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Health Literacy and Relationship Factors in Exercise Behavior Affecting Health of Students Nakhon Sawan Rajabhat University

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Abstract

This study aimed to determine the levels of health literacy and examine the relationship between specific dimensions of health literacy and exercise behavior among undergraduate students at Nakhon Sawan Rajabhat University. Methodology was a quantitative cross-sectional survey. Sample was conducted among 284 undergraduate students, selected via stratified random sampling. The research instruments included the European Health Literacy Survey Questionnaire (HLS-EU-Q) and the Exercise-Related Factors Questionnaire. Data was collected through paper-based formats online and analyzed using descriptive statistics and inferential statistics, including Chi-square and Fisher's Exact tests, with a significance level set at $p < 0.05$. The findings revealed that four out of six health literacy dimensions had a statistically significant positive relationship with exercise attitudes: Access to Health Information and Services ($p=0.016$), Interacting to Increase Knowledge ($p=0.012$), Changing One's Own Health Behavior ($p=0.014$), and Presenting Health Information ($p=0.018$). In these dimensions, students with high literacy levels reported overwhelmingly positive attitudes toward exercise. Conversely, Understanding Health Information ($p=0.069$) and Making Health Decisions ($p=0.057$) did not reach statistical significance. Interestingly, these cognitive and evaluative dimensions showed an inverse descriptive trend, where higher literacy scores were associated with more negative or realistic attitudes toward exercise, suggesting a "burden of knowledge" regarding the complexities of health maintenance. The study demonstrates that social, functional, and advocacy-based health literacy are the primary drivers of positive exercise attitudes among university students. While technical understanding of health information is important, it does not directly translate into motivation. Therefore, health promotion interventions should focus on simplifying access to services, fostering communicative confidence, and encouraging peer-led health advocacy to effectively improve exercise behaviors and overall student health.

Keywords: Health Literacy, Exercise Behavior, University Students, Health Promotion, Nakhon Sawan Rajabhat University

1. Introduction

Physical inactivity and sedentary behavior are among the most critical risk factors for non-communicable diseases (NCDs) globally (Division of NCDs, 2023; World Health Organization, 2018). In Thailand, NCDs represent the leading health challenge, accounting for 75% of all deaths—approximately 320,000 individuals annually. Notably, 55% of these are classified as premature deaths, with mortality rates from stroke and ischemic heart disease continuing to rise (Division of NCDs, 2023).

While mortality rates among youth (aged 10–24) decreased significantly between 1990 and 2019, the Disability-Adjusted Life Year (DALY) rate remains substantial, particularly due to mental health issues. This indicates that while survival has improved, the quality of life and productivity of young people are still compromised by underlying health conditions (Global Burden of Disease Study, 2019). Among Thai adolescents and young adults, physical activity levels remain low, with males typically demonstrating higher rates of exercise than their female counterparts (Jiang et al., 2024). Variations in these behaviors are influenced by personal factors such as gender, age, and educational status (Sinsap et al., 2025; Jiang et al., 2024).

Ilona Kickbusch (Kickbusch et al., 2006; Kickbusch and Maag, 2008) and Don Nutbeam (2000; Nutbeam and Kickbusch, 2000) were instrumental in European developments; they recognized the potential of health literacy for health promotion and public health, beyond its clinical importance in healthcare. From 2004, Kickbusch advocated for health literacy at the European Health Forum Gastein (2004) and initiated the HLS-CH study in Switzerland in 2006 (Wang et al., 2012). Following the 2006 European Public Health Conference (EUPHA) in Montreux, where a European Commission representative was convinced of the field's relevance, Kickbusch, Jürgen Pelikan, and Helmut Brandt formed a group to establish a consortium, develop a proposal, and secure funding for a European health literacy study.

To define health literacy, a systematic literature review identified 17 definitions and 12 models. Content analysis of these sources yielded a comprehensive, "all-inclusive" consensus definition and conceptual model (Sørensen et al., 2012). This model reflects the evolving understanding of health literacy in research, practice, and policy over the last two decades (Pelikan and Ganahl, 2017a, b). The HLS-EU Consortium views health literacy as an extension of general literacy, encompassing the knowledge, drive, and ability required to manage health information. This involves a fourfold process that includes accessing, comprehending, evaluating, and utilizing information. The fourfold process is used to guide daily decision-making in the areas of medical care, risk prevention, and wellness. Ultimately, this framework serves as a tool for individuals to sustain or enhance their well-being throughout their lives (Sørensen et al., 2013).

The definition and conceptual model cover the continuum of health, from illness to wellness, across personal and systemic perspectives. They encompass various dimensions of health literacy (Nutbeam, 2008) within the modern "health society" (Kickbusch, 2007), including clinical (Pleasant and Kuruvilla, 2008), medical (Peerson and Saunders, 2009), patient (Ishikawa and Yano, 2008), and public health aspects (Freedman et al., 2009).

The definition moves beyond the reactive understanding of information provided by experts; it emphasizes proactively accessing, evaluating, and applying information. These four steps of information management fulfill the requirements suggested by Nutbeam (2008) for health literacy measures: the ability to access specific information from various sources, discriminate between those sources, personalize the information, and apply it for personal benefit.

Furthermore, this framework aligns with Nutbeam's (2000) typology: functional health literacy (understanding), interactive health literacy (accessing), and critical health literacy (evaluating/appraising). In this context, health literacy is viewed not just as cognitive

knowledge, which has a short half-life in late modernity, but as an emotional resource for motivating health-relevant action. It represents a resource for acting healthily in all roles and settings, echoing the WHO Ottawa Charter's principle that "health is created and lived by people within the settings of their everyday life" (WHO, 1986).

While the HLS-EU definition only implicitly mentions the "relational" character of health literacy - the fit between personal competencies and situational demands (Parker, 2009; Kickbusch et al., 2013). This dual aspect is made explicit in its operationalization. The measurement instrument specifically assesses the difficulties people encounter when performing various tasks (Pelikan et al., 2013). Finally, a generic model is used for data analysis, distinguishing between health literacy, its personal and situational determinants, and its consequences for health behavior and status (Pelikan and Ganahl, 2017a, b). The model assumes a dominant causal direction from determinants to consequences, while allowing for cyclical links.

Subsequently, the European Health Literacy Survey Questionnaire (HLS-EU-Q) has significantly impacted health literacy policy, research, and practice. While the HLS-EU study adopted a life-course perspective, it included only participants aged 15 and older; consequently, the results cover youth, adulthood, and aging, but exclude childhood (Sørensen et al., 2013).

Significantly, Thai research reveals a paradox: while university students possess "good to high" levels of health literacy (HL) (Chinapong & Kaosanit, 2020; Lathananan & Nilvacharamanee, 2019), their actual health behaviors and physical activity levels are suboptimal (Chinapong & Kaosanit, 2020; Sinsap et al., 2025). This discrepancy highlights a "knowledge-practice gap," suggesting that theoretical understanding alone is insufficient to drive behavioral change (Chinapong & Kaosanit, 2020). The core issue may lie not in a lack of knowledge, but in the ability to apply that information within a personal context.

Therefore, investigating the relationship between health literacy and exercise behavior among university students is essential—particularly at Nakhon Sawan Rajabhat University, given its mission to promote local development (Nakhon Sawan Rajabhat University, n.d.). Understanding health-related behaviors and determinants specific to students in this region is a vital prerequisite for designing effective and culturally appropriate health promotion programs.

Research Objectives:

1) To assess the levels of health literacy and exercise behavior among students at Nakhon Sawan Rajabhat University.

2) To investigate the relationship between health literacy and exercise behavior.

2. Methodology

This study employs quantitative research design using a cross-sectional survey methodology. The study focuses on a single population group and does not involve an experimental or control group. Its primary objectives are to determine the levels of health literacy and exercise behavior among students at Nakhon Sawan Rajabhat University and to examine the relationship between these two variables.

2.1 Population and Sampling

Target Population: The target population consists of 6,222 regular undergraduate students currently enrolled at Nakhon Sawan Rajabhat University (Database of the Office of Academic Promotion and Registration, 2025).

Sample Size: The sample size was determined using Yamane's formula (1967) with a 95% confidence level and a 0.05 margin of error, resulting in a minimum required sample of 376 participants.

Sampling Method: The researchers utilized stratified random sampling. Participants were recruited on a voluntary basis from clusters of students who utilize university exercise facilities.

2.2 Instruments

Instruments included 1) the European Health Literacy Survey Questionnaire (HLS-EU-Q) and 2) the Exercise-Related Factors Questionnaire

2.2.1 European Health Literacy Survey Questionnaire (HLS-EU-Q)

The HLS-EU instrument integrates two distinct traditions of health literacy measurement: the task-based approach exemplified by HALS (Rudd et al., 2004), which evaluates complex decision-making in daily life, and the self-reported approach (Chew et al., 2004, 2008), which assesses the perceived difficulty of specific tasks.

Table 1: HLS-EU health literacy matrix (Sørensen et al., 2013).

(47 items)	Access/ find/obtain information relevant to health (13 items)	Understand information relevant to health (11 items)	Appraise/ judge/evaluate information relevant to health (12 items)	Apply/use information relevant to health (11 items)
Healthcare (16 items)	Ability to access information on medical and clinical issues (4 items)	Ability to understand medical information and derive meaning (4 items)	Ability to interpret and evaluate medical information (4 items)	Ability to make informed decisions on medical issues (4 items)
Disease prevention (15 items)	Ability to access information on risk factors for health (4 items)	Ability to understand information on risk factors and derive meaning (3 items)	Ability to interpret and evaluate information on risk factors for health (5 items)	Ability to make informed decisions on risk factors for health (3 items)
Health promotion (16 items)	Ability to update oneself on determinants of health in the social and physical environment (5 items)	Ability to understand information on determinants of health in the social and physical environment and derive meaning (4 items)	Ability to interpret and evaluate information on health determinants in the social and physical environment (3 items)	Ability to make informed decisions on health determinants in the social and physical environment (4 items)

To operationalize the conceptual model, a 12-cell matrix was constructed, mapping four cognitive information-processing competencies against three health domains. As shown in Table 1, the HLS-EU instrument utilizes 47 items to measure twelve distinct sub-dimensions of health literacy. The items are distributed relatively evenly across the four information-processing stages: Access (13 items), Understand (11 items), Appraise (12 items), and Apply (11 items). Within the rows, the domain of Healthcare focuses on clinical medical issues, while Disease Prevention centers on understanding and managing risk factors. The Health Promotion domain focuses on navigating health determinants in

one's social and physical environment. This multifaceted approach allows for the generation of both a global health literacy score and specific sub-indices for each domain and competency. This 3×4 framework captures the comprehensive nature of health literacy by identifying concrete tasks for each sub-domain, pairing healthcare, disease prevention, and health promotion with the four stages of information management: accessing, understanding, appraising, and applying information. This analytical structure allows for both a global measure of health literacy and specialized measures for its various sub-dimensions.

The 47-item HLS-EU questionnaire serves as a versatile tool for policy, practice, and research. By measuring the relative difficulty of 47 concrete tasks, it provides a diagnostic foundation for policymakers to design targeted interventions. Furthermore, the standardized format allows responses to be aggregated into various indices, facilitating efficient correlation and regression analyses to explore the relationships between health literacy and its determinants and consequences.

For answering the questions, a four-point Likert scale was employed, ranging from 'very easy' to 'very difficult'. By using these four symmetrical categories, the researchers aimed to avoid a response set that might overstate the difficulty of health literacy tasks. A typical item followed this format: "On a scale from 'very easy' to 'very difficult', how easy is it to [perform task]?" (e.g., "...understand what your doctor says to you?"). Respondents could select one of the four difficulty levels or opt for 'no answer'.

This study revised the 47-item HLS-EU questionnaire regarding to Thai context. The revised version consists of 6 dimensions including 1) Access to Health Information and Services, 2) Understanding Health Information and Services for Action, 3) Interacting to Increase Knowledge and Understanding, 4) Making Health Decisions, 5) Changing One's Own Health Behavior, and 6) Presenting Health Information.

Dimension 1 - Access to Health Information and Services includes the following questions to assess participants' behaviors over the past 12 months:

Dimension of Access to Health Information and Services provided the following questions to ask participants' behaviors with over the past 12 months:

- How easy has it been for you to find reliable health information from various sources (e.g., the internet, healthcare professionals)?
- How easy has it been for you to access general health checkups or disease screenings (e.g., blood pressure or blood sugar tests)?
- How easy has it been for you to find information on how to prevent Non-Communicable Diseases (NCDs), such as diabetes or hypertension?
- How easy has it been for you to find information about exercises suitable for your physical condition?
- How easy has it been for you to access information about proper nutrition and healthy eating?
- How easy has it been for you to find information regarding your healthcare rights and benefits and how to use them?
- How easy has it been for you to find healthcare services that meet your specific needs (e.g., physical therapy clinics)?
- How easy has it been for you to access information regarding minor illnesses and basic self-care?

Dimension 2 - Understanding Health Information and Services for Action includes the following questions to assess participants' behavior over the past 12 months:

- How easy has it been for you to understand advice from healthcare professionals regarding how to take care of your health?
- How easy has it been for you to read and understand medical documents, such as treatment consent forms or medication labels?
- How easy has it been for you to understand your annual health checkup results (e.g., BMI, blood pressure, blood sugar levels)?

- How easy has it been for you to understand information about the causes and impacts of various chronic diseases (e.g., diabetes, heart disease)?
- How easy has it been for you to understand manuals or brochures on correct exercise techniques?
- How easy has it been for you to understand advice regarding dietary modifications for better health?
- How easy has it been for you to understand health information shared through social media?
- How easy has it been for you to fill out forms or documents related to receiving healthcare services?

Dimension 3 - Interacting to Increase Knowledge and Understanding includes the following questions to assess participants' behaviors over the past 12 months:

- How easy has it been for you to ask healthcare professionals questions about your health concerns?
- How easy has it been for you to discuss your symptoms or personal health information with doctors or nurses, so they understand your situation?
- How easy has it been for you to seek further explanation from experts or health personnel when you receive unclear health information?
- How easy has it been for you to exchange health experiences or knowledge with friends or family members?
- How easy has it been for you to question or react when you encounter health information in the media that seems exaggerated or unreliable?
- How easy has it been for you to consult friends or experts about planning an exercise routine that is suitable for you? 23.
- How easy has it been for you to inquire about the impacts of smoking or alcohol consumption on your health?
- How easy has it been for you to talk to friends or family members to seek advice on managing stress?

Dimension 4 - Making Health Decisions includes the following questions to assess participants' behaviors over the past 12 months:

- How easy has it been for you to decide which exercise routine is appropriate for your health and daily schedule?
- How easy has it been for you to choose healthy and nutritionally correct food based on health recommendations?
- How easy has it been for you to decide to follow a doctor's advice after being diagnosed with a chronic disease?
- How easy has it been for you to decide whether or not to use health products or treatments advertised with persuasive claims?
- How easy has it been for you to decide to participate in health promotion activities organized by various agencies?
- How easy has it been for you to decide to avoid health-risk behaviors, such as smoking or drinking alcohol? 31. Over the past 12 months, how easy has it been for you to decide on a stress management method that is right for you?
- How easy has it been for you to decide to change your lifestyle to reduce the risks of diseases you are concerned about?

Dimension 5 - Changing One's Own Health Behavior includes the following questions to assess participants' behaviors over the past 12 months:

- How easy has it been for you to start exercising regularly according to your plan?
- How easy has it been for you to maintain your body weight within a healthy range?
- How easy has it been for you to reduce your consumption of sweet, oily, and salty foods (according to healthy eating principles)?
- How easy has it been for you to manage stress or negative emotions using constructive methods?

- How easy has it been for you to quit or reduce smoking (if you are a smoker)?
- How easy has it been for you to quit or reduce alcohol consumption (if you are a drinker)?
- How easy has it been for you to undergo your scheduled annual health checkup?
- How easy has it been for you to follow COVID-19 prevention measures (e.g., hand washing, mask-wearing, social distancing)?

Dimension 6 - Presenting Health Information includes the following questions to assess participants' behaviors over the past 12 months:

- How easy has it been for you to provide accurate information about exercise to friends or family members?
- How easy has it been for you to guide or persuade those close to you to take an interest in and care for their health?
- How easy has it been for you to share your successful health-care experiences with others to inspire them?
- How easy has it been for you to be a positive health role model (e.g., in terms of exercise or diet) for those around you?
- How easy has it been for you to explain the importance of disease prevention to others?
- How easy has it been for you to provide information to others about the rational use of medicine?
- How easy has it been for you to encourage people in your community to participate in health promotion activities?

2.2.2 Exercise-Related Factors Questionnaire

The questionnaire consists of three dimensions measured on a 5-point Likert scale, ranging from Strongly Disagree (1) to Strongly Agree (5). The three dimensions are 1) knowledge and attitudes, 2) motivation and self-management, and 3) supporting factors and barriers.

Knowledge and Attitudes (4 items): Assesses the participants' understanding of age-appropriate exercise, the perceived necessity of exercise for long-term health, awareness of NCD prevention, and the enjoyment of physical activity.

Motivation and Self-Management (3 items): Evaluates self-motivation for regular exercise, time management abilities despite busy schedules, and proactive planning of exercise routines.

Supporting Factors and Barriers (6 items): Examines social support, accessibility to safe facilities, and access to reliable information. It also investigates perceived barriers, such as physical limitations, environmental/weather conditions, and the misconception that daily chores are sufficient for physical health.

2.3 Data Collection

Ethical approval for this study was granted by the Health Research Ethics Committee (HREC) of Nakhon Sawan Province (Approval No. NSWPHO-035/2025). Following ethical approval, data collection will commence with the target student group. All participants will receive a detailed project briefing, and written informed consent will be obtained prior to data collection, in accordance with the National Research Council of Thailand (2016) guidelines. Data will be collected primarily through online questionnaires, with paper-based versions used as a secondary method to ensure the target sample size is reached. The questionnaire was sent to 376 participants and returned to 284 participants.

2.4 Data Analysis

Data analysis included descriptive statistics, inferential statistics and statistical significance. Descriptive Statistics: Frequency distributions, percentages, means, and standard deviations will be used to describe the general demographic characteristics of the sample. Inferential Statistics: Correlation analysis will be performed to examine the linear relationship between health literacy and exercise behavior (Chinapong & Kaosanit, 2020). Statistical Significance: A significance level of 0.05 ($p < .05$) will be applied for all hypothesis testing (Sinsap et al., 2025; Chinapong & Kaosanit, 2020).

3. Findings

To clarify the levels of health literacy and exercise behavior among students at Nakhon Sawan Rajabhat University, the relationship between each dimension of health literacy and exercise behavior will be discussed. The section, therefore, present the following topics:

3.1 Relationship between Access to Health Information and Services and Exercise Behavior

Table 2: Relationship between Access to Health Information and Services and Exercise Behavior (n = 284)

Exercise Behavior	Level of Access to Health Information and Services			p-value
	Poor	Fair	Good	
Attitude exercise behavior towards level of access to health information and services				0.016*
Positive	0 (0.0)	1 (7.2)	13 (92.8)	
Neutral	29 (16.6)	91 (52.0)	55 (31.4)	
Negative	40 (42.0)	53	2 (2.3)	

*Chi-square test, **Fisher's Exact test

Table 2 presents the correlation between the level of access to health information and services and attitudes toward exercise behavior among 284 participants. The analysis, conducted using Chi-square and Fisher's Exact tests, revealed a statistically significant relationship between these two variables ($p = 0.016$). The data demonstrates a clear positive trend: as the level of access to health information and services increases, attitudes toward exercise become more favorable. Participants who held a positive attitude toward exercise, an overwhelming majority (92.8%) reported a "Good" level of access, while none (0.0%) fell into the "Poor" access category. Among those with a neutral attitude, half (52.0%) reported "Fair" access, with the remainder split between "Good" (31.4%) and "Poor" (16.6%) access. Participants with a negative attitude toward exercise were the most likely to experience barriers to information and services. 42.0% of this group reported "Poor" access, and only 2.3% reported having "Good" access.

The significant findings in Table 2 suggest that "Access to Health Information and Services" is a critical determinant of exercise-related attitudes. In this study, "Access" was defined by the ease with which participants could navigate eight key areas, including finding reliable online info, understanding healthcare rights, and accessing disease screenings. Correlation between Information Ease and Motivation The fact that nearly 93% of those with positive attitudes also reported "Good" access suggests that when individuals find it easy to locate "information about exercises suitable for [their] physical condition" and "proper nutrition," they are better equipped to form a positive outlook on physical activity. Reliability plays a major role here; the ease of finding "reliable health information from various sources" likely reduces the confusion or "information overload" that often leads to demotivation or negative attitudes toward health behaviors.

The high percentage of "Poor" access among those with negative attitudes (42.0%) highlights a systemic issue. If a participant finds it difficult to "access general health

checkups" or "find healthcare services that meet [their] specific needs," they may perceive the healthcare system as inaccessible. This frustration can manifest as a negative attitude toward the behavior itself. For example, if information on "how to prevent Non-Communicable Diseases (NCDs)" is difficult to find or understand, individuals may feel disempowered, leading to a lack of interest in preventive measures like exercise.

These results imply that to improve exercise rates in this population, health providers should not only focus on the benefits of exercise but also on the accessibility of the information. Simplifying the process of "finding healthcare rights" and providing clear channels for "minor illness and self-care" information could lower the psychological barrier to entry for exercise. By moving participants from "Poor" to "Good" access, there is a statistical likelihood that their attitudes toward maintaining an exercise behavior will improve alongside their health literacy.

3.2 Relationship between Understanding Health Information and Services for Action and Exercise Behavior

Table 3: Relationship between Understanding Health Information and Services for Action and Exercise Behavior (n = 284)

Exercise Behavior	Level of Understanding Health Information and Services for Action			p-value
	Poor	Fair	Good	
Attitude exercise behavior towards level of understanding health information and services for action				0.069
Positive	53 (29.1)	12 (40.0)	4 (5.6)	
Neutral	125 (68.7)	13 (43.3)	7 (9.7)	
Negative	4 (2.2)	5 (16.7)	61 (84.7)	

*Chi-square test, **Fisher's Exact test

Table 3 examines the relationship between the level of understanding of health information and services and the participants' attitudes toward exercise behavior ($n = 284$). The statistical analysis yielded a p-value of 0.069.

Under the standard threshold for statistical significance ($p < 0.05$), this result is not statistically significant, indicating that there is no strong evidence of a definitive relationship between these two variables in this specific sample. However, the data reveals a counter-intuitive descriptive trend. Surprisingly, the majority of participants with a "Good" level of understanding (84.7%) reported a negative attitude toward exercise behavior. In contrast, only 2.2% of those with "Poor" understanding held a negative attitude. Those with a "Poor" level of understanding were more likely to hold neutral (68.7%) or positive (29.1%) attitudes compared to those who understood the information well. Of those with a "Fair" level of understanding, the majority held neutral (43.3%) or positive (40.0%) attitudes.

The results of Table 3 provide an interesting point of discussion, especially when compared to the "Access" dimension. While access significantly correlated with positive attitudes, "Understanding" ($p = 0.069$) did not reach statistical significance, and the descriptive data showed an inverse relationship. This dimension measured the ability to "understand medical documents," "interpret annual health checkup results (BMI, blood sugar)," and "understand manuals on correct exercise techniques." One might expect that better understanding would lead to a more positive attitude; however, the data suggests the opposite. This could be due to a "burden of knowledge," where participants who clearly understand the "causes and impacts of chronic diseases" or the complexity of "correct exercise techniques" may feel overwhelmed or discouraged, leading to a more negative or realistic (rather than optimistic) attitude toward their ability to exercise. The findings suggest that the ability to "read medication labels" or "fill out forms" (functional health literacy) does not automatically translate into psychological motivation for exercise. While

a participant may be able to "understand advice regarding dietary modifications" or "understand health info from social media," this cognitive understanding does not necessarily fix the emotional or environmental barriers that shape their attitude toward exercise behavior. The p-value of 0.069 indicates that we cannot confidently generalize these findings to a broader population. The lack of significance suggests that "Understanding" is a less powerful predictor of exercise attitude than "Access." It implies that simply providing brochures or explaining BMI results, while helpful for health knowledge, is not sufficient on its own to improve a person's attitude toward physical activity.

Because "Good" understanding was descriptively linked with more "Negative" attitudes in this sample, health educators should ensure that when explaining "annual health checkup results" or "chronic disease impacts," they do so in a way that is empowering rather than frightening. The goal should be to bridge the gap between understanding the risks and feeling positive about the ability to change behavior.

3.3 Relationship between Interacting to Increase Knowledge and Understanding for Action and Exercise Behavior

Table 4: Relationship between Interacting to Increase Knowledge and Understanding and Exercise Behavior (n = 284)

Exercise Behavior	Level of Interacting to Increase Knowledge and Understanding			p-value
	Poor	Fair	Good	
Attitude exercise behavior towards level of interacting to increase knowledge and understanding				0.012*
Positive	1 (6.7)	2 (13.3)	12 (80)	
Neutral	31 (17.7)	89 (50.9)	55 (31.4)	
Negative	39 (44.5)	52 (55.3)	3 (3.2)	

*Chi-square test, **Fisher's Exact test

Table 4 examines how communicative interaction, specifically seeking and exchanging health information, relates to participants' attitudes toward exercise behavior (n = 284). The statistical analysis shows a p-value of 0.012, which is statistically significant ($p < 0.05$). This indicates a strong association between a participant's ability to interact with others regarding health and their attitude toward exercise. A substantial majority (80.0%) of participants who held a positive attitude toward exercise also reported a "Good" level of interaction. Only a small fraction (6.7%) of this group reported "Poor" interaction skills. Conversely, those with negative attitudes towards exercise behavior were far more likely to have lower levels of interaction. 44.5% of this group reported "Poor" interaction, and 55.3% reported "Fair" interaction. Critically, only 3.2% of those with a negative attitude reported "Good" interaction levels. The neutral group was primarily characterized by a "Fair" level of interaction (50.9%).

The significant relationship found in Table 4 ($p = 0.012$) highlights that interactive health literacy, the ability to act as an active participant in health conversations, is a major driver of positive exercise attitudes. The dimension of "Interacting to Increase Knowledge" involves the ease of "asking healthcare professionals questions" and "seeking further explanation from experts." The data suggests that participants who are comfortable navigating these interactions are better positioned to form positive attitudes. When an individual can "discuss symptoms or personal health info" clearly with a doctor, they likely receive more personalized and encouraging advice, which reduces the uncertainty and fear often associated with starting or maintaining an exercise routine. The dimension also covers the ease of "exchanging health experiences with friends or family" and "consulting friends about planning an exercise routine." The high correlation between "Good" interaction and "Positive" attitudes underscores the importance of social health literacy.

By talking to peers, participants gain social support and shared knowledge, which makes exercise feel more attainable and socially rewarding. In contrast, those with "Poor" interaction may feel isolated in their health journey, contributing to their 44.5% rate of negative attitudes. An interesting component of this dimension is the ability to "question information in the media that seems exaggerated or unreliable." Participants who feel equipped to do this are less likely to be discouraged by unrealistic fitness trends or "fad" health advice. This critical thinking skill, rooted in interaction and inquiry, allows individuals to focus on sustainable exercise behaviors, fostering a more positive and resilient attitude.

These findings suggest that health interventions should not just offer one-way information (like brochures) but should focus on coaching participants to ask questions. By improving a person's ability to "talk to family members about managing stress" or "inquire about the impacts of smoking/alcohol," health providers can empower them. This empowerment leads to higher self-efficacy, which Table 4 shows is a key bridge to developing a positive attitude toward exercise.

3.4 Relationship between Making Health Decisions and Exercise Behavior

Table 5: Relationship between Making Health Decisions for Action and Exercise Behavior (n = 284)

Exercise Behavior	Level of Making Health Decisions for Action			p-value
	Poor	Fair	Good	
Attitude exercise behavior towards level of making health decisions for action				0.057
Positive	52 (75.4)	11 (15.9)	6 (8.7)	
Neutral	122 (84.1)	14 (9.7)	9 (6.2)	
Negative	4 (5.7)	4 (5.7)	62 (88.6)	

*Chi-square test, **Fisher's Exact test

Table 5 presents the relationship between the participants' ability to make health decisions and their attitude toward exercise behavior (n = 284). The statistical analysis resulted in a p-value of 0.057. While this value is slightly above the conventional threshold for statistical significance ($p < 0.05$), it represents a marginal significance or a strong trend. Interestingly, the descriptive data reveals a striking inverse relationship between decision-making ability and exercise attitudes. A vast majority (88.6%) of participants who were categorized as having a "Good" level of health decision-making held a negative attitude toward exercise behavior. Conversely, of those who held a positive attitude toward exercise, 75.4% were categorized as having a "Poor" level of decision-making. Similarly, the majority of those with neutral attitudes (84.1%) fell into the "Poor" decision-making category.

The findings in Table 5 are provocative and contradict the common assumption that better decision-making skills lead to more positive health attitudes. With a p-value of 0.057, these results suggest a complex psychological or practical friction between the "act of deciding" and the "attitude toward the behavior." The "Making Health Decisions" dimension includes tasks such as "deciding which exercise routine is appropriate for your daily schedule" and "deciding to change your lifestyle to reduce disease risk." The fact that those with "Good" decision-making skills hold more negative attitudes may stem from realism or perceived difficulty. Participants who are highly capable of evaluating their "daily schedule" and "health-risk behaviors" may be more acutely aware of the barriers, time constraints, and effort required to maintain an exercise routine. For them, "making the decision" is a heavy task that leads to a more skeptical or negative attitude toward the behavior itself. A key item in this dimension is the ability to "decide whether or not to use health products advertised with persuasive claims." Participants with "Good" decision-making levels are likely more critical of health trends and marketing. This critical stance

might extend to exercise behavior; they may be less likely to hold a "blindly positive" attitude and instead focus on the complexities and challenges of health maintenance, which is reflected in the data as a "negative" attitude. Paradox On the other hand, the finding that 75.4% of those with positive attitudes have "Poor" decision-making skills suggests a potential gap between intention and evaluation. These individuals may feel very positive about exercise in theory, but struggle with the practical, cognitive steps of "deciding on a stress management method" or "choosing nutritionally correct food." This indicates that a positive attitude alone does not guarantee that an individual finds the decision-making process easy or accessible.

The marginal significance (p = 0.057) suggests that while the pattern is strong, it may not be universal. However, it serves as a warning for health educators: simply improving a person's ability to "follow a doctor's advice" or "participate in health activities" may not automatically improve their attitude. In fact, it may make them more aware of the difficulties involved. Interventions should aim to make health decisions "easier" and less cognitively taxing to ensure that "Good" decision-making leads to "Positive" rather than "Negative" attitudes.

3.5 Relationship between Changing One's Own Health Behavior and Exercise Behavior

Table 6: Relationship between Changing One's Own Health Behavior and Exercise Behavior (n = 284)

Exercise Behavior	Level of Changing One's Own Health Behavior			p-value
	Poor	Fair	Good	
Attitude exercise behavior towards level of changing one's own health behavior				0.014*
Positive	2 (13.3)	3 (20.0)	10 (66.7)	
Neutral	30 (17.1)	92 (52.6)	53 (30.3)	
Negative	38 (40.4)	51 (54.3)	5 (5.3)	

*Chi-square test, **Fisher's Exact test

Table 6 evaluates the association between the self-reported ease of implementing health behavior changes and participants' attitudes toward exercise (n = 284). The statistical analysis produced a p-value of 0.014, indicating a statistically significant relationship between these variables. The data reveals a strong positive correlation between successful behavior change and exercise attitudes. Two-thirds (66.7%) of participants with a positive attitude toward exercise reported a "Good" level of success in changing their health behaviors. Only 13.3% of this group reported a "Poor" level. Among those with a negative attitude toward exercise, the vast majority struggled with behavioral change; 40.4% reported "Poor" success and 54.3% reported "Fair" success. Notably, only 5.3% of the negative attitude group achieved a "Good" level of behavior change. More than half of the neutral group (52.6%) reported a "Fair" level of behavioral change.

The significant p-value (0.014) in Table 6 confirms that an individual's attitude toward exercise is deeply connected to their actual ability to modify their health habits. This dimension represents the "Action" stage of health literacy, focusing on self-regulation and discipline. The dimension includes the ease of "starting to exercise regularly according to a plan." The findings suggest that when participants find this task achievable, they naturally develop a more positive attitude toward the behavior. This creates a "virtuous cycle" where the ease of action reinforces a positive mindset, which in turn makes further behavior change, such as "maintaining body weight within a healthy range," feel more attainable. Interestingly, this dimension covers more than just fitness; it includes "reducing consumption of sweet, oily, and salty foods," "managing stress," and "undergoing annual checkups." The high concentration of "Good" behavior change within the positive attitude group suggests that exercise attitude is a proxy for overall health discipline. Individuals who find it easy to "follow COVID-19 prevention measures" or "reduce smoking/alcohol"

likely possess high self-efficacy, which manifests as a positive attitude toward physical activity. For the 94.7% of the negative attitude group who reported only "Poor" or "Fair" behavioral change, the findings highlight a significant gap in implementation. If a participant finds it difficult to "manage stress or negative emotions using constructive methods," they may view exercise as another burdensome "chore" rather than a benefit, leading to a negative attitude. This suggests that the inability to change one behavior (like diet or stress management) can negatively impact the attitude toward other behaviors (like exercise).

These findings imply that to improve exercise attitudes, interventions should focus on making behavioral change small and "easy." By helping participants achieve "Good" levels in easier tasks, such as "following COVID-19 measures" or "undergoing a checkup," health providers can build the confidence necessary to shift a participant's attitude from negative to positive, eventually leading to more complex changes like regular exercise.

3.6 Relationship between Presenting Health Information and Exercise Behavior

Table 7: Relationship between Presenting Health Information and Exercise Behavior (n = 284)

Exercise Behavior	Level of Presenting Health Information			p-value
	Poor	Fair	Good	
Attitude exercise behavior towards level of presenting health information				0.018*
Positive	2 (13.3)	2 (13.3)	11 (73.4)	
Neutral	31 (17.7)	92 (52.6)	52 (29.7)	
Negative	37 (39.4)	52 (55.3)	5 (5.3)	

*Chi-square test, **Fisher's Exact test

Table 7 illustrates the association between the level of ease in presenting health information to others and participants' attitudes toward exercise behavior (n = 284). The statistical analysis yielded a p-value of 0.018, which is statistically significant ($p < 0.05$). This indicates a meaningful relationship between an individual's ability to communicate health information and their personal attitude toward exercise. Among participants with a positive attitude toward exercise, a significant majority (73.4%) reported a "Good" level of ease in presenting health information. Only 13.3% in this group reported a "Poor" level. In contrast, participants with a negative attitude toward exercise were very unlikely to be effective at presenting health info; only 5.3% reported a "Good" level. The vast majority of this group fell into the "Fair" (55.3%) or "Poor" (39.4%) categories. The neutral group was primarily concentrated in the "Fair" level of presenting information (52.6%).

The significant findings in Table 7 ($p = 0.018$) suggest that "Presenting Health Information" serves as a form of advocacy literacy that reinforces personal health attitudes. This dimension measures the transition from individual health literacy to social health influence. The dimension includes the ability to "provide accurate information about exercise to friends" and "explain the importance of disease prevention to others." Psychologically, when individuals explain or teach a concept to others, they reinforce their own belief in that concept. Those who find it easy to be a "positive health role model" are more likely to internalize a positive attitude toward exercise to remain consistent with the image they project to their community. Items such as "encouraging people in the community to participate in health promotion" and "persuading those close to you" highlight the social nature of health behaviors. The data shows that those who are successful in these social interactions (73.4% of the positive group) likely have a strong social support system. By being an active "presenter" of health information, they create a social environment that mirrors their positive attitude toward exercise. For participants with a negative attitude toward exercise, the struggle to "share successful health-care experiences" or "provide info on the rational use of medicine" is evident. If an individual does not feel confident in their own health success, they are unlikely to feel they can "inspire others" or act as a role model. This lack of communicative confidence (39.4%

"Poor" in the negative group) suggests that a negative attitude may be linked to a feeling of health-related social inadequacy or a lack of personal success stories to share.

These results imply that health literacy has a "social multiplier" effect. Individuals who feel empowered to "guide or persuade those close to them" are far more likely to maintain a positive personal attitude toward exercise. Therefore, health programs should not only focus on personal knowledge but also on training individuals to become "health ambassadors" or peer mentors. By improving a person's ability to present health information effectively, healthcare providers can simultaneously strengthen that individual's own positive attitude toward maintaining a healthy lifestyle.

4. Conclusions

This study provided a comprehensive understanding of how various dimensions of health literacy influence the exercise-related attitudes of students at Nakhon Sawan Rajabhat University. Collectively, the data suggests that while high levels of health literacy generally foster more favorable attitudes toward exercise, the relationship is nuanced and depends heavily on whether the literacy dimension is functional/social or cognitive/evaluative.

4.1 The Drivers of Positive Attitude: Access, Interaction, and Action

The study identified four dimensions that significantly and positively correlate with exercise attitudes: Access ($p=0.016$), Interacting ($p=0.012$), Changing Behavior ($p=0.014$), and Presenting Information ($p=0.018$).

Access and Interaction: Students who can easily navigate health systems and communicate their needs to professionals or peers are much more likely to maintain a positive outlook. This confirms that social support and the removal of physical or informational barriers are fundamental to exercise motivation.

Behavioral Change and Advocacy: The strong significance of "Changing One's Own Health Behavior" and "Presenting Health Information" suggests a "virtuous cycle." When students successfully implement small health changes (self-efficacy) and begin to advocate for health within their social circles (role-modeling), their personal commitment and positive attitude toward exercise are significantly reinforced.

4.2 The Cognitive Paradox: Understanding and Decision-Making

In contrast, the dimensions of Understanding ($p=0.069$) and Making Health Decisions ($p=0.057$) did not reach the standard threshold for statistical significance and presented an unexpected inverse trend. In both cases, students with "Good" levels of understanding and decision-making skills tended to report more negative attitudes toward exercise behavior. This suggests a "burden of knowledge" or "realism gap," where a deep understanding of chronic disease risks and the complexity of lifestyle modification may lead to a more skeptical or overwhelmed perspective. It reveals that high cognitive literacy alone is insufficient for motivation if it is not accompanied by the tools to manage the perceived difficulty of the health task.

4.3 Final Implications for Health Promotion

In conclusion, improving exercise behavior among students requires a shift in approach. Simply providing academic or technical health information (cognitive literacy) may not improve attitudes and, in some cases, may inadvertently highlight barriers. Instead, health interventions should focus on:

- Empowerment through Access: Streamlining the way students find reliable info and health services.

- Social and Communicative Skills: Coaching students to ask questions and engage in health discussions, transforming them from passive receivers to active health "ambassadors."
- Low-Stakes Behavioral Change: Focusing on making health changes feel "easy" rather than "correct," thereby bridging the gap between understanding the risks and feeling capable of action.

Ultimately, at Nakhon Sawan Rajabhat University, the most effective path to fostering positive exercise attitudes lies in building social and behavioral self-efficacy—moving literacy from the "head" (knowing) to the "hands" (doing) and "heart" (sharing).

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