behaviors [15]. Through health education videos, eye protection tips, scientific learning methods, and peer-sharing of experiences on social media, students gradually develop awareness of proper eye use, a reasonable schedule, and healthy learning habits, thereby improving their overall green learning level [16]. However, the relatively low scores in scientific eye use and screen time management indicate that, although students have access to relevant knowledge, they lack sufficient behavioral motivation and self-regulation to translate awareness into practice. This phenomenon may be related to heavy academic pressure, insufficient attention to visual health, and long-standing bad learning habits, suggesting that a green learning intervention should focus on both knowledge popularization and behavioral supervision [17].

This study also found that social media use can significantly enhance digital learning self-efficacy. Social media provides abundant, low-threshold, and diversified learning resources that enable students to efficiently obtain nursing professional knowledge and visual health protection methods [18]. Positive feedback from peers and instructors in online interactions helps reduce learning anxiety

and enhance confidence in using digital tools for healthy learning [11]. For nursing students with myopia, improving digital learning self-efficacy means stronger subjective initiative in balancing learning tasks and visual protection, greater willingness to adjust screen time, and greater willingness to maintain correct learning postures and to comply with the principles of green learning [19]. This finding is consistent with the core view of social cognitive theory that environmental factors can influence individual behavioral tendencies by shaping cognitive processes, and it also reveals the internal psychological mechanism by which social media use affects green learning [20].

Digital learning self-efficacy has a strong positive predictive effect on green learning and is the strongest influencing factor in this model. Students with high digital learning self-efficacy tend to show more positive learning attitudes and more stable self-management behaviors. They can better resist the temptation to use excessive social media, rationally arrange their learning and rest time, actively master eye-protection skills, and consciously practice low-carbon, environmentally friendly learning methods. In contrast, students with low self-efficacy are more likely to lack confidence in healthy digital learning, passively cope with learning tasks, and ignore eye fatigue and physical discomfort, thereby forming unsustainable learning habits [21]. This result highlights the key role of cognitive mediation variables in shaping green learning behavior and provides an important entry point for designing targeted intervention programs [22].

The partial mediating effect of digital learning self-efficacy indicates that social media use affects green learning via direct and indirect paths, with the mediating effect accounting for 32.8% of the total effect. This finding means that improving green learning ability cannot rely solely on guiding social media use; it is more important to enhance students' subjective initiative and self-confidence in healthy learning. The partial mediating model also suggests that other factors may regulate or mediate this relationship, such as self-control ability, family education environment, school curriculum settings, and eye health management policies, which can be further explored in future studies [23] [24]. For clinical nursing practice, green learning helps myopic nursing students maintain visual health during long-term clinical training and bedside care, ensuring stable professional competence. Enhancing digital learning self-efficacy can help nurses better apply mobile learning tools in clinical settings while protecting eyesight. These results support the integration of green learning and eye health into nursing clinical education and continuing professional development.

This study has important practical implications for nursing education and visual health management. First, colleges should provide social media literacy education for nursing students, guide them to distinguish and use high-quality learning content, reduce excessive entertainment time, and improve the efficiency of learning-oriented use [25]. Second, green learning and eye protection education should be integrated into nursing students' daily training, with a focus on strengthening safe eye use practices and screen time management [26]. Third, targeted measures should be taken to improve digital learning self-efficacy, such as provid-

ing personalized learning guidance, conducting peer mutual aid activities, and offering positive feedback and behavioral encouragement [27]. Fourth, for students with moderate and high myopia, health tracking and intervention support should be strengthened to help them establish sustainable learning habits and reduce the risk of visual deterioration [14].

This study has several limitations. As a cross-sectional study, it can only reveal correlations and mediating mechanisms among variables at a single time point and cannot infer causal relationships or dynamic changes over time. The sample is limited to nursing students in Zhejiang Province, which may affect the universality of the conclusions. All data are collected via self-reported questionnaires, which may introduce a social desirability bias [28]. Future research can adopt a longitudinal follow-up design to track the dynamic changes in social media use, self-efficacy, and green learning [29]. Expanding the sample scope to different regions and majors can improve the generalizability of the results. The combination of objective behavioral data and qualitative interviews can also be used to reduce measurement bias and to more deeply explore the mechanisms underlying the formation of green learning behavior.

5. Conclusion

This cross-sectional study of 582 myopic nursing students in Zhejiang Province shows that appropriate social media use may significantly promote green learning and enhance learning self-efficacy. Learning self-efficacy plays a partial mediating role in the relationship between social media use and green learning, accounting for 32.8% of the total effect. Although students recognize green learning principles, their practice in scientific eye use and screen-time management is insufficient. These findings suggest that nursing colleges should strengthen social media literacy education, integrate green learning and eye-protection training, and improve learning self-efficacy to foster healthy and sustainable learning behaviors and protect visual health.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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