

**KEY FACTORS INFLUENCING CUSTOMERS
TO USE SPORTS CARDIOLOGY SERVICES IN THAILAND**

The image features a large, faint watermark of the Mahidol University logo in the background. The logo is circular, with a central emblem depicting a traditional Thai architectural structure, possibly a stupa or a similar religious monument, surrounded by Thai script. The watermark is centered and serves as a background for the author's name.

TRAIRAT TREEVETAKSORN

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FULFILLMENT OF THE REQUIREMENTS FOR
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**KEY FACTORS INFLUENCING CUSTOMERS
TO USE SPORTS CARDIOLOGY SERVICES IN THAILAND**

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Trairat Treevetaksorn

.....
Mr. Trairat Treevetaksorn
Candidate

Nathasit Gersri

.....
Assoc. Prof. Nathasit Gersri,
Ph.D.
Advisor

Winai Wongsurawat

.....
Assoc. Prof. Winai Wongsurawat,
Ph.D.
Chairperson

Vichita Ractham

.....
Assoc. Prof. Vichita Ractham,
Ph.D.
Dean
College of Management
Mahidol University

Wanwiphang Manachotphong

.....
Asst. Prof. Wanwiphang Manachotphong,
Ph.D.
Committee member

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Trairat Treevetaksorn

KEY FACTORS INFLUENCING CUSTOMERS TO USE SPORTS CARDIOLOGY SERVICES IN THAILAND

TRAIRAT TREEVETAKSORN 6449168

M.M. (HEALTHCARE AND WELLNESS MANAGEMENT)

THEMATIC PAPER ADVISORY COMMITTEE: PROF. NATHASIT GERDSRI, Ph.D.,
ASSOC. PROF. WINAI WONGSURAWAT, Ph.D., ASST. PROF. WANWIPHANG
MANACHOTPHONG, Ph.D.

ABSTRACT

Introduction: Sports cardiology is considered a new specialized medical field in Thailand; hence, there is limited study in gathering what factors influence the customers to use sports cardiology services in Thailand.

Methods: The literature review identified possible factors influencing the customers to use sports cardiology services, then an online questionnaire was distributed on social media apps targeting only adults who are 18 years old or older to evaluate each factor and their intention to use sports cardiology services on a 4-point Likert scale. Then, key components are analyzed using factor analysis and multiple regression of the derived components to verify their association with the intention to use the services.

Result: There were 234 eligible respondents; 63 percent are female, and 46.5 percent have an age range between 36 and 45 years old. Twenty-six components were reduced by factor analysis, and the remaining are categorized into four factors: Perceived Usefulness, Reliable Innovation, Social Influence, and Service Safety. However, after multiple regression analysis, the only factor that most influences the intention of customers to use sports cardiology is Social Influence. (P value =.006)

Conclusion: Sports cardiology services are new and offer numerous benefits to both individuals and the public. Effective marketing strategies that influence customers to use their services through social media influencers and personal trainers are key to successfully promoting this new branch of medical science in the community.

KEY WORDS: Sports Cardiology/ Sport Cardiology Clinic/ Athlete Heart/
Exercise-related Heart Diseases/ Sports Medicine

40 pages

CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
ABSTRACT	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
CHAPTER I INTRODUCTION	1
1.1 Background and Significance of the Study	1
1.2 Research Objective	3
1.3 Research Question	3
CHAPTER II LITERATURE REVIEW	4
2.1 Individuals need to improve physical exercise performance	4
2.2 Diagnosis and management of individual's pre-existing heart conditions	5
2.3 Trustworthiness of customers towards sports cardiology services	6
2.4 Location and transportation of sports cardiology clinics	9
2.5 Health literacy and social influencing factors	10
CHAPTER III RESEARCH METHODOLOGY	12
3.1 Research design	12
3.2 Population and sample	12
3.3 Research setting	13
3.4 Research instrument	13
CHAPTER IV RESULT AND DISCUSSION	14
4.1 Demographic data	14
4.2 Exercise intensity and Sports Cardiology recognition	17
4.3 Mean values in each specific question	20
4.4 Factor analysis	24
4.5 Multiple regression	31
4.6 Discussion	33

CONTENTS (cont.)

	Page
CHAPTER V CONCLUSION AND RECOMMENDATION	34
5.1 Conclusion	34
5.2 Recommendations	35
5.3 Limitations of the study	36
REFERENCES	37
BIOGRAPHY	41



LIST OF TABLES

Table	Page
4.1 Gender frequency in the study sample	14
4.2 Frequency of participants in each age range	15
4.3 Frequency of participants in each group of monthly income	16
4.4 Frequency of participants in each level of education	16
4.5 Frequency of participants in each category of employment status	17
4.6 Frequency of participants in each weekly aerobic exercise intensity	18
4.7 Frequency of participants who have recognition in sports cardiology	19
4.8 Frequency of participants who can reach sports cardiology services within 2-hour travelling	19
4.9 Preferable locations for participants to use sports cardiology services	20
4.10 Mean value for each specific question about intention to use sports cardiology services in several specified dimensions	21
4.11 Kaiser–Mayer–Olkin (KMO) and Bartlett’s Test of initial factor analysis	24
4.12 The related variables are reorganized and renamed into a new components	30

LIST OF FIGURES

Figure		Page
4.1	Total Variance Explained of initial factor analysis	25
4.2	Rotated Component Matrix of initial factor analysis	26
4.3	Scree Plot of initial factor analysis	27
4.4	Total Variance Explained of final factor analysis	28
4.5	Rotated Component Matrix of final factor analysis	29
4.6	Scree Plot of final factor analysis	29
4.7	The results of the multiple regression analysis using the Enter method	31

CHAPTER I

INTRODUCTION

1.1 Background and Significance of the Study

Sports cardiology is a specialized medical field that focuses on the cardiovascular health of athletes and individuals participating in strenuous physical activities. Its journey involves the early screening, diagnosis, treatment, and prevention of cardiac events and diseases related to sports activities, exercise, and competition. It merges various dimensions of cardiovascular medicine, including cardiac electrophysiology, cardiovascular imaging, inherited structural or congenital heart diseases, and sports physiology. (La Gerche, Baggish, Heidbuchel, Levine, & Rakhit, 2018)

The demand for sports cardiology services in Thailand is influenced by various factors, including the popularity of sports as recreational activities and sports competition events in Thailand, awareness about the importance of cardiovascular health, and the availability of medical centers and institutions that specialize in sports cardiology.

There is an increased interest in sports and physical activities in Thailand, reflected by an increased frequency of sports events such as marathons and triathlon events organized almost every weekends. There were as many as 3,000 health running events in total in 2019 alone (200-250 every month). Each small- and medium-sized event that is organized at the district and sub-district levels possibly draws around one to five thousand of participants. Provincial-level races like the Amazing Thailand Marathon in Bangkok, the Chombueng Marathon in Ratchaburi province presented by ThaiHealth, the Bangsaen Marathon in Chonburi province, the Phuket Marathon, the Chiang Mai Marathon, etc. are considered enormous events. These races may attract tens of thousands of attendees from around the nation and overseas, increasing the total

number of Thais who have raced in favor of building good behaviour to support desirable healthy lifestyles to at least 15 million. (Sukustit, 2020)

Nowadays, much information about people who are affected by exercise-related cardiac events has been reported and widely shared on many social media news feeds; hence it is reasonably assumed that there has been an increase in the awareness of exercise-related cardiovascular health among the Thai population.

The availability of institutions that specialize in sports cardiology services is still limited in Thailand. Most of the sports medicine facilities in the universities mainly focused on sports-related injuries. Cardiovascular medicine services in both governmental and private hospital settings are also limited by medical personnel and resources to mainly serve patients who have already suffered from heart diseases and serious cardiac events. Furthermore, routine screening of underlying heart diseases in athletes is still not widely endorsed for candidates participating in the competition program.

The popularity of sports as recreational activities has recently increased significantly in Thailand, with more individuals engaging in regular exercise and competitive sports. This trend has led to an increased demand for sports cardiology services, creating a need to examine the factors that influence customers' decisions to use these specialized centers.

For better customer service, resource allocation, and an overall improvement of the sports cardiology ecosystem in Thailand, it is crucial to comprehend the causes that cause consumers to use the services offered in the sports cardiology facilities. Healthcare professionals, sports cardiology unit executives, and government policymakers may better fulfill the demands of their target customers, improve service delivery, and raise overall customer satisfaction by knowing these aspects.

The current findings presented in this study would help to provide the key factors influencing customers to use the sports cardiology services specialized centers.

1.2 Research Objective

This study aims to examine the key factors that influenced customers to use services in sports cardiology specialized services centers in Thailand.

1.3 Research Question

The researcher conducted this study to obtain answers to the following questions:

“What are the key factors that influenced customers to use services in the sports cardiology specialized centers in Thailand?”



CHAPTER II

LITERATURE REVIEW

Owing to sports cardiology is a new specialty of medicine, it should be regarded as such in the market for healthcare services. The sports cardiology services providers will face several obstacles regarding issues in dimensions that will persuade their clients to utilize the services they are offering. The following should be the reasons that influenced customers to use sports cardiology services.

2.1 Individuals need to improve physical exercise performance.

Sports cardiology has an important role in enhancing a person's performance in several aspects of physical exercise.

2.1.1 Cardiorespiratory fitness

Sports cardiology focuses on enhancing cardiovascular health, which is essential for raising cardiovascular fitness. This may entail evaluating heart function, spotting any structural heart anomalies, and prescribing specific workout routines. (Franklin et al., 2020) Sports cardiology is important for enhancing cardiovascular health and its effects on exercise performance. (Shave et al., 2010)

2.1.2 Exercise power and strength

The role of sports cardiologists is to assist in identifying and controlling cardiovascular risks or restrictions that might affect an athlete's power and strength. Athletes may enhance their performance in power and strength training by maintaining excellent cardiovascular health, which is crucial for enhancing sports performance in these dimensions. (Eijsvogels & Thompson, 2015)

2.1.3 Speed and agility

The improvement of cardiovascular health via sports cardiology might enhance an individual's agility and quickness. Sportspeople may increase their speed

and agility by boosting oxygen transport to their muscles during high-intensity sports.(Raghuveer et al., 2020)

2.1.4 Endurance and stamina

Exercise training affects heart structure and function in athletes.(Guasch, Mont, & Sitges, 2018) In order to increase endurance and stamina, cardiovascular health must be optimized by sports cardiologists. Athletes can improve their aerobic capacity and endurance performance by treating any existing heart limitations.(Sharma, Merghani, & Mont, 2015)

2.1.5 Prevention and management of cardiac injuries

Identification and treatment of cardiovascular disorders that could enhance the risk of damage during exercise are critical tasks for sports cardiology. Sports cardiology may assist in preventing injuries by monitoring heart conditions and offering proper medical treatment. The European Society of Cardiology (ESC) offers recommendations for managing cardiovascular conditions in athletes, including methods for risk assessment and prevention.(Antonio, Sanjay, Sabiha, & Group, 2021)

2.2 Diagnosis and management of individual's pre-existing heart conditions

Screening, diagnosing, and treating preexisting cardiac problems in people engaging in physical exercise are crucial functions of sports cardiology. Here are some general dimensions in which sports cardiology can contribute to improving this aspect.

2.2.1 Screening of pre-existing heart abnormalities before strenuous physical activity.

Sports cardiology is essential for checking for pre-existing cardiac conditions to avoid cardiovascular problems when exercising. Sports cardiology assists in lowering the risk of cardiac-related injuries by executing proper treatment plans and offering recommendations for safe involvement. The American Medical Society for Sports Medicine (AMSSM) issues guidelines and recommendations on cardiovascular

screening and treatment in athletes.(Jonathan et al., 2017) By adding a diagnostic test, electrocardiogram (ECG), will provide more sensitivity to detect underlying heart condition that are risky for sudden cardiac arrest and death in the athletes.(Harmon, Zigman, & Drezner, 2015)

2.2.2 Diagnosis and management of exercise-related cardiovascular symptoms

Angina and myocardial ischemia can result from a substantial imbalance between the supply and demand for oxygen transferred by blood to the heart muscle.(Berry, Morrow, Marzilli, & Pepine, 2022) As a consequence, some individuals with undiagnosed ischemic heart diseases may aggravated their symptoms particularly when they perform the physical activities, such as exertional breathlessness, chest pain, and syncope. (Siebert & Drezner, 2020) The sports cardiology services have the role of excluding cardiac symptoms relating to exercise in athletes before serious consequences occur when they perform strenuous exercises.

2.2.3 Guided-exercise and cardiac rehabilitation in recovering patients with heart disease.

Physical activity and exercise rehabilitation will promote vascular changes that will improve survival in patients recovering from acute myocardial infarction. (Fadah & Payan-Schober, 2023) Sports cardiology provides guidance and exercise programs for patients recovering from heart attacks in a safe and appropriate manner. There are various medical conditions for which exercise testing used in sports cardiology services can provide the threshold for safe exercise, such as aging people, diabetic or hypertensive patients, heart failure, or even after coronary artery bypass graft surgery or coronary artery stenting.

2.3 Trustworthiness of customers towards sports cardiology services

Several dimensions of trustworthiness and reliability can influence customers to use healthcare services hence each dimension can be applied with sports cardiology services as the following.

2.3.1 Quality assurance and accreditation

Medical services units that keep quality assurance standards and the necessary accreditations are trusted by patients. Reassurance of dependable and trustworthy care can be obtained by adhering to set requirements and regulations. (Hussein, Pavlova, Ghalwash, & Groot, 2021) A study done in the cardiology department, however, did not discover a connection between accreditation and patient satisfaction with the services. (Sack et al., 2010)

2.3.2 Credentials and expertise

Customers value the expertise and credentials of specialists offering medical services. Increased credibility can be achieved through demonstrating expertise, receiving specialized training, earning certificates, and joining respected organizations. (Spake & Megehee, 2010)

2.3.3 Track record and reliability

A positive reputation and a strong track record of delivering high-quality medical services can significantly influence patient trust and reliability. Patients are more likely to use services from centers that have a long history of successfully managing and treating medical and healthcare conditions. (Meesala & Paul, 2018) Positive reviews, feedback, testimonials, and success stories from previous patients can enhance the confidence of potential customers in the medical services offered. (Bujnowska-Fedak & Węgierek)

2.3.4 Effective communication

Clear and effective communication between healthcare providers and patients is essential for building trust and reliability. Openly sharing information about procedures, treatment plans, risks, expected outcomes, and possible complications between healthcare providers and patients fosters trust and reliability. When healthcare providers clearly explain procedures, potential risks, and expected outcomes, patients are more likely to feel confident in the healthcare services that they are going to receive. (Street, Makoul G Fau - Arora, Arora Nk Fau - Epstein, & Epstein)

2.3.5 New and innovative smart healthcare devices

For the past several decades, the significant increase in healthcare costs has been fueled by the population's ongoing aging, rising health consciousness, and ongoing technology advancements (Goyen & Debatin, 2009), but the use of technology in healthcare services improves cost-effectiveness in the administration of medical resources. (Ventola, 2008) Medical devices incorporating the IoT (Internet of Things) have provided convenience for healthcare users; hence, these innovations have made them willing to use these devices because they can live their lives easier. (Costea-Marcu & Militaru, 2019)

2.3.6 Personalized medicine

The advancement of computer technology has opened up new possibilities for the facilitation of medical services. According to studies, computers are getting more and more reliable when processing massive amounts of biological data and calculating anticipated models, especially when used to help doctors reach more precise conclusions. For example, the development of AI (Artificial Intelligence) technology enables computer systems to mimic the abilities of medical specialists in analysis, prediction, and judgment, as well as to offer second opinions or help formulate the exact diagnosis. (Lin, Tu, Hwang, & Huang, 2021) In terms of willingness to use personalized medicine, it was discovered that patients would be more willing to consume this kind of service if the disease associated with how the diseases have been perceived to be high risk (e.g., heart attack) as opposed to a chronic condition perceived to be at the low risk (e.g., high cholesterol). (Issa, Tufail, Hutchinson, Tenorio, & Baliga, 2009)

Patients appreciate tailored, patient-centered treatment that takes into account their individual needs, preferences, and goals. Healthcare practitioners who personalize treatment strategies for each patient's condition will be seen as more trustworthy and credible.

2.4 Location and transportation of sports cardiology clinics

Several variables might have a key impact on persuading customers to utilize sports cardiology services in terms of location and transportation. These characteristics include closeness or proximity, accessibility to public transportation, and parking availability. For each dimension, below are further discussions:

2.4.1 Closeness or proximity

Patients are more likely to utilize sports cardiology services if those facilities are conveniently located near their residence or workplace; this indicates that proximity to healthcare services positively influences healthcare utilization. Otherwise, patients are more likely to use medical services if the facilities are conveniently located and easily accessible. This includes having clinics, hospitals, or sports medicine centers situated in or near lifestyle centers, shopping malls, sports venues, or areas with a high concentration of population. (Rode & da Cruz, 2018)

2.4.2 Accessibility to transportation infrastructure

The availability of appropriate road infrastructure and transportation options (e.g., highways and major roads) can enhance accessibility to medical services. Accessibility also refers to the physical layout and design of the healthcare facility to accommodate individuals with disabilities or mobility challenges.

The presence of nearby public transportation options, such as the BTS and MRT systems in Bangkok, can make medical services more accessible to customers who rely on public transit. Public transportation accessibility positively impacts healthcare utilization, especially for individuals without private vehicles. (Mo, 2020)

2.4.3 Parking availability

Adequate parking facilities can influence customers' decisions to utilize medical services, particularly for those who prefer to drive their vehicles. Limited parking space or expensive parking fee may deter potential customers from accessing healthcare facilities. (Mockford, Staniszezwska, Griffiths, & Herron-Marx, 2012)

2.5 Health literacy and social influencing factors

In terms of health literacy and social issues, many elements may significantly influence encouraging clients to use sports cardiology services. These traits include perceived usefulness, social media influence, peer influence, celebrity endorsement, and personal trainer or coach recommendations. Below are more comments for each dimension:

2.5.1 Perceived usefulness of exercise performance

The perceived value of sports performance within a particular group or culture may have an impact on people seeking sports cardiology approaches. Individuals may be more willing to prioritize their cardiovascular health and seek specialist consultation in sports-centric communities where athletic achievement is highly regarded. (Chin, Do, & Kim, 2022)

2.5.2 Social-media and celebrity influence customers awareness

Individuals' awareness of sports cardiology services might be influenced by social media and celebrity endorsements. Positive endorsements from well-known sportsmen or celebrities may raise consciousness regarding the significance of cardiovascular health and encourage people to use those medical services. (Elaheebocus, Weal, Morrison, & Yardley, 2018)

2.5.3 Peer Influence and Social Support

The existence of social support networks and peer influence might affect people's choices to use sports cardiology services. If sportsmen or sports fans witness their peers using such services, they may be more tempted to do the same owing to perceived advantages and a desire to conform to social standards.

2.5.4 Influence of personal coaches and trainers

Coaches and trainers significantly influence athletes' decision-making processes. Their support for sports cardiology services, as well as their emphasis on the

significance of cardiovascular health, may have a substantial impact on athletes' decisions to seek specialized medical care. (Tayne et al., 2020)

2.5.5 Individual health literacy and effective education curriculum

Individuals desire to seek specialist sports cardiology treatments might be influenced by their degree of health awareness and comprehension of cardiovascular health risks. Effective health education programs included in the fundamental educational program may raise well-being awareness and encourage people to use sports cardiology services.



CHAPTER III

RESEARCH METHODOLOGY

3.1 Research design

This chapter describes the methodology of the study. The researcher used a predictive correlational research design to examine the factors that influenced customers to use services in the sports cardiology specialized centers according to the perspective of people living in Thailand.

3.2 Population and sample

3.2.1 Population

The population is individuals who reside in Thailand. The subjects will be selected by purposive sampling based on the following criteria:

Inclusion criteria

1. The individuals who reside in Thailand for more than 1 year.
2. The individuals must be older than 18 years old.
3. The individuals who plan to live permanently in Thailand for the next 5 years.
4. The individuals who can read and understand Thai or English.
5. The individuals must have voluntarily agreed to participate.

3.2.2 Sample

The sample in this study is based on the power analysis and effect size. This was conducted by using G*Power 3.1.9.2 for calculating sample size, at power = .95, alpha coefficient 0.05, and effect size = .15. The total sample sizes from the calculation included 129 cases. For the prevention of data collection error, researchers will add an additional 20 percent of the sample size (withdrawals, missing data, etc.). Thus, there are a total of 254 sample cases in this study.

3.3 Research setting

The researcher carried out in-person at public places where people exercise, such as gyms, fitness centers, and public parks, and also online interviews using the same questionnaire created using Google Forms distributed via multiple social media channels, for instance, Line group chat, and Facebook Messenger.

3.4 Research instrument

In this study, the researcher used the “Key factors influencing customers to use Sports Cardiology Services in Thailand” questionnaire to examine the factors. Two language versions of the questionnaires were developed by the researcher based on literature review. This questionnaire consists of five sections: (1) an introduction, (2) a screening question (2 questions), (3) a general question (4 questions), (4) a specific question (26 questions), and (5) a demographic question (5 questions). It employs a four-point Likert response structure with importance levels ranging from minor to critical (from Strongly Disagree to Strongly Agree).

The questionnaire created using Google Forms was distributed via multiple social media channels, for instance, Line group chat and Facebook Messenger.

CHAPTER IV

RESULT AND DISCUSSION

This research used a predictive correlational research design to examine the factors that influenced customers to use services in the sports cardiology specialized centers according to the perspective of people living in Thailand. The finding of the analyses is presented in this chapter. The researcher received 259 responses: 237 from a Thai version questionnaire and 22 from an English version questionnaire, whereas 5 responses were excluded because the respondents do not plan to live permanently in Thailand within the next 5 years; hence, 254 data sets will be eligible for the study.

4.1 Demographic data

The sample comprised 254 (n = 254) individuals living in Thailand. The demographic data were presented as follows:

4.1.1 Gender

The table below shows the gender frequency. Most respondents are female, accounting for 63 percent or 160 respondents, and the other 94 are male, accounting for 37 percent.

Gender	Number	Percent
Male	94	37
Female	160	63
Total	254	100

Table 4.1 Gender frequency in the study sample.

4.1.2 Age range

The table below shows the frequency of the respondents in each age range. It is clearly seen that the majority of people aged 36–45 years old account for 118 as the frequency, or 46.5 percent, followed by the age between 26–35 years old as the frequency, 62, or 24.4 percent, and the age of people among 46–55 years old had 35 people or 13.8 percent, and the age of people among 18–25 years old had 20 people or 7.9 percent, then people in the age group 56–65 years had 14 people or 5.5 percent, and finally, the 5 elderly people whose age are 66 years old or older at 1.9 percent.

Age range (Years)	Number	Percent
18 – 25	20	7.9
26 – 35	62	24.4
36 – 45	118	46.5
46 – 55	35	13.8
56 – 65	14	5.5
66 and older	5	1.9
Total	254	100

Table 4.2 Frequency of participants in each age range.

4.1.3 Average monthly income

The table below demonstrates the frequency of respondents in each group by average monthly income. The largest group of respondents had an average monthly income between 20,001 and 40,000 Baht, with 80 respondents accounting for 31.5 percent, followed by a group with an average monthly income between 40,001 and 60,000 Baht, with 54 respondents, or 21.3 percent. The survey also revealed that 15.7 percent of respondents have extremely high average monthly incomes, with 40 individuals reporting an income higher than 100,000 Baht. Meanwhile, a group with an average monthly income of less than 20,000 Baht has 34 people, or 13.4 percent, followed by a group with an average monthly income between 60,001 and 80,000 Baht, with 27 respondents, or 10.6 percent. On the other hand, a significant portion of the respondents, consisting of 19 people, have an average monthly income between 80,001 and 100,000 Baht. This group represents 7.5

percent of the total respondents. The data suggests a clear disparity in income distribution among the survey participants, with a notable concentration of individuals reporting either very high or very low average monthly incomes.

Monthly Income (Baht)	Number	Percent
Less than 20,000	34	13.4
20,001 – 40,000	80	31.5
40,001 – 60,000	54	21.3
60,001 – 80,000	27	10.6
80,001 – 100,000	19	7.5
More than 100,000	40	15.7
Total	254	100

Table 4.3 Frequency of participants in each group of monthly income.

4.1.4 Level of education

For the educational level of the respondents, the table below shows that most of the respondents have bachelor's degrees, with 147 respondents or 57.9 percent, followed by groups of master's degrees with 82 respondents or 32.3 percent, a group of doctorate degrees or professional level with 18 respondents or 7.1 percent, and the smallest part is the group of respondents with high school levels, with 7 respondents or 2.8 percent.

Educational Level	Number	Percent
High school or equal	7	2.8
Bachelor's degree	147	57.9
Master's degree	82	32.3
Doctorate or professional or equal	18	7.1
Total	254	100

Table 4.4 Frequency of participants in each level of education.

4.1.5 Current employment status

The following table demonstrates that 147 respondents or 57.9 percent are government officers or full-time employed, followed by a group of business owners or executives with 46 respondents or 18.1 percent, and then a group of part-time employees with 30 respondents or 11.8 percent. The remaining respondents consisted of unemployed students, freelancers, and retirees, making up the remaining 12.2 percent. It is worth noting that the majority of government officers and full-time employed individuals in the survey could indicate a strong representation of the working population in the survey population.

Employment status	Number	Percent
Government officer or full-time employment	147	57.9
Part-time employment	30	11.8
Business owners or executives	46	18.1
Retirement	13	5.1
Unemployment	18	7.1
Total	254	100

Table 4.5 Frequency of participants in each category of employment status.

4.2 Exercise intensity and Sports Cardiology recognition

The participants' insights into exercise habits and understanding of sports cardiology were collected in order to assess the respondents' concerns about exercise and its links to medical services, particularly the cardiology department. This part of the study aims to identify any gaps in knowledge or misconceptions that may exist among the participants. Additionally, this study will contribute to the overall understanding of exercise behavior and its impact on cardiovascular health, potentially leading to improved preventative measures and interventions in sports cardiology.

4.2.1 Aerobic or cardio exercise intensity

Regarding the American Heart Association's recommendations, adults should engage in at least 150 minutes to 300 minutes of moderate physical activity or 75 to 150 minutes of vigorous physical activity per week to improve long-term health. (American Heart Association) Hence, the questionnaire was created to evaluate the adequacy of exercise intensity in the sample group.

According to the table below, most of the participants exercise less than 150 minutes a week, with 156 people accounting for 61.4 percent. The remaining 38.6 percent of respondents have an adequate amount of weekly exercise, given that 67 respondents, or 26.4 percent exercise 150 to 300 minutes a week, and 31 respondents, or 12.2 percent exercise more than 300 minutes a week. This data suggests that a significant portion of the respondents may not be meeting the recommended amount of weekly exercise. It is important for the associated healthcare stakeholders to address this issue and provide guidance on incorporating regular exercise into their patients' lifestyles to improve their overall cardiovascular health.

Weekly aerobic exercise intensity	Number	Percent
Less than 150 minutes	156	61.4
150 – 300 minutes	67	26.4
More than 300 minutes	31	12.2
Total	254	100

Table 4.6 Frequency of participants in each weekly aerobic exercise intensity.

4.2.2 Sports cardiology services recognition

The table below demonstrates whether the study participants knew about the existence of sports cardiology services. Only 37.8 percent, or 96 respondents, knew about sports cardiology services, while the rest never knew about sports cardiology, which accounted for 62.2 percent, or 158 respondents. This finding suggests that there is a significant lack of awareness regarding sports cardiology services among the study participants. Addressing this gap and increasing public education about the existence

and importance of sports cardiology for the health and well-being of the population is crucial.

Recognition of SC services	Number	Percent
Yes	96	37.8
No	158	62.2
Total	254	100

Table 4.7 Frequency of participants who have recognition in sports cardiology. (SC= Sports Cardiology)

4.2.3 Reachable to sports cardiology services.

According to the table below, the study participants could travel to sports cardiology service centers in under two hours if they were able to attend there. Just 17.7% of respondents, or 45, were able to access the sports cardiology services, while 158 respondents, or 82.3 percent, encountered obstacles or were unable to access those facilities. This indicates a significant disparity in access to sports cardiology services among the Thai population. The results also show the potential for establishing these specialized services to serve Thailand's various regions.

Reachable to SC services	Number	Percent
Yes	45	17.7
No	209	82.3
Total	254	100

Table 4.8 Frequency of participants who can reach sports cardiology services within 2-hour travelling. (SC= Sports Cardiology)

4.2.4 Sport cardiology preferred location

The respondents were questioned about whether they have to use sports cardiology services and in which location the sports cardiology facility should be situated. The two most famous places were residential areas and their familiar medical facilities, accounting for 31.5 percent and 29.9 percent, respectively. At a similar

frequency of 15.4 percent, the third and fourth places are sports facilities and public parks. Other notable locations mentioned by the respondents were nearby the workplace, which accounted for 7.9 percent of the responses. Another noteworthy location that should be suggested is near the university's fitness centers or gyms, highlighting the importance of accessibility and convenience for student-athletes actively engaged in sports and fitness activities.

Preferred Location for SC services	Number	Percent
Residential area	80	31.5
Workplace	20	7.9
Sport clubs or gyms	39	15.4
Public parks	39	15.4
Familiar medical centers	76	29.9
Total	254	100

Table 4.9 Preferable locations for participants to use sports cardiology services.

4.3 Mean values in each specific question

In the part of specific questions, the researcher inserted two negative questions to exclude the respondents who did not intentionally engaged in answering the questionnaire, in this step, 20 respondents out of 254 respondents were excluded hence the remaining 234 respondents were left for further steps of investigation; mean values and factor analysis.

The final column of the table below indicates the mean score for each specific question, whereas the numerical score of 1 to 4 indicates "Strongly Disagree", "Disagree", "Agree", and "Strongly Agree", respectively. The mean score provides a quantitative measure of the overall agreement or disagreement with each specific question. It allows for a more precise understanding of the participants' opinions and helps identify any trends or patterns in their responses.

Table 4.10 Mean value for each specific question about intention to use sports cardiology services in several specified dimensions.

Code	Specific questions	Mean
Exercise Performance		
P1.CRF	Sports cardiology services can improve my cardiorespiratory fitness resulting in having the favorable exercise outcome.	3.32
P2.Agile	Suggestions from sports cardiology services can help increase physical agility.	3.03
P3.Endur	Sports cardiology services can help increase the body's endurance and make exercising last longer.	3.16
P4.Prevent	Consultation with a physician specializing in sports cardiology before starting strenuous exercise can help prevent heart disease that occurs while exercising.	3.23
Diagnosis and Treatment of Heart Diseases		
D1.Screen	A consultation of my heart condition at a Sports Cardiology Service can help find potential heart disease and prepare my body for strenuous exercise in the long term.	3.38
D2.CP	If I have chest pain when exercising, I will go to a sports cardiology center specializing in exercise-related heart conditions.	3.2
D3.DOE	I will go to a sports cardiology service if I find that I exercise and get tired more easily than usual at a similar intensity level of exercise.	3.2
D4.Dizzy	I will go to a sports cardiology service if I experience dizziness when I try to exercise.	3.15
D5.Rehab	I will advise acquaintances who have heart disease and want to exercise to consult a doctor who specializes in sports cardiology for proper advice on exercise training.	3.35

Code	Specific questions	Mean
Trustworthiness		
T1.SafePro	I will only go to sports cardiology services that provide safety protocols while delivering the services.	3.13
T2.XuserP	I would like to visit a Sports Cardiology facility if I found that people who have used that service have consistently good performance in exercise.	3.29
T3.Specialist	I prefer to go to a sports cardiology facility to receive consultations provided by cardiologists who specialize in heart physiology and exercise.	3.05
T4.Commu	I want to go to a sports cardiology facility that offers counseling that can provide easy-to-understand and practical advice.	3.38
T5.Accredit	I will only visit a sports cardiology center that has received accreditation from reliable organizations.	3.44
T6.Innovat	I will only go to a sports cardiology facility equipped with modern tools or equipment.	3.06
T7.Personal	I will go to a sports cardiology facility that can personally tailor the advice to suit me.	3.18
Location and Transportation(L)		
L1.Refer	I will go to a sports cardiology service center only if that center is located near an advanced medical facility that will promote a convenient referral system.	2.93
L2.MainSt	I would like to visit a Sports Cardiology service center that can be easily reached by the main road or expressway.	3.28
L3.RailSYS	I would like to visit a facility that provides sports cardiology services that I can travel to conveniently using the BTS or MRT railway system.	3.21

Code	Specific questions	Mean
L4.Parking	I would like to go to a sports cardiology services facility that can be parked conveniently.	3.32
Health literacy and social influencing factors		
S1.SelfReal	I will go to a sports cardiology service center because I realize that heart conditions affect exercise performance.	3.30
S2.SoMedia	As I have seen on social media, I would go to a Sports Cardiology service facility that raises my awareness of the importance of a heart examination before exercise.	3.06
S3.Celeb	I would like to use services at a sports cardiology center because I know that famous people have also used such services.	2.53
S4.Friend	I will visit the sports cardiology services center if a friend of mine who has experience with sports cardiology services suggests it to me.	2.94
S5.Trainer	According to my personal trainer's advice, I will visit a sports cardiology facility.	2.78
S6.SelfRisk	I would go to a sports cardiology clinic because I realized that I might be at risk of heart attacks while exercising.	3.24
The intention to use sports cardiology services in the future		
IntenUse	I will go to use the services at the sports cardiology center within the next 2 weeks.	2.27

4.4 Factor analysis

The technique of determining the link between each data point by summarizing the component groupings and removing unclassified or undetermined attributes is known as factor analysis. In this study, the researcher did the initial factor analysis using all of the questions exclude one from the intention to use the service factor, then cut those unclear attributes according to the criteria one by one. Low factor loading with a factor loading score of less than 0.4, cross-loading attributes (attributes that show scores from two or more components), and mismatch meaning characteristics compared to other attributes within its component group are the criteria for dropping the questions.

For each factor analysis, the researcher also uses the KMO (Kaiser-Meyer-Olkin) Measure of Sampling Adequacy to test the suitability of the data in factor analysis by evaluating the degree of correlation among variables in this case, the criteria is that the MSA score is greater than 0.4 for each question. Simultaneously, Bartlett's Test of Sphericity is performed to examine the correlation matrix significance, revealing sufficient correlation among the variables to perform factor analysis with a significant value less than 0.05.

Kaiser-Mayer-Olkin (KMO) and Bartlett's test of sphericity were conducted to assess the data's adequacy. A KMO value greater than 0.50 to 1 indicates appropriateness for factor analysis. In this study, the KMO value was found to be 0.896, suggesting that the data is suitable for factor analysis, as shown in Table 4.11.

Table 4.11 Kaiser–Mayer–Olkin (KMO) and Bartlett’s Test of initial factor analysis.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.896
Bartlett's Test of Sphericity	Approx. Chi-Square	2317.208
	df	325
	Sig.	<.001

Table 4.11 shows the variables in this research are interrelated, with a Kaiser-Mayer-Olkin (KMO) value of 0.896, a Chi-Square value of 2317.208, and a p-value of less than .001. These results indicate that the variables are correlated and are suitable for further factor analysis.

4.4.1 Initial factor analysis

The initial factor analysis, which included all specified questions, yielded 5 components that met the Eigenvalue criterion, with a cumulative percent of variance of 54.8% (Figure 4.1). However, it suggests different cross-loading components that necessitate the dimension reduction method (Figure 4.2).

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.437	32.450	32.450	4.095	15.752	15.752
2	1.851	7.120	39.570	3.413	13.129	28.881
3	1.605	6.173	45.743	2.761	10.618	39.499
4	1.232	4.738	50.481	2.206	8.483	47.982
5	1.121	4.313	54.793	1.771	6.811	54.793
6	.962	3.699	58.492			
7	.924	3.555	62.047			
8	.857	3.295	65.342			
9	.836	3.216	68.558			
10	.779	2.997	71.555			
11	.766	2.945	74.500			
12	.680	2.616	77.116			
13	.657	2.525	79.641			
14	.579	2.227	81.868			
15	.558	2.146	84.014			
16	.509	1.957	85.972			
17	.472	1.817	87.789			
18	.454	1.746	89.535			
19	.433	1.664	91.199			
20	.416	1.601	92.800			
21	.382	1.469	94.269			
22	.377	1.449	95.718			
23	.310	1.192	96.909			
24	.294	1.130	98.039			
25	.280	1.078	99.117			
26	.230	.883	100.000			

Extraction Method: Principal Component Analysis.

Figure 4.1 Total Variance Explained of initial factor analysis.

Rotated Component Matrix^a

	Component				
	1	2	3	4	5
T5.Accredit	.706				
T7.Personal	.699				
D5:Rehab	.698				
L4,Parking	.648				
T6.Innovat	.610				
S6:SelfRisk	.530				
T3.Specialist	.417				
P1.CRF		.707			
T2.XuserP		.698			
D1.Screen		.641			
P2.Agile		.615			
P4.Prevent	.486	.566			
S1.SelfReal		.538			
P3.Endur	.430	.468		.408	
D2.CP			.699		
L2.MainSt			.587		
L3.Railsys			.567		
D3.DOE			.477		
T4.Commu	.467		.468		
D4.Dizzy	.425		.461		
S3.Celeb				.696	
S4.Friend				.683	
S5.Trainer				.604	
S2.SoMedia				.423	
L1.Refer					.780
T1.SafePro					.734

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Figure 4.2 Rotated Component Matrix of initial factor analysis.

Another way to estimate the total number of important elements is a scree plot. It is a graph with the eigenvalue on the Y-axis and the number of components mentioned on the X-axis in decreasing order of eigenvalues. In order to calculate the total number of important elements, we must consider an eigenvalue of 1 or higher on the Y-axis of a scree plot. Then, using the X-axis, we can calculate the total number of important components with eigenvalue 1. To ensure consistency, the total number of significant factors identified by a scree plot can be compared to the total number of significant factors developed using factor analysis.

Figure 4.3 below illustrates initial run of the scree plot from this study. The researcher discovered that there were five constructs that had the significant point where Eigenvalue greater than 1 however this scree plot was unable to establish a clear Eigenvalue drop among the relevant elements. As a result, component analysis must be conducted to remove some features from a scree plot in order to make a clear separation between variables.

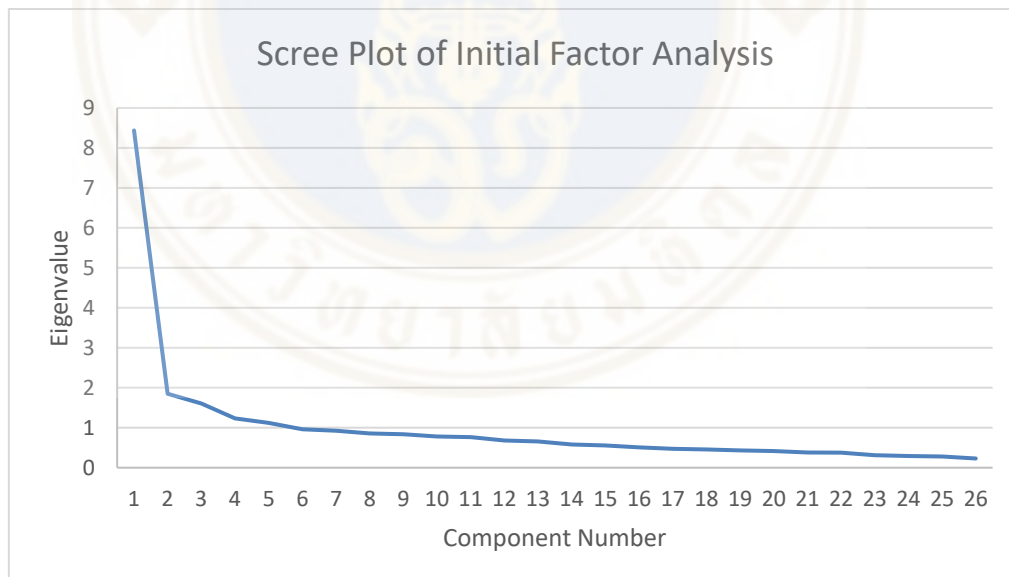


Figure 4.3 Scree Plot of initial factor analysis.

4.4.2 Final factor analysis

After removing irrelevant dimensions, the final factor analysis shows four components that meet the Eigenvalue criterion, with a cumulative percent of variance of 62.4% (Figure 4.4).

Regarding the Scree plot after a dimension reduction process for final factor analysis in Figure 4.6, as unrelated variables were eliminated, the scree plot is much clearer. There is a sharp drop or clear separation between constructs 4 and 5. Therefore, the result ended up with 3 significant constructs before the drop.

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.885	32.378	32.378	2.317	19.308	19.308
2	1.501	12.507	44.885	1.884	15.697	35.005
3	1.084	9.030	53.915	1.682	14.015	49.020
4	1.014	8.452	62.367	1.602	13.347	62.367
5	.778	6.484	68.851			
6	.678	5.650	74.501			
7	.653	5.439	79.939			
8	.623	5.194	85.133			
9	.548	4.569	89.702			
10	.505	4.209	93.912			
11	.404	3.370	97.281			
12	.326	2.719	100.000			

Extraction Method: Principal Component Analysis.

Figure 4.4 Total Variance Explained of final factor analysis.

Based on the features presented in Table 4.11, the four remaining components can be renamed as "Perceived Usefulness", "Reliable Innovation", "Social Influence", and "Safety Service".

Rotated Component Matrix^a

	Component			
	1	2	3	4
T2.XuserP	.811			
D1.Screen	.750			
D3.DOE	.640			
D2.CP	.639			
T5.Accredit		.785		
T6.Innovat		.739		
T7.Personal		.689		
S3.Celeb			.748	
S4.Friend			.710	
S5.Trainer			.675	
T1.SafePro				.814
L1.Refer				.807

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Figure 4.5 Rotated Component Matrix of final factor analysis.

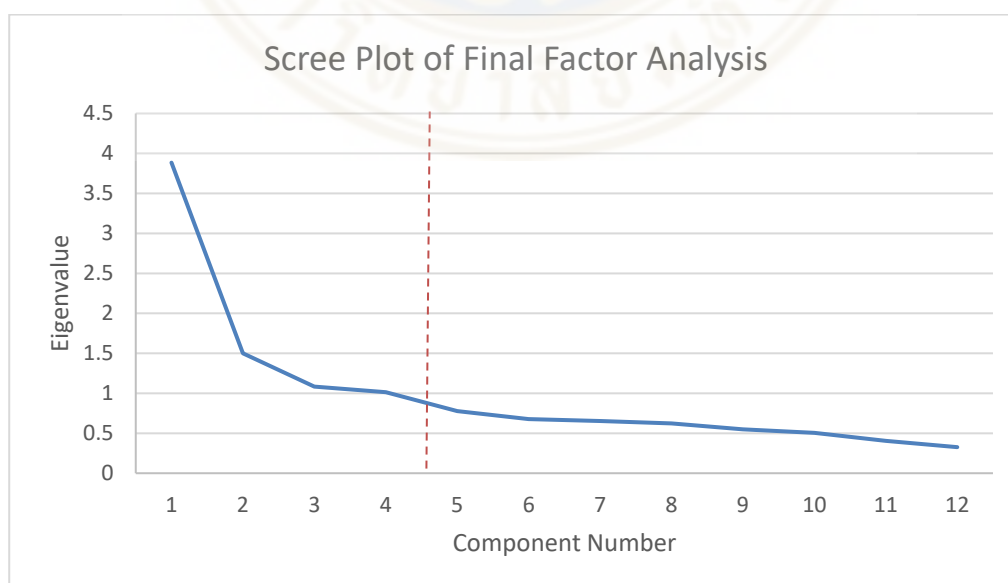


Figure 4.6 Scree Plot of final factor analysis.

Table 4.12 The related variables are reorganized and renamed into a new components.

Code	Questions Detail	New Group
T2.XuserP	I would like to visit a Sports Cardiology facility if I found that people who have used that service have consistently good performance in exercise.	Perceived Usefulness
D1.Screen	A consultation of my heart condition at a Sports Cardiology Service can help find potential heart disease and prepare my body for strenuous exercise in the long term.	
D3.DOE	I will go to a sports cardiology service if I find that I exercise and get tired more easily than usual at a similar intensity level of exercise.	
D2.CP	If I have chest pain when exercising, I will go to a sports cardiology center specializing in exercise-related heart conditions.	
T5:Accredit	I will only visit a sports cardiology center that has received accreditation from reliable organizations.	Reliable Innovation
T6.Innovat	I will only go to a sports cardiology facility equipped with modern tools or equipment.	
T7.Personal	I will go to a sports cardiology facility that can personally tailor the advice to suit me.	
S3.Celeb	I would like to use services at a sports cardiology center because I know that famous people have also used such services.	Social Influence
S4.Friend	I will visit the sports cardiology services center if a friend of mine who has experience with sports cardiology services suggests it to me.	
S5.Trainer	According to my personal trainer's advice, I will visit a sports cardiology facility.	
T1.SafePro	I will only go to sports cardiology services that provide safety protocols while delivering the services.	Service Safety
L1.Refer	I will go to a sports cardiology service center only if that center is located near an advanced medical facility that will promote a convenient referral system.	

4.5 Multiple regression

The researcher then performs multiple regression to evaluate the relative effect of the four independent variables on the dependent variable (intention to use Sports Cardiology Services). Before the researcher ran multiple regression, we created compound variables of the final four constructs, which are the average score of each construct. The researcher renamed them as “Perceived Usefulness”, “Reliable Innovation”, “Social Influence” and “Service Safety” and input these items as independent variables for multiple regression analysis.

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.251 ^a	.063	.047	.719	

a. Predictors: (Constant), Service_Safety, Social_Influence, Reliable_Innovation, Perceived_Usefulness

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.987	4	1.997	3.858	.005 ^b
	Residual	118.509	229	.518		
	Total	126.496	233			

a. Dependent Variable: IntenUse
b. Predictors: (Constant), Service_Safety, Social_Influence, Reliable_Innovation, Perceived_Usefulness

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.948	.442		2.146	.033
	Perceived_Usefulness	.208	.130	.122	1.601	.111
	Reliable_Innovation	-.120	.126	-.072	-.953	.342
	Social_Influence	.305	.109	.191	2.785	.006
	Service_Safety	.065	.089	.053	.726	.468

a. Dependent Variable: IntenUse

Figure 4.7 The results of the multiple regression analysis using the Enter method.

The R, R², adjusted R², and the standard error of the estimate, which may be used to assess how well a regression model fits the data, are displayed in the Model Summary table in the result of multiple regression depicted in Figure 4.7. The R squared value is the percentage of the variation in the dependent variable that can be explained by the independent variables, whilst the value of R may be viewed as one indicator of the accuracy of the prediction of the dependent variable (intention to use services). The R-squared value known as "Adjusted R-squared" has been changed to adjust for the number of predictors in a regression model. According to the findings, 4.7 percent of the variability of our dependent variable is explained by the independent factors.

The results of the multiple regression analysis performed using the Enter technique are shown in the Coefficients table in Figure 4.7. It was discovered that "Social Influence" is a major component that affects consumers to utilize services at a statistically significant level of 0.05 in the equation, which contains four independent variables. Only one variable that is important for elucidating the intention to purchase, according to the study, is the Socializing Influence, which has a significance value of .006. The Social Influence component's standardized coefficient beta is 0.191, which indicates that the desire to utilize services will rise by 0.191 for every unit increase in the Social Influence factor. Thus, social influence has a beneficial impact on the desire to utilize sports cardiology services, which is something that providers can emphasize in next marketing initiatives.

4.6 Discussion

The purpose of this study was to examine the key factors that influenced customers to use services in sports cardiology specialized services centers in Thailand. This chapter aims to interpret and discuss the significant findings related to the purposes had been discussed. The social influence is a significant factor that influences customers to use sport cardiology services at a statistically significant. This study's findings are consistent with exiting international studies, stating that individuals' awareness of sports cardiology services influenced by social media and celebrity endorsements. Positive endorsements from well-known sportsmen or celebrities may raise consciousness regarding the significance of cardiovascular health and encourage people to use those medical services (Elaheebocus et al., 2018). Moreover, previous study found that social media are an increasingly influence customers to use services in sports cardiology and commonly used platform for delivering health promotion interventions. (Simeon et al., 2020)

CHAPTER V

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Sports cardiology is considered a new specialized medical field with customers awareness towards sports cardiology is not widely perceived. Despite low services availability, the patients' concerns to their heart health conditions are now increasing along with social media contents that create and raise the interests for taking care of their own health. In order to better understand patients' preferences to use sports cardiology services, the researcher conducted a study to examine what are key factors that influenced customers to use services in the sports cardiology specialized centers in Thailand. According to the collected data, the sample group consists with wide range of age group, but a group of individuals aged 36-45 year is a group of potential customers who are particularly concerned about perceived usefulness, reliable, innovative, safety, and social influence, however a factor that influence from customers' society is only an important factor that influence them to use sports cardiology services.

Targeting to build awareness for sports cardiology services is crucial because not only for improving individual well-being but also reducing the risk of sudden cardiac death in the young athlete's population. These benefits and concepts should be communicated to potential customers through a comprehensive marketing strategy that emphasizes the social media influencers and personal trainer that have potentials to influence target customers come to visit sports cardiology services unit.

In summary, field of sports cardiology and its related services are new advanced knowledge and offer numerous benefits to both individual and publics, and the researcher believe that effective marketing strategy through social driven is a key to promote this new branch of medical science to successfully endorse in the community.

5.2 Recommendations

Based on the outcome of the factor analysis that “Perceived Usefulness”, “Reliable Innovation”, “Social Influence” and “Service Safety” are the factors that influence patients to use sports cardiology services, the researcher can give out the recommendation as follows:

5.1.1 Recommendations for Sports Cardiology services marketing.

Promoting sports cardiology services should prioritize targeting individuals with a great deal of persuasion power so that community members will recommend the services to their consumers. In this instance, it is social media influencers and personal trainers who must recommend the services to their followers and clients. The strategy that should be employed is to educate those groups with influencing power about the perceived value of sports cardiology services, that the services provided are new and advanced in technology, and that the context of obtaining treatments is safe with a good and effective referral system.

5.1.2 Recommendations for future studies

Future research in this scope has numerous dimensions to be explored; however, this study result has given guidance to focus on the people with influencing power in the communities of athletes and people who are adorable in exercise. Owing to the increasing number of social media platforms and influencers, future studies should investigate how people's attitudes are affected by these promotional messages and processes. This is to get a better understanding of what needs to be taken into consideration before starting a collaboration between sports cardiology businesses and influencers. Moreover, further studies should mention consumers' attitudes towards the phenomenon of influencer marketing and how this affects the rate at which they purchase services. Determining what consumers expect from social media influencers is crucial to understanding consumer attitudes.

5.3 Limitations of the study

One of the limitations of this study is that two-thirds of respondents were female, whereas men are more likely to perform vigorous exercise than women, and most people who are at risk of abnormal heart conditions tend to be male. Hence, the gender inequality ratio in this study may potentially lead to gender bias in the results. By underrepresenting males, the study risks overlooking factors that could be relevant to the broader population. Gender plays a crucial role in health-seeking behaviors, and by not including the appropriate number of male respondents, the study may miss out on gender-specific influences on the utilization of sports cardiology services. Furthermore, the findings from this study might not be easily generalizable to populations with a more balanced gender distribution or male-dominated groups, limiting the broader applicability of the results.

Another significant limitation arises from the decision to include individuals with all ranges of exercise intensity levels. By focusing solely on the general population, the study overlooks a subset of individuals who are likely to have different motivations, concerns, and barriers related to sports cardiology services. High-intensity athletes may have distinct cardiovascular demands and requirements, making their utilization of such services unique. Neglecting to prioritize this particular demographic may result in a limited understanding of the comprehensive range of factors that impact the utilization of sports cardiology services.

Time constraints in gathering samples present another limitation in this study. The process of data collection is integral to the quality and comprehensiveness of any research. If the study is conducted within a limited timeframe, it might lead to a rushed data collection process, compromising the diversity and representativeness of the sample. This could result in a skewed understanding of the factors influencing the utilization of sports cardiology services within the general population. Adequate time is essential for recruiting a diverse and well-distributed sample to ensure the robustness of the study's findings.

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