

# ความรู้เกี่ยวกับสุขภาพสมองและพฤติกรรมดูแลสุขภาพสมองของ เยาวชน อายุ 15-22 ปี ในเขตกรุงเทพมหานคร

## Brain health related knowledge and brain health behaviors among adolescents aged 15-22 years old in Bangkok

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### บทคัดย่อ

วัยรุ่นเป็นช่วงเวลาที่สำคัญสำหรับการพัฒนาสมอง พฤติกรรมใช้ชีวิตส่งผลต่อการทำงานของสมอง การศึกษา ความรู้เกี่ยวกับสมองและพฤติกรรมดูแลสุขภาพสมองของวัยรุ่นเป็นสิ่งสำคัญ สำหรับการประเมินพัฒนาการอย่างครอบคลุม การศึกษานี้มีวัตถุประสงค์เพื่อประเมินความรู้เกี่ยวกับ

สุขภาพสมองและพฤติกรรมสุขภาพสมองและเพื่อศึกษาปัจจัยทำนายพฤติกรรมสุขภาพสมอง เป็นการวิจัยเชิงสำรวจออนไลน์แบบภาคตัดขวาง ซึ่งเป็นการศึกษาวัยรุ่นอายุ 15-22 ปี ในกรุงเทพมหานคร เก็บข้อมูลด้วยแบบสอบถามที่พัฒนาขึ้นเพื่อรวบรวมข้อมูลในการศึกษาคั้งนี้ ใช้สถิติเชิงพรรณนา เช่น ความถี่และเปอร์เซ็นต์ เพื่อวิเคราะห์ลักษณะของผู้เข้าร่วม แบบจำลองเชิงเส้นทั่วไปเพื่อวิเคราะห์ปัจจัยทำนาย พฤติกรรมดูแลสุขภาพสมอง จากผลการศึกษา มีผู้เข้าร่วมในการศึกษาคั้งนี้จำนวน 1,225 คน ผลการวิจัย พบว่า ผู้ตอบแบบสอบถามส่วนใหญ่ ร้อยละ 52.24 มีความรู้เกี่ยวกับสุขภาพสมองในระดับดี และ ส่วนใหญ่ร้อยละ 58.69 มีพฤติกรรมด้าน สุขภาพสมองในระดับปานกลาง ปัจจัยทำนายพฤติกรรมดูแลสุขภาพสมอง ได้แก่ รายได้ครัวเรือน ทำนายได้ร้อยละ 16.80 (Beta=0.168, p-value=0.05) ช่องทางการได้รับความรู้ด้านสุขภาพ (Beta= 0.091, p-value= 0.05) ทำนายได้ ร้อยละ 9.10 และความรู้เกี่ยวกับสุขภาพสมอง ทำนายได้ร้อยละ 8.40 (Beta= 0.084, p-value=0.05) สรุปได้ว่า ในการพัฒนาพฤติกรรมด้านสุขภาพสมอง ควรมุ่งเน้นไปที่การเสริมสร้างความรู้เกี่ยวกับสุขภาพสมองและการ รณรงค์สร้างความรู้เพิ่มเติมการเข้าถึงข้อมูลด้านสุขภาพสำหรับทุกกลุ่ม รายได้ การกำหนดเป้าหมาย การแทรกแซง เพื่อจัดการกับความท้าทายเฉพาะ เช่น การแก้ปัญหาเรื่องมลภาวะ และส่งเสริมการทำงานร่วมกันระหว่าง ผู้มีส่วนได้ ส่วนเสียเพื่อการแก้ปัญหาที่ครอบคลุม

**คำสำคัญ :** สุขภาพสมอง, ความรู้, เยาวชน, พฤติกรรม, กรุงเทพมหานคร

### Abstract

Adolescence is a critical period for brain development, with lifestyle choices impacting cognitive function. Understanding brain health knowledge and behaviors among teenagers is crucial for comprehensive development assessment. To assess brain health-related knowledge and brain health behavior and to study predictive factors for brain health behaviors. This is a cross-section online survey research, a study of adolescents aged 15-22 years old in Bangkok, Thailand. A questionnaire was developed to collect data in this study. Descriptive statistics such as frequency and percentage were used to analyze participant characteristics. A generalized linear model was used to analyze predictive factors. There were 1,225 adolescents participating in this study. The results showed that the majority of respondents (52.24%) have a good level of knowledge of brain health, and most of them (58.69%) engage in brain health behaviors at a moderate level. Factors predicting behavior include household income (Beta=0.168, p-value=0.05) could predict 16.80%, receiving health knowledge through news channels (Beta= 0.091, p-value= 0.05), could predict 9.10%,

and possessing brain health knowledge (Beta= 0.084,  $p$ -value=0.05) could predict 8.40%, respectively. To improve brain health behaviors, focus on enhancing education and awareness campaigns, ensuring accessibility to health information for all income groups, targeting interventions to address specific challenges, improving the environment by reducing pollution and congestion, and fostering collaboration among stakeholders for comprehensive solutions.

**Keywords:** Brain health, Knowledge, Adolescents, Behaviors, Bangkok

## Introduction

The adolescent stage is a critical period marked by rapid physical, cognitive, and emotional development. Central to this development is the maturation of the brain, a process that continues into early adulthood. The teenage years constitute a vulnerable yet formative phase where lifestyle choices and behaviors can significantly impact cognitive function and mental well-being.<sup>(1-2)</sup> Exploring the intersection of brain health-related knowledge and behaviors among teenagers is essential for fostering a comprehensive understanding of factors influencing their neurological development. During adolescence, the brain undergoes structural changes, particularly in regions associated with executive functions, emotional regulation, and decision-making.<sup>(3)</sup> A robust understanding of cognitive development is crucial in assessing how teenagers perceive and prioritize brain health. Research has shown that knowledge about the brain's plasticity and the impact of

lifestyle choices on cognitive function can influence adolescents' attitudes and behaviors related to their own brain health.<sup>(4)</sup> Teenagers often engage in behaviors that can either support or compromise brain health. These behaviors include dietary choices, physical activity, sleep patterns, substance use, and screen time.<sup>(1,5)</sup> Research has demonstrated that a balanced diet rich in nutrients, regular exercise, adequate sleep, and limited exposure to harmful substances positively contribute to cognitive performance. Conversely, engaging in risky behaviors, such as substance abuse or insufficient sleep, can have detrimental effects on the developing brain.<sup>(6-8)</sup>

Understanding the level of brain health-related knowledge among teenagers is essential for tailoring effective educational interventions. Research indicates that there may be disparities in knowledge levels based on socioeconomic factors, educational environments, and cultural backgrounds.

Identifying these disparities is critical for developing targeted educational programs that can enhance overall awareness and promote positive brain health behaviors.<sup>(9-12)</sup> The pervasive influence of technology and social media in the lives of teenagers raises questions about their impact on brain health. Excessive screen time, cyberbullying, and constant connectivity may have implications for cognitive well-being. Investigating the relationship between technology use and brain health behaviors can provide insights into potential risks and opportunities for promoting healthy habits.<sup>(13-15)</sup> Brain health extends beyond cognitive functions to encompass emotional and mental well-being. Understanding how mental health challenges, such as stress and anxiety, affect teenagers and how these challenges relate to their behaviors is a critical aspect of research in this field.<sup>(16-17)</sup> Strategies for fostering resilience and coping mechanisms play a vital role in promoting holistic brain health. Exploring the nexus of brain health-related knowledge and behaviors, based on KAP Theory, among teenagers is crucial for developing targeted interventions that promote optimal cognitive development and well-being during this critical stage of life. This research aims to contribute valuable

insights to inform educational programs, public health initiatives, and policies geared toward enhancing the brain health of adolescents. The objective of this study were to assess brain health related knowledge, brain health behaviors and to study predictive factors for brain health behaviors

## Study Methods

This is a cross sectional survey research that studied adolescents aged 15-22 years old in Bangkok, Thailand who could access the internet (infinite population). The data was collected by an online survey (Google form) between 1 December 2023 - 15 January 2024.

## Population and sample group

Population for this study was adolescents aged 15-22 years old who live in Bangkok, Thailand who could connect to the internet which is an infinite population. The sample group was calculated by Cochran formula.<sup>(18)</sup> at 95% confidence level. The sample group was 346 people. However, there were 1,225 people who were willing to participate and filled in the online survey, therefore we conducted this study on all 1,225 participants.

## Instrument

In this study, the online survey was used as an instrument to collect the data. It was developed based on literature review 1) information about brain health, brain health guidelines from the World Health Organization and Ministry of Public Health, Thailand, and 2) related studies about brain health. This online survey consists of 3 parts: personal information questions, brain health-related questions, and behavior-level tests about brain health questions. The questionnaire consisted of 3 parts; personal information of respondents, knowledge questions and brain health behavior questions.

Part 1 Personal information, encompassing 5 questions related to gender, class level, news channel receiving healthcare information, household income, and the use of brain supplements.

Part 2 Brain Health Knowledge Question, comprises 14 multiple-choice questions assessing general knowledge about brain health. The questions are 3-multiple choice questions with only 1 correct answer. Correct answers contribute to a total score, with a score range of 0-14 points. Scores between 80-100% or a score of 11-14, indicate a good level of knowledge. Scores between 60-79% or a score of 8-10,

indicate that knowledge about brain health is at a moderate level. Scores lower than 60% or a score lower than 8, indicate low level of knowledge about brain health.

Part 3 Brain Health Behavior Question, consists of 7 questions to measure brain health behavior. The questions measure the frequency of practice (Likert Scale) 1-5, with 5 = always practice, 4=Practice frequently, 3=Occasionally practice, 2=Practice sometimes and 1=Never practices. The total scores range from 7-35 points, a score of 80-100% or a score of 28-35 reflects a good behavior level. A score of 60-79% or a score of 21-27, indicates a moderate behavior level, and scores below 60% or a score lower than 21 suggest a low behavior level.

The data collection instruments used in this study were reviewed by three medical science experts with an IOC value greater than 0.5.

## Data collection

This study collected data using an online questionnaire (Google form). Respondents were invited to participate in answering online questionnaires through social media groups such as education groups, volunteer groups, and travel groups.

## Data analysis

Analyze personal information, knowledge, and behavior regarding brain health using descriptive statistics, including frequency, percentage, mean, and standard deviation, using inferential statistics. A generalized linear model was utilized to analyze the factors predicting brain health behavior, with significance observed at  $p < 0.05$ .

## Ethical considerations

In data collection in this study, the researcher explained the objectives of the study to the volunteers until they understood them well. Volunteers decided to participate in the questionnaire. This study collected data anonymously, and the information obtained by the researcher was confidential.

## Study Result

Table 1 displays the percentages of demographic characteristics of the volunteers who completed the survey questionnaires. A total of 1,225 individuals have responded. The majority of responses are female, accounting for 850 people (69.39%), while males account for only 375 (30.61%). The top two ages of responders were between grades 10 and 11, with 256 people (20.90%) and 265 people (21.63%), respectively. According to the data, social media was an overwhelming number of sources for obtaining health news for 826 (67.43%), while school was the second for 225 persons (18.37%). The household income of those who responded to this questionnaire ranges between 40,001 and 80,000 baht for 283 persons (23.10%) and 80,001 to 150,000 baht for 373 people (30.45%). Based on research statistics, persons who took a brain supplement 280 people (22.86%) is less than those who did not 945 people (77.14%).

Table no.1 Illustration Demographic characteristic of respondents (n=1,225)

Variable	Frequency (%)
<b>Gender</b>	
Male	375 (30.61)
Female	850 (69.39)
<b>Class Level</b>	
Grade 10	256 (20.90)
Grade 11	265 (21.63)
Grade 12	140 (11.43)
University Year 1	125 (10.20)
University Year 2	216 (17.63)
University Year 3	97 (7.92)
University Year 4 and above	97 (7.92)
Not attending school	29 (2.37)
<b>New Channel receiving health news</b>	
TV, Radio	46 (3.76)
Magazine, Newspaper	18 (1.47)
Internet, Social Media	826 (67.43)
Parent	62 (5.06)
School	225 (18.37)
Friends	28 (2.29)
Others	20 (1.62)
<b>Household Income (Baht)</b>	
<20,000	78 (6.37)
20,001-40,000	230 (18.78)
40,001-80,000	283 (23.10)
80,001-150,000	373 (30.45)
>150,000	261 (21.30)
<b>Taking brain supplement</b>	
Yes	280 (22.86)
No	945 (77.14)
<b>Total</b>	<b>1,225 (100.00)</b>

Majority of respondents had a good level of brain health knowledge (n=640, 52.24%), followed by a moderate level of brain health knowledge (n=348, 28.41%) and a poor level of brain health knowledge (n=92, 7.51%).

**Table No.2** Illustrate the knowledge score level about brain health of the sample group.

Percentage	Frequency (%)	Knowledge level
2	640 (52.24)	Good
60-79	348 (28.41)	Moderate
Below 60	92 (7.51)	Poor

From analyzing question items regarding brain health knowledge, the results showed that the top 3 correctly answered questions were 1) Which nutrient is often associated with supporting cognitive function and is found in abundance in fatty fish? (94.78%) 2) How can maintaining cardiovascular health contribute to overall brain health? (93.71%) and 3) Chronic stress can negatively impact brain health. Which relaxation technique is commonly used to manage stress and promote mental well-being? (91.18%) Questions answered most poorly were: 1) Proper hydration is essential for brain health. What is the approximate percentage of water in the human brain? (54.45%) 2) Which lifestyle factor has been linked to a decreased risk of developing neurodegenerative diseases such as Alzheimer's? (48.90%) and 3) What is a primary factor that can contribute to age-related cognitive decline if left unmanaged? (44.90%)

**Table No.3** Question items of brain health knowledge answered correctly

Brain Health Knowledge Questions	n (%)
1. What role does regular aerobic exercise play in maintaining brain health?	922 (75.27)
2. Which nutrient is often associated with supporting cognitive function and is found in abundance in fatty fish?	1,161 (94.78)
3. How many hours of sleep per night are generally recommended for optimal brain health in adults?	1109 (90.53)
4. Chronic stress can negatively impact brain health. Which relaxation technique is commonly used to manage stress and promote mental well-being?	1,117 (91.18)

Brain Health Knowledge Questions	n (%)
5. What role does social connection play in maintaining brain health?	1051 (85.80)
6. Which type of cognitive stimulation involves activities that challenge the brain and promote the formation of new neural connections?	1114 (90.94)
7. Proper hydration is essential for brain health. What is the approximate percentage of water in the human brain?	667 (54.45)
8. What is a primary factor that can contribute to age-related cognitive decline if left unmanaged?	550 (44.90)
9. Which brain region is responsible for controlling basic bodily functions such as breathing and heart rate?	832 (67.92)
10. How does chronic lack of sleep affect cognitive function?	1112 (90.78)
11. What is the primary function of the hippocampus in the brain?	846 (69.06)
12. Which lifestyle factor has been linked to a decreased risk of developing neurodegenerative diseases such as Alzheimer's?	599 (48.90)
13. What is the term for the ability of the brain to adapt and reorganize itself in response to experience or injury?	777 (63.43)
14. How can maintaining cardiovascular health contribute to overall brain health?	1,148 (93.71)

Majority of respondents had a moderate level of brain health behavior (n=719, 58.96%), followed by a good level of brain health behavior (n=277, 22.61%) and a poor level of brain health behavior (n=229, 18.69%).

**Table no.4** Illustrate the brain health behavior score level of the sample group.

Percentage	Frequency (%)	Brain Health Behavior level
80-100 (28-35)	277 (22.61)	Good
60-79 (21-27)	719 (58.69)	Moderate
Below 60 (below 21)	229 (18.69)	Poor

Brain health behaviors that most respondents always practice were 1) You are connected to your close friends and family (54.86%) and 2) You always sleep at night for 7-9 hours (23.92%). While brain health behaviors that least number of respondents always practice were 1) You spend time doing meditation or self-reflection (12.33%) and 2) You do aerobic exercise (11.35%)

Table No.5 Question items of brain health behavior (1= never, 2= rarely, 3=sometimes, 4= often, 5= always)

Brain Health Behavior	1 Never n (%)	2 Rarely n (%)	3 Some- times n (%)	4 Often n (%)	5 Always n (%)
1. You do aerobic exercise	134 (10.94)	195 (15.92)	457 (37.31)	300 (24.49)	139 (11.35)
2. You eat foods or supplement that contain Omega-3 fatty acids	194 (15.84)	254 (20.73)	363 (29.63)	260 (21.22)	154 (12.57)
3. You always sleep at night for 7-9 hours	32 (2.61)	233 (19.02)	380 (31.02)	287 (23.43)	293 (23.92)
4. You spend time doing meditation or self-reflection	146 (11.92)	248 (20.24)	376 (30.69)	304 (24.82)	151 (12.33)
5. You are connected to your close friends and family	8 (0.65)	34 (2.78)	169 (13.80)	342 (27.92)	672 (54.86)
6. You are engaging in puzzles and mental exercise games.	127 (10.37)	211 (17.22)	364 (29.71)	338 (27.59)	185 (15.10)
7. You drink enough water each day	7 (0.57)	58 (4.73)	302 (24.65)	347 (28.33)	511 (41.71)

From a generalized linear model analyzing factors influencing brain health behavior among respondents, the result showed that household income ( $\beta=0.168$ ,  $p\text{-value}<0.05$ ), News channel receiving health knowledge ( $\beta= 0.091$ ,  $p\text{-value}<0.05$ ) and Brain health knowledge ( $\beta= 0.084$ ,  $p\text{-value}<0.05$ ) were predictive factors for brain health behaviors among respondents.

Table No. 6 Analysis of factors influence brain health behaviors

Variable	B	Std. Error	$\beta$	t	p-Value
Gender	0.282	0.248	0.031	1.138	0.255
Class Level	-0.181	0.061	-0.089	-2.998	0.003
News channel receiving health knowledge	0.348	0.106	0.091	3.278	0.001
Household Income	0.589	0.104	0.168	5.681	0.000
Taking Brain Supplement	-1.281	0.276	-0.129	-4.642	0.000
Brain Health Knowledge	0.159	0.053	0.084	3.014	0.003

## Discussion

The result revealed that respondents had a good level of brain health knowledge. This could contribute to several factors; high school and university curricula often include courses in biology, psychology, and health sciences, which cover topics related to brain health. Respondents learn about the structure and function of the brain, as well as factors that affect brain health such as nutrition, exercise, sleep, and stress management.<sup>(19-21)</sup> Respondents can access information through the internet or other digital resources about brain health, neurobiology and related content.<sup>(22-24)</sup> There has been a growing awareness of the importance of brain health in recent years, thanks to awareness campaigns by organizations and initiatives focused on mental

health and well-being. These campaigns often target young people and provide information and resources to help them maintain good brain health.<sup>(1,25-26)</sup>

The majority of respondents rely on their parents for information regarding healthcare, including brain health, as most respondents come from households with higher incomes than the average household income in Bangkok.<sup>(27)</sup> Additionally, 22.86% of respondents consume brain health supplements, indicating knowledge and importance placed on brain health. The two questions that the sample group answered correctly the most were about Omega fatty acids and stress relief through meditation. These questions may have been easily accessible to the public through advertisements for brain health supplements

and basic relaxation techniques. Conversely, the three questions that the sample group answered correctly the least were about the percentage of water in the human brain, factors contributing to cognitive decline, and lifestyle factors linked to the risk of neurological diseases like Alzheimer's. These questions may require medical or specialized scientific knowledge, which individuals lacking in that area may struggle to answer. Concerning brain health behavior, the results indicated that respondents engage in brain health behavior at a moderate level. This could be because of lifestyle choices of respondents, which are mostly students,<sup>(28)</sup> respondents may face competing priorities such as academic demands,<sup>(29-30)</sup> extracurricular activities,<sup>(31-32)</sup> and social life. As a result, they may not always prioritize behaviors that promote optimal brain health, such as getting enough sleep, exercising regularly, and maintaining a balanced diet. High school and university can be stressful environments<sup>(33-34)</sup> with respondents facing pressure to perform well academically, meet deadlines, and excel in various aspects of their lives. Stress can negatively impact brain health and lead respondents to engage in behaviors such as skipping meals, staying up late to study,

and neglecting relaxation and self-care practices. While many respondents may have a basic understanding of brain health, they may not fully appreciate the importance of certain behaviors or know how to implement them effectively. Additionally, misinformation or conflicting advice from peers, media, or online sources<sup>(35-36)</sup> can contribute to confusion or uncertainty about the best practices for maintaining brain health.<sup>(37-38)</sup>

The physical and social environments in which respondents live and study can influence their brain health behaviors. Bangkok is facing continuous air pollution problems, particularly from harmful PM 2.5 dust particles, leading to a decrease in the encouragement of outdoor activities such as using public parks.<sup>(39-40)</sup> Along with traffic congestion issues in Bangkok, people waste a significant amount of time traveling on the roads, resulting in less time available for engaging in other activities.<sup>(41-42)</sup> Factors such as access to nutritious food,<sup>(6)</sup> safe and supportive living arrangements, exposure to environmental toxins, and peer influences can all impact respondents' ability to adopt and maintain healthy habits.<sup>(43)</sup> Adolescence and young adulthood are periods of significant cognitive, emotional, and social development. Respondents may be more

focused on exploring their identities, establishing independence, and navigating transitions, which can distract them from prioritizing behaviors that support optimal brain health.<sup>(44)</sup> When analyzing the brain health behavior questions of the sample group, the two most common practices are “Connected to close friends and family” and “Drink enough water each day”. This may be because friends and family are close individuals, and respondents tend to prioritize them as our top relationships, making communication with close friends or family less challenging and something we naturally engage in. As for drinking water, it is a fundamental necessity for human survival. Many people place importance on staying hydrated, either through upbringing and teachings from family or surrounding influences. Additionally, due to the high temperatures in Thailand, there is an increased loss of fluids in the body, prompting people to drink more water.

On the other hand, the two least practiced behaviors in the sample group are “Do aerobic exercise” and “Spend time doing meditation or self-reflection.” This may be attributed to time constraints, especially after a full day of school. Not all children have free time, as some may have additional classes

or homework, leading to the majority of their time being dedicated to academics. Another reason is that these activities are somewhat individual preferences, with some people enjoying them while others may not. Those who dislike physical exercise or activities like meditation and self-reflection may opt for alternative pursuits. From a generalized linear model analysis, the result revealed that household income, new channels receiving health knowledge and knowledge about brain health can predict brain health behavior 16.80%, 9.10% and 8.40% respectively. Household income could predict brain health behavior 16.80%, this may be because financial resources play a significant role in accessing healthcare services, including those related to brain health.<sup>(28)</sup> Higher household income typically translates to better access to healthcare resources such as medical professionals, medications, and diagnostic tests. Individuals with higher household income may have more opportunities to engage in brain-healthy behaviors such as regular exercise, purchasing nutritious foods, and participating in cognitive activities. Moreover, higher income levels can lead to reduced stress related to financial insecurity, which is known to have adverse effects on brain health. While

news channel receiving health knowledge could also predict brain health behavior by 9.10%, it could be explained that accessing up-to-date health information through various channels like online platforms, social media, and health-focused apps allows individuals to stay informed about the latest research, treatments, and preventive measures related to brain health. Being exposed to new channels for health knowledge may lead to increased awareness of the importance of brain health and the adoption of preventive behaviors such as engaging in mental exercises, seeking regular check-ups, and adhering to healthy lifestyle habits.<sup>(45-46)</sup>

Having health knowledge could influence behavior, according to KAP Theory,<sup>(47)</sup> Individuals with a greater understanding of brain health are more likely to engage in behaviors that promote cognitive function and reduce the risk of neurological disorders. Knowledge about the brain's physiology, the importance of nutrition, exercise, sleep, and stress management in maintaining brain health can empower individuals to make informed lifestyle choices.

## Conclusion

The study highlights a generally good level of brain health knowledge among respondents, likely influenced by educational curricula and awareness campaigns. However, despite this knowledge, the adoption of brain health behaviors remains moderate, with factors such as lifestyle choices, academic pressures, and environmental influences playing significant roles. Socioeconomic factors like household income, access to health information channels and knowledge about brain health significantly predict brain health behavior, emphasizing the importance of addressing these factors in promoting healthier lifestyles. Moreover, environmental factors, such as air pollution and traffic congestion in urban areas like Bangkok, pose additional challenges to promoting brain health behaviors by limiting outdoor activities and increasing time spent on commuting. Overall, addressing these multifaceted influences on brain health behaviors requires a comprehensive approach that integrates education, awareness campaigns, and policy interventions to create supportive environments conducive to healthier lifestyles.

## แนะนำการอ้างอิงสำหรับบทความนี้

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