Causal Model of Health Literacy in Thai Older Adults with Knee Osteoarthritis

Porntip Pa-in, Tipaporn Wonghongkul, Sirirat Panuthai,* Totsaporn, Khampolsiri, Rojanee Chintanawat

Abstract: Knee osteoarthritis is the most common form of arthritis causing disability among older adults. Proper self-care is vital and achievable with health literacy. Thai older adults with knee osteoarthritis have been found to have inadequate health literacy, and poor self-care behaviors for this condition. The purpose of this descriptive cross-sectional study was to test a causal model of health literacy in Thai older adults with knee osteoarthritis, depicting relationships among provider-patient communication, patient engagement, cognitive function, knowledge of knee osteoarthritis, Internet use, social support, social participation, and health literacy. Participants comprised 318 older adults with knee osteoarthritis, selected using multi-stage random sampling from nine community hospitals in a northern Thai province. Data were collected using a demographic data form, the European Health Literacy Survey Questionnaire, the Provider-patient Communication Scale, the Patient Health Engagement Scale, the Montreal Cognitive Assessment-Basic, the Arthritis Knowledge Scale, the Internet Use Questionnaire, the Social Support Questionnaire, and the Community Participation of the Elderly Questionnaire. Data were analyzed using descriptive statistics, Pearson's product moment correlation, and structural equation modeling.

The final model fitted with empirical data and explained 36% of the variance in health literacy with Internet use as the strongest predictor directly affecting health literacy. Internet use and social participation had positive direct and indirect effects on health literacy via cognitive function. Cognitive function and social support positively directly affected health literacy. Patient engagement negatively affected health literacy indirectly via Internet use. Knowledge of knee osteoarthritis and provider-patient communication did not affect health literacy directly or indirectly. In conclusion, nurses should design interventions to promote health literacy of this population by highlighting Internet use, social participation, cognitive function, social support, and patient engagement, with testing in clinical practice.

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Introduction

Knee osteoarthritis is a major personal and public health concern, with a global prevalence in 2020 of 28.7%, 34%, and 49.8% among people aged 60-69 years, 70-79 years, and 80 years or over, respectively.[1] The prevalence of this condition is

Porntip Pa-in, RN, PhD (Candidate), Faculty of Nursing, Chiang Mai University, Mueang, Chiang Mai, Thailand 50200, E-mail: porntipp73@gmail.com
Tipaporn Wonghongkul, RN, PhD, Associate Professor, Faculty of Nursing, Chiang Mai University, Mueang, Chiang Mai, Thailand 50200, E-mail: tipaporn.w@cmu.ac.th
Correspondence to: Sirirat Panuthai,* RN, PhD, Assistant Professor, Faculty of Nursing, Chiang Mai University, Mueang, Chiang Mai, Thailand 50200, E-mail: siriratpanuthai@hotmail.com
Totsaporn Khampolsiri, RN, PhD, Assistant Professor, Faculty of Nursing, Chiang Mai University, Mueang, Chiang Mai, Thailand 50200, E-mail: tkhamposiri@gmail.com
Rojanee Chintanawat, RN, PhD, Assistant Professor, Faculty of Nursing, Chiang Mai University, Mueang, Chiang Mai, Thailand 50200, E-mail: rojanee.c@cmu.ac.th

expected to increase due to aging populations, especially in low-income and middle-income countries. In Thailand, knee osteoarthritis prevalence is highest in the northern region, and is one of the five leading causes of disability in older adults.[2] Therefore, older adults with knee osteoarthritis should engage in proper self-care to delay disease progression and reduce disability from the disease. Individuals' active engagement in their self-care requires an ability to access and understand health information, and act on this information, which is health literacy.

Health literacy is an effective tool for empowering individuals to assume more health responsibility and deeper engagement with their own health care.[3] Older adults with adequate health literacy can make good health decisions, thereby reporting better health status and overall quality of life.[4] Unfortunately, it was found that 48.4% of Thai older adults with knee osteoarthritis had inadequate health literacy, and 39.6% had poor self-care behavior for knee osteoarthritis.[5] Thus, to enhance health literacy for empowering them to perform better health behaviors, nurses and other health professions need to understand the multiple factors that influence health literacy in this particular population. Nevertheless, research on health literacy and older adults with knee osteoarthritis from the context of low- and middle-income countries, especially Thailand, is limited. This knowledge is expected to be a basis for developing effective interventions to empower older Thais with knee osteoarthritis to engage better in their own health care and health behaviors.

Conceptual Framework and Literature Review

The Integrated Model of Health Literacy (IMHL) was developed by Sørensen et al.[6] based on a systematic review of literature on definitions and conceptual frameworks of health literacy. This model encompasses the key aspects of the current conceptual models of health literacy. It describes health literacy as knowledge, competencies, and motivation related to the process of accessing, understanding, appraising, and applying health-related information. The factors influencing health literacy can be divided into distal factors (societal and environmental determinants) and proximal factors (personal determinants and situational determinants).[6]

Societal and environmental determinants include the demographic situations, cultures, language, political force, and social systems that affect people's health literacy. Culture influences the language used by older adults to communicate during health encounters. Provider-patient communication is the perception about a provider's communication regarding talking clearly, explaining medical care, and responding to patients' concerns.[7] Effective provider-patient communication serves to provide health information in ways that can be understood by clients. Provider-patient communication is correlated with health literacy directly[8] and indirectly, through disease knowledge.[9] Moreover, culture affects how older adults engage in their own health care through a process of discussion of their preferences and wishes for future care with their doctors. Patient engagement represents persons' involvement in their own health care.[10] It involves the ability to link knowledge and experiences derived from one's thoughts, emotions, and actions in health management for good health outcomes. Patient engagement allows older adults to work together to produce good, safe care outcomes, resulting in both personal and overall health. Patient engagement has been positively related to health literacy, directly,[11] and indirectly, via Internet use.[12]

Personal determinants are individual characteristics such as age, gender, race, socioeconomic status, education, and employment. The ageing process is known to affect a person's cognitive function that involves multiple mental abilities derived from cognitive processes such as visual perception, executive function, language, attention, memory, and orientation.[13] Cognitive function is learning in the brain, developing knowledge and

understanding through cognitive processes that involve the perception of information from the body's senses. Various forms of thinking are required for understanding information, analyzing, reasoning, decision-making, planning. Cognitive function is related to health literacy directly[14] and indirectly through disease knowledge.[9] Knowledge of knee osteoarthritis is a personal determinant that refers to accurate understanding of knee osteoarthritis, encompassing definition, types, causes, common symptoms, impacts, treatments, and behaviors to control and prevent complications.[15] Disease knowledge creates beliefs about the consequences of acting on certain health information that, in turn, will form an intention to act on such health information. Previous research has revealed a positive association between disease knowledge and health literacy.[16]

Situational determinants include interactions with people and physical environments. The Internet is a powerful tool for older adults' social interactions and exploration of health information. Internet use refers to the utilization of online networks for exchanging information regarding diseases, healthy lifestyles, medication, treatments, care providers, patient organization, laws and regulations related to health conditions, and peer-support forums.[17] The Internet offers opportunities to consume information and build health and medical knowledge. Previous research showed both direct[18] and indirect associations between Internet use and health literacy through cognitive function because Internet use is thought to reduce age-related cognitive decline.[19]

Social support is important for active aging and refers to the received emotional, informational, and tangible assistance from people who are close, or others in society.[20] Greater social support can improve the ability to access and understand health information and negotiate in the health care system. Social support is crucial for transmitting appropriate health information and monitoring behaviors and practices among all population groups. Social support has been found to be positively associated with health literacy directly[18] and indirectly via older adults' social participation.[21]

Older adults' continuous participation in social activities can contribute to better individual health outcomes. Social participation refers to the engagement of older adults in activities that contribute to society, membership in associations and organizations, discussions, social events, and religious ceremonies,[22] and allows them to obtain health-related information through interaction with others and access potentially knowledgeable people who positively influence health literacy.[23] Moreover, social participation has been related to health literacy via cognitive function.[24] Although a number of significant distal societal and environmental determinants, proximal personal determinants, and situational determinants of health literacy have been identified in older populations, the mechanisms by which these factors are associated with health literacy remain poorly understood among older adults with knee osteoarthritis.

Study aim

This study aimed to test a causal model depicting the relationships among provider-patient communication, patient engagement, cognitive function, knowledge of knee osteoarthritis, Internet use, social support, social participation, and health literacy.

Method

Design: This study used a descriptive, cross-sectional, correlational design. This report was written following the STROBE guideline for cross-sectional studies.

Sample and Setting: The participants were older adults with knee osteoarthritis in a northern province of Thailand. The sample size was determined based on structural equation modeling (SEM) with a subject-to-parameter ratio of 20:1.[25] In this study, there were 15 parameters; thus, the minimum sample size was determined to be 300 (20 x 15). The final data set of our study consisted of 318 participants, which was

sufficient for SEM.[25] We used a multi-stage random sampling method. Firstly, a province of Thailand was randomly selected using simple random sampling. Secondly, this province was divided using stratified random sampling into three zones: northern, central, and southern zones. Thirdly, one district was randomly sampled from each zone, totaling three districts. Next, three sub-districts were randomly selected from each selected district, totaling nine sub-districts. Finally, the participants were recruited randomly based on the proportion of older adults with knee osteoarthritis and registered in the public health database in each sub-district. The inclusion criteria were: Thai older adults aged ≥ 60 years; diagnosed with knee osteoarthritis; cognitively intact, assessed using the Short Portable Mental Status Questionnaire (SPMSQ)[26] with a score of at least 8 out of 10; having no history of hearing or vision loss; being able to communicate in Thai; having no knee joint replacement surgery; and willing to participate in the study. (see **Figure 2**).

Ethical Considerations: The study was approved by the Research Ethics Committee of the Faculty of Nursing, Chiang Mai University (Research ID: 2563-063; Study Code: 2563-EXP054). All eligible participants were informed of the study process, anonymity and confidentiality, voluntary involvement, and the right to withdraw at any time without repercussions. All participants signed a consent form.

Instruments: Nine instruments were used to collect data. The primary investigator (PI) obtained permission from the instrument developers and translators before using them, apart from the demographic instrument, which was developed by the PI. The latter consisted of closed questions to obtain personal characteristics and illness data of participants, including gender, age, marital status, education level, occupation, monthly income, income source, duration since diagnosis of knee osteoarthritis, comorbidity, and current treatment.

The European Health Literacy Survey Questionnaire (HLS-EU-Q47)[27] was translated into Thai using the back-translation method[28] by Thongdee *et al.*

(unpub.) to assess the health literacy of older adults with knee osteoarthritis. The HLS-EU-Q47 contains 47 items rated on a 4-point Likert scale, ranging from 1 (very difficult) to 4 (very easy) to cover the theoretically-defined four indicators of health literacy: accessing health information (13 items), understanding health information (11 items), appraising health information (12 items), and applying health information (11 items). The total raw score is transformed into a standardized metric. Total possible scores range from 0 to 50, with higher scores indicating higher health literacy.[27] The content validity index (CVI) was 0.95, and Cronbach's alpha pilot-tested in 10 Thai older adults with uncontrolled diabetes was 0.98.[27] In our study, Cronbach's alpha in the main study was 0.96. Standardized factor loadings were 0.77, 0.88, 0.91, and 0.90, respectively.

The Provider-patient Communication Scale was developed by Pinprapapan et al.[7] The scale measures the provider-patient communication of older adults with knee osteoarthritis and consists of nine items within three indicators: general clarity (2 items), explanation of disease and medical care (4 items), and responsiveness while listening (3 items). Items are rated on a 4-point Likert scale ranging from 1 (never) to 4 (always) for positive items and 1 (always) to 4 (never) for negative items. An example item is: "Physicians and nurses use words that you cannot understand." Total possible scores range from 9-36, and higher scores indicate better provider-patient communication.[7] The Cronbach's alpha in this study was 0.94. Standardized factor loadings were 0.06, 0.72, and 0.94, respectively.

The Patient Health Engagement Scale (PHE-scale) developed by Graffigna et al.[10] and translated into Thai by Jitauraungkoon et al.[29] was used to assess patient engagement of older adults with knee osteoarthritis. It comprises five ordinal items about how respondents might feel when thinking about their disease. Each item can be completed by choosing one of the seven options (1-7). These options are

converted into a patient engagement score based on the conversion table.[10] An example item is: "What do you think about your illness?" Total raw scores range from 5−20, and a median score is calculated from 1−4, with a higher median score indicating greater patient engagement.[29] The Cronbach's alpha in the actual sample was 0.84.

The Montreal Cognitive Assessment−Basic (MoCA−B) was developed by Julayanont et al.[13] and is used to assess the cognitive function of older adults. It has 10 items that evaluate six cognitive domains: memory, visuospatial ability, executive function, attention, language, and orientation. An example item is: "Name as many fruits as possible in one minute." Total possible scores range from 0−30. One point is added if a respondent has four years of education or less (in case the total score is lower than 30). Additionally, one point is added if the respondent cannot read or write, regardless of education level. A total score of < 25 indicates mild cognitive dysfunction.[13] The Cronbach's alpha tested in the actual sample was 0.80. Standardized factor loadings were 0.54, 0.03, 0.25, 0.67, 0.83, and 0.45, respectively.

The Arthritis Knowledge Scale was developed by Aree−Ue and Piyakajornrot[15] to assess knowledge of knee osteoarthritis of older adults. It has ten true−false items about disease progression, causes, impacts, and management. Respondents receive 1 point for a correct answer. An example item is: "Knee osteoarthritis is a disease of older adults." Total possible scores range from 0−10, with higher scores indicating higher knowledge of knee osteoarthritis. The Kuder−Richardson 20 (KR−20) tested in the actual sample was 0.84.

The Internet Use Questionnaire developed by the Health Information National Trends Survey: HINTS 2012,[30] was translated into Thai by Kheokao et al.[17] to assess the Internet use of older adults. It has eight items to measure the level of Internet use by health topic, including disease, healthy lifestyle, medication, treatments, care providers, patient organization,

laws and regulations related to health conditions, and peer−support forums. Items are rated on a 4−point Likert scale from 0 (never) to 3 (regularly). An example item is: "Over the past one week, how frequently have you searched for information about healthy lifestyle patterns from the online/social media sources?" Total possible scores range from 0.00 to 3.00, with a higher score indicating higher Internet use. The Cronbach's alpha tested in the actual sample was 0.95.

The Social Support Questionnaire (SSQ), developed and translated into Thai by Hanucharurnkul,[31] was used to assess the social support of older adults. It covers three types of social support, including informational, emotional, and tangible support from three sources: family, friends, and health care providers. Items are rated on a 4−point Likert scale from 0 (no support) to 4 (a great deal of support). An example item is: "How much has this person boosted your spirit when you feel low during your present illness?" Total scores range from 0−28, with higher scores indicating greater social support. The Cronbach's alpha tested in the actual sample was 0.97. Standardized factor loadings were 0.81, 0.90, and 0.83, respectively.

The Community Participation of Elderly Questionnaire, developed in Thai by Linsuwanont,[22] was used to measure social participation of older adults. It consists of 10 items, including participation in activities that contribute to society, membership of associations and organizations, participation in discussions, participation in social events, participation in religious ceremonies, and information support. An example item is: "When there is a problem in the community, you usually participate in sharing opinions to solve the problem with your neighbors." Items are rated on a 5−point Likert scale from 1 (not at all true) to 5 (very true) for positive items, and 5 (not at all true) to 1 (very true) for negative items. Total scores range from 1 to 50, with higher scores reflecting higher social participation. The Cronbach's alpha tested in the actual sample was 0.90.

Data Collection: Data were collected between July and December 2020 by the PI and eight research assistants (RAs). All RAs had graduated from areas related to health, such as nursing, public health, and Thai traditional medicine, with experience in conducting research, and were working in the selected area. They were trained formally to recruit potential participants, obtain informed consent and collect data using the questionnaires. While collecting data, due to the COVID-19 pandemic, researchers strictly followed the disease prevention protocols of the Department of Disease Control in Thailand: wearing a hygienic mask, using alcohol spray, social distancing between people and so on. Participants in each hospital who met the inclusion criteria were informed clearly about the research and ethical considerations. After agreeing to participate, participants signed a consent form for the protection of participants. They were given nine self-report questionnaires to complete privately and in a sequence that accommodated ease of use. The total time to complete the questionnaires ranged between 60 and 80 minutes, with a break of approximately 10-15 minutes.

Data Analysis: Descriptive statistics were used to describe the demographic data of the participants and the study variables. The correlations between variables were analyzed using Pearson's product-moment correlation coefficient. Path analysis was performed using SEM. Before running the SEM, assumptions (missing data, outliers, normality, homoscedasticity, linearity, and multicollinearity) were tested. The analysis results showed no missing data and no outliers. Regarding normality, the data had a normal distribution. The assumptions for linearity were not violated, and there were no multicollinearity issues.[32] The IBM SPSS Amos 26 Program was used to test and develop the hypothesized Model of Health Literacy among Older Adults with Knee Osteoarthritis (MHLOAKO). SEM with a maximum likelihood estimation method was used to evaluate the fit of the hypothesized MHLOAKO based on the criteria[32] (**Table 1**).

Table 1. Comparison of the goodness-of-fit statistics in the hypothesized and modified MHLOAKO

Goodness-of-fit Indices	Criterion of Goodness-of-fit	Hypothesized Model	Modified Model
Chi-square (χ^2)		520.083	228.967
P-value	p > 0.05	< 0.001	< 0.001
Relative Chi-square (χ^2/df)	≤ 3.00	3.271	1.647
Goodness of fit index (GFI)	≥ 0.90	0.854	0.934
Adjusted goodness-of-fit index (AGFI)	≥ 0.90	0.807	0.901
Root mean square error of approximate (RMSEA)	≤ 0.05	0.085	0.045
Comparative Fit Index (CFI)	≥ 0.90	0.855	0.964

Results

Demographic characteristics

In this study, there were no missing data, and all 318 participants returned the questionnaires (the response rate was 100%). Their mean age was 69.2 years (SD = 7.07). The participants were female (67.30%), married (66.35%), and had primary education (77.36%). Moreover, 44.65% of participants were unemployed, and 40.57% were farmers, with a mean monthly income of 2,669.81 Thai baht (SD = 2596.18) or US$76.81. The main source of their income was from subsistence allowance (100%). The mean duration of knee osteoarthritis diagnosis was 5.41 years (SD = 5.28), with 68.87% of the participants having comorbidity that required regular medical treatment.

Model testing

The hypothesized MHLOAKO is illustrated in **Figure 1**. After testing the hypothesized MHLOAKO, the fit indices showed that the model did not fit with

the empirical data. Then, we modified the MHLOAKO by adding paths with double-headed arrows to allow for correlating errors based on the modification indices, considering the constructs with the highest values of error shown by the program. Only the p-value did not meet the criteria, which was acceptable because the p-value associated with the Chi-square value is very sensitive to large sample size and other indices could be used to claim the model to be accepted.[32] The final MHLOAKO showed the best fit to the empirical data. Overall, most of these indices indicated that the MHLOAKO fit the empirical data (**Table 1**).
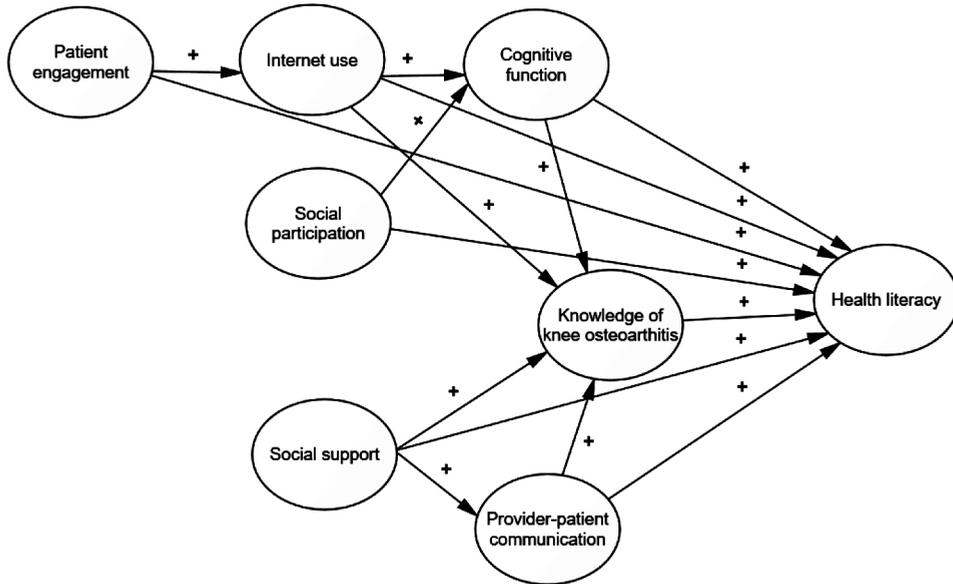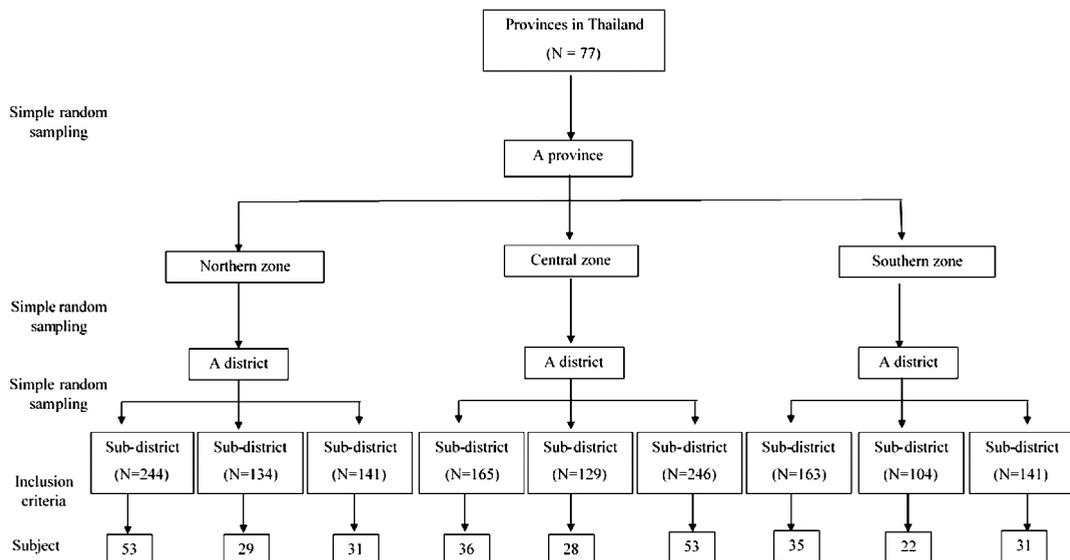

Figure 1. The hypothesized MHLOAKO

Figure 2. Sampling method of the study

Regarding the relationship among latent variables and health literacy, it was found that factors positively related to health literacy were Internet use, social participation, cognitive function, and social support, while provider-patient communication, patient engagement, and knowledge of knee osteoarthritis were not significantly related to health literacy (**Table 2**).

Table 2. Correlation matrix of studied variables (n = 318)

Variables	1	2	3	4	5	6	7	8
Provider-patient communication	1.00							
Patient engagement	-0.03	1.00						
Cognitive function	0.10	0.01	1.00					
Knowledge of knee osteoarthritis	-0.11	-0.12[*]	0.05	1.00				
Internet use	-0.01	-0.07	0.16[**]	0.03	1.00			
Social support	-0.06	0.20[**]	0.03	0.13[*]	-0.16[**]	1.00		
Social participation	-0.03	0.16[**]	0.22[**]	0.14[*]	0.11	0.32[**]	1.00	
Health literacy	-0.07	-0.00	0.34[**]	0.08	0.44[**]	0.12[*]	0.38[**]	1.00

$*\ p < 0.05,\ \ **\ p < 0.01$

Table 3 shows the effect of the influencing variables on health literacy. Internet use positively affected health literacy directly and indirectly via cognitive function. Social participation positively affected health literacy directly and indirectly via cognitive function. Cognitive function positively affected health literacy directly but did not affect health literacy indirectly via knowledge of knee osteoarthritis. Social support positively affected health literacy directly but did not affect health literacy indirectly via provider-patient communication or knowledge of knee osteoarthritis. Patient engagement negatively affected health literacy indirectly via Internet use but did not affect health literacy directly. These five predictors explained 36% of the total variance in health literacy in the final MHLOAKO. Knowledge of knee osteoarthritis did not have a direct effect on health literacy. Provider-patient communication did not have a direct or indirect effect on health literacy via knowledge of knee osteoarthritis (**Figure 3, Table 3**).

Table 3. The multi-relative co-efficient ($R2$), the total effect (TE), the indirect effect (IE), and the direct effect (DE) of the influencing variables on health literacy

Endogenous Variables	R^2	Influencing Variables	TE	IE	DE
Health literacy	0.36	Cognitive function	0.24[**]	–	0.24[**]
		Internet use	0.39[**]	0.03[*]	0.36[**]
		Patient engagement	-0.04[*]	-0.04[*]	–
		Social participation	0.34[**]	0.06[**]	0.28[**]
		Social support	0.13[**]	0.00	0.13[**]
Cognitive function	0.07	Internet use	0.14[*]	–	0.14[*]
		Social participation	0.24[**]	–	0.24[**]
Internet use	0.01	Patient engagement	-0.11[*]	–	-0.11[*]

$*\ p < 0.05,\ \ **\ p < 0.01$

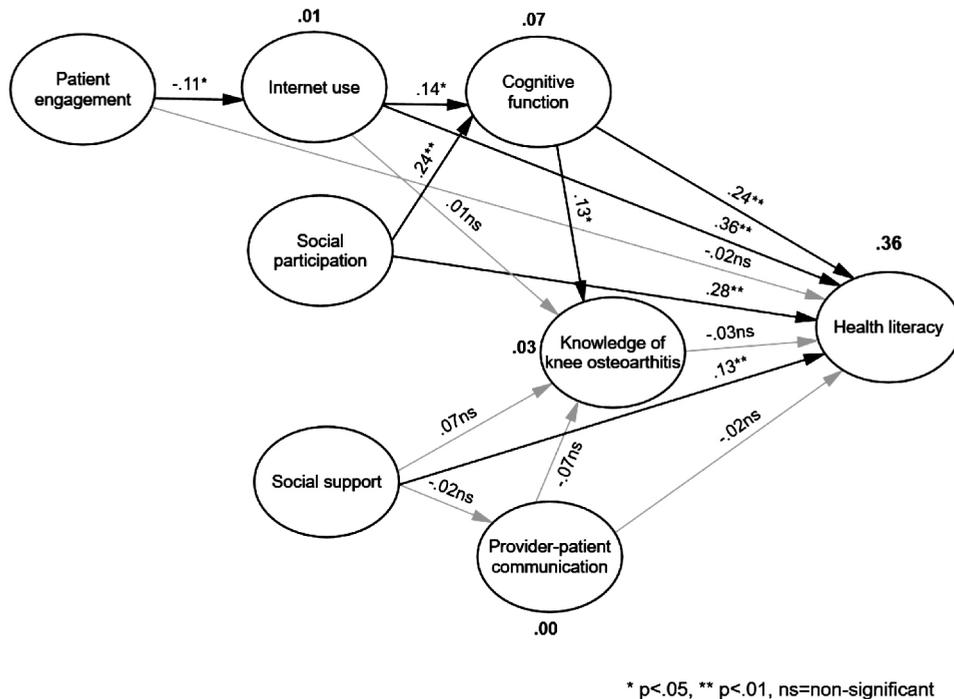* p<.05, ** p<.01, ns=non-significant

Figure 3. The final MHLOAKO

Discussion

The final MHLOAKO supported the IMHL[6] in that the factors influencing the health literacy of older adults with knee osteoarthritis included both distal and proximal factors. The findings showed that 36% of the total variance in health literacy was explained by distal factors including societal and environmental determinants (patient engagement), as well as proximal factors including personal determinants (cognitive function) and situational determinants (Internet use, social support, and social participation).

Internet use was the strongest predictor directly affecting health literacy. Consistent with the IMHL,[6] health literacy is influenced by situational determinants, which encompass individuals' interactions with their environments. Older adults use the Internet as a powerful channel for interacting with others and exploring health information. Frequent engagement in online health information-seeking behavior leads to higher health literacy because older adults can acquire additional health knowledge. Consistent with previous literature, Internet use had the strongest direct influence on health literacy among older adults.[18] For older adults with knee osteoarthritis, the Internet was an effective channel to provide useful information that covered the basics of osteoarthritis, its treatment, self-managing symptoms, the benefits of behavioral change, and maintaining a healthy lifestyle.[33] Internet use also positively affected health literacy indirectly via cognitive function, as we hypothesized. Consistently, Internet use predicted better cognitive function among older adults.[19] Our findings reflect the potential of digital health technology to stimulate cognitive function and health literacy as easier access to health information. Various features in digital technology should be employed to enhance their understanding and ability to appraise and apply health information.

As hypothesized, social participation was positively directly associated with health literacy.

Our finding resonates with the conceptual framework[6] that social participation, as a situational determinant involving how people interact with their social surroundings, affects health literacy. Social participation allows people to obtain health-related information through interaction with others and through access to potentially knowledgeable people who positively influence health literacy. Similarly, previous research reported a positive association between social participation and health literacy among older adults.[23] Social participation was also found to be indirectly associated with health literacy through cognitive function. Active participation in multiple social activities protects cognitive function, as it provides older adults with an opportunity to experience more dynamic environments that are advantageous for maintaining their cognition through stimulation of neurogenesis.[34] Research has also shown that social participation is associated with less cognitive decline.[24] Therefore, health literacy programs should seek strategies to encourage older adults to engage in various social activities to maximize their cognitive capacity for understanding health information and to interact with other people who may favorably influence their health literacy.

As we expected, cognitive function was positively associated with health literacy. In line with the IMHL,[6] cognitive function is an individual characteristic in personal determinants affecting how people access, understand, appraise, and apply medical information. This means that an increase in cognitive function would increase health literacy, whereas a decrease would decrease health literacy. Consistent with previous research, higher cognitive function scores protected against health literacy decline.[35] This insight emphasizes that the provision of health information or activities to promote health literacy among older adults with knee osteoarthritis should be tailored to their cognitive function.

The findings showed that social support had a positive direct effect on health literacy, as hypothesized in this study; the result supported the conceptual framework that social support was one of the situational determinants of health literacy.[6] Social support is crucial for transmitting appropriate health information. Higher levels of social support can improve one's ability to acquire and understand medical information and negotiate in the health care system. For older adults in Asia, family members play an important part in providing information about alternative therapies, including traditional remedies such as salt, herbs, and oils that are beneficial approaches for knee osteoarthritis.[36] Correspondingly, social support was significantly correlated with health literacy among Thai older adults.[18] However, social support did not affect health literacy indirectly via knowledge of knee osteoarthritis or provider-patient communication. This may be explained by the age-related degeneration of reading, listening, and writing skills experienced by most older adults, which might impair their ability to communicate effectively and understand health information.[37]

As speculated, patient engagement had a significant indirect effect on health literacy through Internet use. Consistent with the IMHL,[6] patient engagement is considered a societal and environmental determinant, which includes cultures and social systems that affect health literacy. Thus, how older adults engaged in their own health care under their cultural and social contexts could influence their health literacy. As the Internet is a vital source of information, older adults utilized it to construct their health experiences and gain an understanding of symptoms and treatments. This finding is consistent with another study.[12] Nevertheless, patient engagement had no direct effect on health literacy, probably because the participants were older adults who might hold traditional beliefs and base their health care on a physician's opinion. They might follow the recommendations of their physician or family members, causing them to lack confidence in making health decisions on their own. Therefore, older adults need to be promoted for psychological

readiness to play an active role in their own health care, especially through Internet, to construct their health experiences and gain an understanding of medical information.

Provider-patient communication was not associated with health literacy or knowledge of knee osteoarthritis. This finding was inconsistent with the hypotheses and the IMHL[6] that communication or language is a societal and environmental determinant affecting health literacy. In contrast, other studies reported that provider-patient communication was correlated with health literacy[8] and disease knowledge.[9] Age-related changes and degeneration, such as reduced hearing ability and visual acuity, may influence health literacy by affecting older adults' ability to understand health information communicated by their health providers.[37] Moreover, approximately 69% of our participants had a comorbidity requiring regular medical treatments. Taking certain drugs may lead to hearing or communication problems, which might also affect their ability to access and understand health information.[37]

Surprisingly, we found no evidence of the association between knowledge of knee osteoarthritis and health literacy, which was also incongruent with the hypotheses and the IMHL.[6] It is possible that aging changes might cause physical limitations, and limit the ability to read and understand health information.[37] Moreover, older adults in our study had a primary level of education. Given that most information in health systems is in written form, a higher level of education is needed to receive and understand this information.[38] Our finding was congruent with previous research that disease knowledge could not predict health literacy among community-dwelling older adults.[39]

Conclusions

Our findings provide empirical knowledge on the patterns of relationships between factors influencing health literacy of older adults with knee osteoarthritis

that mostly confirm the IMHL.[6] The MHLOAKO suggests the important role of social skills, specifically identifying cognitive function, Internet use, social participation, social support and patient engagement as influencing factors of health literacy among older adults with knee osteoarthritis. This understanding is beneficial to the development of guidelines to tailor nursing interventions for promoting the health literacy of older adults with knee osteoarthritis.

Limitations and Recommendations

This study had some limitations. Our findings were based on cross-sectional data, which might limit the conclusions about causal relationships. The participants appeared to be homogeneous in terms of age, education level, marital status, and geographical residence. Therefore, interpretations and generalizations from data analysis and the study results might be limited. Further research should be conducted among older adults in different contexts.

Implications for Nursing Practice

This study provides new nursing knowledge regarding factors directly and indirectly predicting health literacy among older adults with knee osteoarthritis to help nurses clearly understand this phenomenon. The MHLOAKO specifically identifies patient engagement, cognitive function, Internet use, social participation, and social support as influencing factors of health literacy among older adults with knee osteoarthritis. Nurses can use this knowledge to guide and tailor nursing intervention for improving health literacy by utilizing the Internet as a channel for easier access to health information and stimulating cognitive function for health literacy. Moreover, nurses should seek strategies to encourage older adults to engage in their own health care and participate in social activities to maximize their health literacy.

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แบบจำลองเชิงสาเหตุของความรอบรู้ด้านสุขภาพในผู้สูงอายุข้อเข่าเสื่อมชาวไทย

พรทิพย์ ปาอิน ทิพาพร วงศ์หงษ์กุล ศิริรัตน์ ปานอุทัย* ทศพร คำผลศิริ โรจนี จินตนาวัฒน์

บทคัดย่อ: ข้อเข่าเสื่อมเป็นโรคข้ออักเสบที่พบบ่อยที่สุด ที่ส่งผลให้เกิดความพิการในผู้สูงอายุ การดูแลตนเอง
อย่างเหมาะสมจึงมีความสำคัญและสามารถปฏิบัติได้ด้วยการมีความรอบรู้ด้านสุขภาพ พบว่าผู้สูงอายุไทย
ที่เป็นโรคข้อเข่าเสื่อมมีความรอบรู้ด้านสุขภาพและมีพฤติกรรมการดูแลตนเองต่อโรคที่ยังไม่เพียงพอ การวิจัย
เชิงพรรณนาแบบภาคตัดขวางนี้มีวัตถุประสงค์เพื่อทดสอบแบบจำลองเชิงสาเหตุของความรอบรู้ด้านสุขภาพ
ของผู้สูงอายุโรคข้อเข่าเสื่อมที่แสดงความสัมพันธ์ระหว่างการสื่อสารระหว่างผู้ให้บริการกับผู้ป่วย
การมีส่วนร่วมของผู้ป่วย การทำหน้าที่ด้านการรู้คิด ความรู้เกี่ยวกับข้อเข่าเสื่อม การใช้อินเทอร์เน็ต
การสนับสนุนทางสังคม การมีส่วนร่วมทางสังคม และความรอบรู้ด้านสุขภาพ กลุ่มตัวอย่างเป็นผู้สูงอายุ
ที่เป็นโรคข้อเข่าเสื่อมจำนวน 318 คน คัดเลือกโดยใช้การสุ่มแบบหลายขั้นตอนจากโรงพยาบาลชุมชน
9 แห่งในจังหวัดทางภาคเหนือของประเทศไทย เก็บรวบรวมข้อมูลโดยใช้แบบบันทึกข้อมูลส่วนบุคคล
แบบสอบถามความรอบรู้ด้านสุขภาพ แบบสอบถามการติดต่อสื่อสารระหว่างบุคลากรสุขภาพและ
ผู้ป่วย แบบสอบถามการมีส่วนร่วมด้านสุขภาพของผู้ป่วย แบบสอบถามการทำหน้าที่ด้านการรู้คิด
แบบสอบถามความรู้เรื่องโรคข้อเข่าเสื่อม แบบสอบถามการใช้อินเทอร์เน็ต แบบสอบถามการ
สนับสนุนทางสังคม และแบบสอบถามการมีส่วนร่วมทางสังคม วิเคราะห์ข้อมูลโดยใช้สถิติพรรณนา
สถิติสหสัมพันธ์ของเพียร์สัน และสถิติการวิเคราะห์โมเดลสมการโครงสร้าง

      แบบจำลองสุดท้ายมีความสอดคล้องกับข้อมูลเชิงประจักษ์และอธิบายความแปรปรวนของ
ความรอบรู้ด้านสุขภาพได้ร้อยละ 36 โดยการใช้อินเทอร์เน็ตเป็นปัจจัยทำนายสำคัญที่สุดที่ส่งผลทางตรง
ต่อความรอบรู้ด้านสุขภาพ การใช้อินเทอร์เน็ตและการมีส่วนร่วมทางสังคมส่งผลเชิงบวกทั้งทางตรงและ
ทางอ้อมต่อความรอบรู้ด้านสุขภาพผ่านการทำหน้าที่ด้านการรู้คิด การทำหน้าที่ด้านการรู้คิดและการสนับสนุน
ทางสังคมส่งผลเชิงบวกทางตรงต่อความรอบรู้ด้านสุขภาพ การมีส่วนร่วมของผู้ป่วยส่งผลเชิงลบทางอ้อม
ต่อความรอบรู้ด้านสุขภาพผ่านการใช้อินเทอร์เน็ต ความรู้เกี่ยวกับข้อเข่าเสื่อมและการสื่อสารระหว่าง
ผู้ให้บริการกับผู้ป่วยไม่ส่งผลต่อความรอบรู้ด้านสุขภาพทั้งทางตรงหรือทางอ้อม สรุปได้ว่า พยาบาลควร
ออกแบบโปรแกรมเพื่อส่งเสริมความรอบรู้ด้านสุขภาพของประชากรกลุ่มนี้โดยมุ่งเน้นการใช้อินเทอร์เน็ต
การมีส่วนร่วมทางสังคม การทำหน้าที่ด้านการรู้คิด การสนับสนุนทางสังคม และการมีส่วนร่วมของผู้ป่วย
รวมทั้งการทดสอบทางคลินิก

คำสำคัญ: การทำหน้าที่ด้านการรู้คิด ความรอบรู้ด้านสุขภาพ การใช้อินเทอร์เน็ต ข้อเข่าเสื่อม ผู้สูงอายุ
การมีส่วนร่วมของผู้ป่วย การมีส่วนร่วมทางสังคม การสนับสนุนทางสังคม

พรทิพย์ ปาอิน *พยาบาลวิชาชีพ นักศึกษาหลักสูตรปริญญาเอก คณะพยาบาลศาสตร์
มหาวิทยาลัยเชียงใหม่ อำเภอเมือง เชียงใหม่ ประเทศไทย 50200*
E-mail: porntipp73@gmail.com
ทิพาพร วงศ์หงษ์กุล *พยาบาลวิชาชีพ ปริญญาเอก รองศาสตราจารย์ คณะพยาบาลศาสตร์
มหาวิทยาลัยเชียงใหม่ อำเภอเมือง เชียงใหม่ ประเทศไทย 50200*
E-mail: tipaporn.w@cmu.ac.th
ติดต่อที่: ศิริรัตน์ ปานอุทัย* *พยาบาลวิชาชีพ ปริญญาเอก ผู้ช่วยศาสตราจารย์
คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ อำเภอเมือง เชียงใหม่ ประเทศไทย 50200*
E-mail: siriratpanuthai@hotmail.com
ทศพร คำผลศิริ *พยาบาลวิชาชีพ ปริญญาเอก ผู้ช่วยศาสตราจารย์ คณะพยาบาลศาสตร์
มหาวิทยาลัยเชียงใหม่ อำเภอเมือง เชียงใหม่ ประเทศไทย 50200*
E-mail: tkhamposiri@gmail.com
โรจนี จินตนาวัฒน์ *พยาบาลวิชาชีพ ปริญญาเอก ผู้ช่วยศาสตราจารย์ คณะ
พยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ อำเภอเมือง เชียงใหม่ ประเทศไทย 50200*
E-mail: rojanee.c@cmu.ac.th