

# ปัจจัยที่มีอิทธิพลต่อการทำกิจกรรมทางกายของวัยรุ่นตอนต้นที่มีน้ำหนักเกินเกณฑ์ Factors Influencing Physical Activity among Early Adolescents with Overweight

นิพนธ์ต้นฉบับ

Original Article

ณิชนันท์ ไพโรธรินทร์<sup>1</sup>, ชนัญชิดาดุสเสดี ทุลศิริ<sup>2\*</sup> และ สอมสมัย รัตนกริชากุล<sup>3</sup>

<sup>1</sup> ศึกษาศาสตร์พยาบาลศาสตรมหาบัณฑิต สาขาวิชาการพยาบาลเวชปฏิบัติชุมชน คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา อ.เมือง จ.ชลบุรี 20131

<sup>2</sup> สาขาวิชาการพยาบาลชุมชน คณะพยาบาลศาสตร์ มหาวิทยาลัยบูรพา อ.เมือง จ.ชลบุรี 20131

<sup>3</sup> นักวิชาการอิสระ

\* Corresponding author: stoonsiri@yahoo.com

วารสารไทยเภสัชศาสตร์และวิทยาการสุขภาพ 2568;20(4):151-158.

Nitchanan Phirarin<sup>1</sup>, Chanandchidassadee Toonsiri<sup>2\*</sup> and Somsamai Rattanaareethakul<sup>3</sup>

<sup>1</sup> Student in Master of Nurse Science Program (Community Nurse Practitioner), Faculty of Nursing, Burapha University, Muang, Chonburi 20131 Thailand

<sup>2</sup> Department of Community Nursing, Faculty of Nursing, Burapha University, Muang, Chonburi 20131 Thailand

<sup>3</sup> Independent academician

\* Corresponding author: stoonsiri@yahoo.com

Thai Pharmaceutical and Health Science Journal 2025;20(4):151-158.

## บทคัดย่อ

**วัตถุประสงค์:** เพื่อศึกษาปัจจัยที่มีอิทธิพลต่อการทำกิจกรรมทางกายของเด็กวัยรุ่นตอนต้นที่มีน้ำหนักเกินเกณฑ์ **วิธีการศึกษา:** การวิจัยเชิงสำรวจมีตัวอย่างเป็นนักเรียนชั้นมัธยมศึกษาตอนต้น ของโรงเรียนในเขต อ.เมือง จ.ระยองที่มีน้ำหนักเกินเกณฑ์ 135 คน จากการสุ่มอย่างง่ายในภาคการศึกษาปลายปี การศึกษา 2565 ตอบแบบสอบถาม 1-กิจกรรมทางกาย 2-ทัศนคติต่อกิจกรรมทางกาย 3-การรับรู้ความสามารถของตนเองในการทำกิจกรรมทางกาย 4-ปัจจัยแวดล้อมทางกายภาพที่สนับสนุนกิจกรรมทางกาย และ 5-การสนับสนุนจากบุคคลรอบข้าง วิเคราะห์ข้อมูลด้วยสมการถดถอยพหุคูณแบบขั้นตอน **ผลการศึกษา:** การทำกิจกรรมทางกายของเด็กวัยรุ่นตอนต้นที่มีน้ำหนักเกินเกณฑ์ โดยรวมอยู่ในระดับปานกลาง ( $M = 1.76$ ,  $SD = 0.66$ ) ปัจจัยที่สามารถร่วมทำนายการทำกิจกรรมทางกายของกลุ่มตัวอย่าง ได้แก่ แรงสนับสนุนจากบุคคลรอบข้าง ( $\beta = 0.365$ ) และการรับรู้ความสามารถของตนเอง ( $\beta = 0.360$ ) โดยร่วมกันทำนายการทำกิจกรรมทางกายได้ร้อยละ 40.3 ( $R^2 = 0.403$ ,  $P\text{-value} < 0.001$ ) **สรุป:** การสนับสนุนให้เด็กวัยรุ่นตอนต้นที่มีน้ำหนักเกินปรับเปลี่ยนทำกิจกรรมทางกายภาพส่วนหนึ่งได้ด้วยการเสริมแรงสนับสนุนจากบุคคลรอบข้างและการรับรู้ความสามารถของตนเอง

**คำสำคัญ:** กิจกรรมทางกาย; แรงสนับสนุนจากบุคคลรอบข้าง; การรับรู้ความสามารถของตนเอง; วัยรุ่นตอนต้น; น้ำหนักเกินเกณฑ์

## Abstract

**Objective:** To identify factors influencing physical activity among early adolescents with overweight. **Methods:** Survey research had 135 overweight junior high school students in a school in Muang district, Rayong province, Thailand, selected by simple random sampling during the second semester of the academic year 2022. They were asked to complete questionnaires of Physical Activity, Attitudes Toward Physical Activity, Perceived Self-Efficacy in Physical Activity, Physical Environmental Factors Supporting Physical Activity, and Social Support. Multiple linear regression analysis was used to test the association. **Results:** Mean score of physical activity was at a moderate level ( $M = 1.76$ ,  $SD = 0.66$ ). The significant predictors of physical activity were social support ( $\beta = 0.365$ ) and self-efficacy ( $\beta = 0.360$ ), together explaining 40.3% of the variance of the physical activity ( $R^2 = 0.403$ ,  $P\text{-value} < 0.001$ ). **Conclusion:** To promote physical activity in overweight early adolescents, it could be in part to enhance their self-efficacy and social support.

**Keywords:** physical activity; social support; self-efficacy; early adolescents; overweight

## Editorial note

Manuscript received in original form: October 13, 2024;

Revision notified: January 8, 2025;

Revision completed: April 18, 2025;

Accepted in final form: April 21, 2025;

Published online: June 30, 2025.

Journal website:

<http://ejournals.swu.ac.th/index.php/pharmindex>

## Introduction

Overweight and obesity in early adolescence have emerged as some of the most critical public health concerns of the 21st century, with prevalence steadily increasing in both developed and developing countries. Rapid economic and social changes have significantly influenced lifestyle behaviors, leading to excessive caloric intake and reduced physical activity. These behaviors contribute to the rise in obesity and other non-communicable diseases (NCDs).<sup>1</sup> Data from the Department of Health in Thailand show that the percentage of children aged 6–14 years classified as overweight or obese increased from 10.65% in 2017 to 13.83% in 2022, exceeding the national target of no more than 10%.<sup>2</sup>

The causes of overweight conditions are multifactorial, involving both internal factors such as genetics, age, hormonal imbalances,<sup>3</sup> and pre-existing medical conditions, and external factors such as lifestyle and environmental changes.<sup>4</sup> In the digital age, modern conveniences and sedentary behaviors—such as prolonged use of electronic devices—have contributed to decreased levels of physical activity and unhealthy dietary patterns characterized by increased consumption of carbohydrates, sugar, and fat. These behaviors are key contributors to overweight<sup>5</sup> and obesity and are known risk factors for chronic diseases.<sup>1</sup>

Physical activity involves any bodily movement produced by skeletal muscles that results in energy expenditure above

resting levels. It includes three main categories: (1) exercise and sports, (2) active transportation, and (3) recreational activities. According to global recommendations, children and adolescents aged 5–17 years should engage in at least 60 minutes of moderate-to-vigorous physical activity daily, on at least three days per week.<sup>6</sup> Regular physical activity contributes not only to improved physical health, such as muscle and bone development, but also supports emotional and social well-being, confidence, and self-esteem.<sup>7</sup>

Despite its importance, only about 25% of Thai children<sup>8</sup> and adolescents met the recommended levels of physical activity between 2012 and 2019. The COVID-19 pandemic further exacerbated this issue. The proportion of youth achieving sufficient physical activity declined from 26.2% in 2018 to just 17.1% in 2020.<sup>7</sup> These figures indicate a persistently low level of physical activity among Thai youth.

Rayong Province, located in eastern Thailand, has undergone rapid economic and social expansion, especially in Mueang District.<sup>2</sup> These developments have significantly affected the health behaviors of school-aged children, leading to increased sedentary lifestyles and overnutrition. According to data from the Department of Health, the prevalence of overweight and obesity among children aged 6–14 years in Rayong was notably high: 18.69% in 2018, 17.22% in 2019, and 14.55% in 2020.<sup>2</sup>

Research on physical activity among early adolescents in Thailand remains limited, especially compared to international studies.<sup>9</sup> Much of the knowledge applied to promote physical activity in Thai youth is derived from foreign research. A review of the literature identifies various factors that influence physical activity behaviors, including gender<sup>10–13</sup>, attitudes toward physical activity<sup>10,12,14</sup>, self-efficacy<sup>11,15</sup>, supportive physical environments<sup>9,11,14–17</sup>, and social support<sup>11,13,14,16–18</sup> from peers and family members.

study is grounded in the PRECEDE–PROCEED Model by Green and Kreuter (2005)<sup>19</sup>, which provides a comprehensive framework for planning and evaluating health behavior interventions. It examines factors influencing physical activity among overweight early adolescents aged 12–14 years, focusing on: 1) Predisposing factors: gender, attitudes toward physical activity, and self-efficacy 2) Enabling factors: physical environmental support 3) Reinforcing factors: social support from significant others. The goal is to determine whether overweight early

adolescents engage in sufficient physical activity and to identify the key influencing factors. The findings aim to inform the development of tailored strategies to promote adequate physical activity and prevent overweight conditions in this vulnerable age group.

## Methods

This study employed a predictive correlational research design to investigate the factors influencing physical activity among overweight lower secondary school students. The study received ethical approval from the Human Research Ethics Committee of Burapha University (Research Ethics Code: G-HS100/2565).

The participants were students aged 12–14 years, both male and female, who were classified as overweight based on the 2021 Thai growth reference chart for children and adolescents aged 6–19 years developed by the Department of Health. Specifically, the inclusion criteria required students to have a body weight greater than +2 standard deviations (SD) above the standard weight-for-height ratio. Eligible participants were enrolled in public schools located in Mueang District, Rayong Province, during the second semester of the 2022 academic year.

The inclusion criteria were as follows : 1) Willingness to participate in the study. 2) Ownership of a smartphone with internet access. 3) Absence of any health conditions or chronic diseases that would prevent physical movement or exercise.

The sample size was calculated using the G\*Power software, yielding a required sample of 123 participants. To account for incomplete responses or missing data, an additional 10% (12 students) was added, resulting in a total sample size of 135 participants.

A simple random sampling technique was used to select schools. Among 16 public schools in Mueang District that offered lower secondary education, 30% (5 schools) were randomly selected by drawing lots. A list of students meeting the overweight criteria was obtained from class teachers using recent (within the past three months) height and weight records. These students' names were numbered and written on equal-sized paper slips, which were then folded, placed in a container, shaken, and randomly drawn. Each selected school contributed 27 students to the sample.

This study was guided by the PRECEDE–PROCEED Model developed by Green and Kreuter (2005), with a focus on Phase 3: Educational and Ecological Assessment. This phase emphasizes the identification of behavioral and environmental factors that influence health behaviors. Variables included in this study were derived from a review of the relevant literature and aligned with the PRECEDE framework. 1) Predisposing factors: gender, attitudes toward physical activity, and perceived self-efficacy. 2) Enabling factors: physical environmental factors that support physical activity. 3) Reinforcing factors: social support from family, peers, and teachers. Understanding these influencing factors is essential for developing targeted strategies to promote adequate physical activity and prevent overweight conditions in early adolescents. Behavioral change planning must begin with a comprehensive assessment of the underlying causes before effective interventions can be designed and implemented.

#### Research instruments

The research instruments used in this study comprised six sections of questionnaires developed and adapted based on a literature review, textbooks, and related research:

This section collected demographic and background information of lower secondary school students classified as overweight. It included variables such as gender, age, weight, height, grade level, number of household members, living arrangements, the type of physical activity most frequently performed, and modes of transportation to and from school.

#### Attitudes Toward Physical Activity Questionnaire

This section consisted of 14 items developed by the researcher based on a literature review. The items were measured using a 5-point Likert scale ranging from *strongly agree* to *strongly disagree*, with both positively and negatively worded statements. The total score ranged from 14 to 70 points, interpreted according to Wichian Ketsing's (2000) criteria: 51.10–70: High (positive) attitude 32.10–51: Moderate attitude 14–32: Poor attitude

Section 3: **Perceived Self-Efficacy in Physical Activity Questionnaire** This questionnaire included 10 items, also developed by the researcher, and assessed using a 5-point rating scale (from *most confident* to *least confident*). The total score ranged from 10 to 50 points, and interpretation was based on Wichian Ketsing's criteria: 36.68–50: High

level of self-efficacy 23.34–36.67: Moderate level 10–23.33: Low level

#### Section 4: **Physical Environmental Factors Supporting Physical Activity Questionnaire**

This section contained 6 items, measured using a 5-point rating scale (from *strongly agree* to *strongly disagree*). The total score ranged from 6 to 30 points, interpreted as follows: 22.10–30: High level of environmental support 14.10–22: Moderate level 6–14: Low level

#### Section 5: **Social Support Questionnaire**

This section included 12 items measuring the level of social support from surrounding individuals such as family, peers, and teachers. A 5-point rating scale was used (from *always* to *never*). The total score ranged from 12 to 60 points, and was categorized as follows: 44.10–60: High level of social support 28.10–44: Moderate level 12–28: Low level

#### Section 6: **Physical Activity Questionnaire**

This section was adapted from the 2015 Thai Children and Youth Physical Activity Survey (ages 10–13) developed by Areekul Amornsriwatanakul, Fiona Bull, and Michael Rosenberg (2015) 202020. It consisted of 20 items measured using a 5-point rating scale based on frequency of engagement: 4 = Performed 7 days/week (regularly) 3 = Performed 5–6 days/week (frequently) 2 = Performed 3–4 days/week (occasionally) 1 = Performed 1–2 days/week (rarely) 0 = Never performed

The average physical activity score ranged from 0.00 to 4.00, and was interpreted as follows: 3.21–4.00: Very high level 2.41–3.20: High level 1.61–2.40: Moderate level 0.81–1.60: Low level 0.00–0.80: Very low level

**Adequate physical activity** was defined based on a literature review suggesting that early adolescents should engage in at least 60 minutes of physical activity per day, at least 3 times per week. A participant was considered to have adequate physical activity if they scored an average of 2.00 or above, which reflects performing activities 3–4 days/week or more. The calculation formula was: Physical Activity Score = (Frequency score × Total number of items) The interpretation of average scores in terms of adequacy was: 2.00–4.00: Adequate physical activity 0.00–1.99: Inadequate physical activity

#### Instrument Quality Assessment

The research instruments were submitted for evaluation to a panel of five experts for content validity assessment.

The panel included: Three faculty members from the School of Nursing specializing in Mental Health Nursing, Community Nursing, and Pediatric Nursing. One faculty member from the Faculty of Sports Science. One professional nurse specializing in community nursing

The experts reviewed the instruments for relevance and appropriateness of content. Following their recommendations, the researcher revised the instruments in consultation with the thesis advisor. The experts' feedback was compiled and used to calculate the Content Validity Index (CVI) to quantify content validity. According to David (1992, as cited in Boonjai Srisathitnakorn, 2010), a CVI of 0.80 or higher indicates acceptable content validity. The resulting CVI values for the instruments were: Attitudes toward Physical Activity Questionnaire: 0.85 Perceived Self-Efficacy Questionnaire: 0.80 Physical Environmental Factors Questionnaire: 1.00 Social Support Questionnaire: 0.91 Physical Activity Questionnaire: 0.90 All instruments demonstrated satisfactory content validity above the acceptable threshold.

The finalized questionnaires, after content validation and revision, were pilot-tested on a sample of 30 lower secondary school students with similar characteristics to the target population, but who were not part of the main study sample. Reliability was assessed using Cronbach's alpha coefficient to measure internal consistency reliability, with a threshold value of 0.70 or higher considered acceptable (Cronbach, 1951, as cited in Julalak Baramsee, 2008). The Cronbach's alpha coefficients obtained for each questionnaire were: Attitudes toward Physical Activity Questionnaire: 0.802 Perceived Self-Efficacy Questionnaire: 0.800 Physical Environmental Factors Questionnaire: 0.801 Social Support Questionnaire: 0.802 Physical Activity Questionnaire: 0.838 These results indicate good internal consistency and reliability of the instruments used in the study.

#### **Participant ethical protection**

This research was approved by the Graduate Research Ethics Committee of Burapha University, with the ethical approval code: G-HS100/2565; approval date: February 16, 2023. Participation in this study was entirely voluntary, with informed consent obtained by having participants sign a consent form. Since the study involved minors under the age of 18, who are not legally competent, the researcher

obtained written permission from their guardians as well as assent from the participants themselves. Both guardians and participants were required to sign the consent form prior to data collection. Permission was requested one week in advance of data collection. The researcher clearly explained the research objectives and procedures to the participants, informing them that their decision to participate or decline would have no negative consequences. Participants were allowed to withdraw from the study at any time without penalty. Confidentiality was strictly maintained; only the researcher and thesis advisor had access to the data. Research findings are presented in aggregate form without identifying individuals or schools. Data will be used solely for academic purposes and will be destroyed after publication and dissemination of the results.

#### **Data collection procedure**

The researcher obtained an official letter from the Dean of the Graduate School at Burapha University addressed to school principals to request permission to collect data. Subsequently, the researcher met with school principals and relevant teachers to explain the research details and data collection procedures.

Once participants were identified, consent forms and permission letters were distributed to guardians and participants, with one copy for each party. Consent was requested one week prior to data collection. Class teachers collected the signed consent forms.

Data collection was conducted in a setting arranged by the researcher to ensure physical distancing and privacy during questionnaire completion. The questionnaires were administered online using Google Forms. The Google account utilized two-factor authentication, ensuring data security and preventing unauthorized access by Google administrators or third parties.

All data were immediately transferred from Google Forms to a higher-security system upon completion of data collection. Each participant required approximately 30 minutes to complete the questionnaire. No school staff or teachers were present in the room during data collection to maintain confidentiality and privacy.

#### **Data analysis**

The researcher recorded and analyzed the data using a statistical software package. Descriptive statistics, including frequency, percentage, mean, and standard

deviation, were employed to analyze personal data. The predictive power of factors influencing students' physical activity behaviors was analyzed using stepwise multiple regression analysis.

## Results

Half of the participants were male (54.8%). The majority were 14 years old (75.6%) and classified as obese (60%). Most were studying in Grade 8 (54.1%) and came from families with fewer than four members (69.6%). It was found that most participants lived with both their father and mother (51.9%). The most frequently performed physical activity was running (41.5%), followed by walking (26.7%). Regarding transportation to and from school, the most common method was riding as a passenger on a motorcycle (43.0%), followed by traveling by car (19.3%). (Table 1).

**Table 1** Demographic and clinical characteristics of the participants (N = 131).

| Characteristics                                    | N   | %    |
|----------------------------------------------------|-----|------|
| <b>Gender</b>                                      |     |      |
| Male                                               | 74  | 54.8 |
| Female                                             | 61  | 45.2 |
| <b>Age</b>                                         |     |      |
| 12–13 years                                        | 33  | 24.4 |
| 14 years                                           | 102 | 75.6 |
| (Min = 12, Max = 15, Mean = 14.01, SD = 0.431)     |     |      |
| <b>Nutritional Status</b>                          |     |      |
| Overweight                                         | 54  | 40.0 |
| Obese                                              | 81  | 60.0 |
| <b>Educational Level</b>                           |     |      |
| Grade 7 (Matthayom 1)                              | 25  | 18.5 |
| Grade 8 (Matthayom 2)                              | 73  | 54.1 |
| Grade 9 (Matthayom 3)                              | 37  | 27.4 |
| <b>Number of Family Members</b>                    |     |      |
| Less than 4                                        | 94  | 69.6 |
| 4 or more                                          | 41  | 30.4 |
| (Min = 2, Max = 10, Mean = 4.28, SD = 0.462)       |     |      |
| <b>Living Arrangement</b>                          |     |      |
| With both parents                                  | 70  | 51.8 |
| With mother only                                   | 29  | 21.5 |
| With relatives/grandparents                        | 27  | 20.0 |
| With father only                                   | 9   | 6.7  |
| <b>Most Frequently Performed Physical Activity</b> |     |      |
| Running                                            | 56  | 41.5 |
| Walking                                            | 36  | 26.7 |
| Dancing / Traditional Thai Dance                   | 24  | 17.8 |
| Playing football                                   | 16  | 11.8 |
| Cycling                                            | 3   | 2.2  |
| <b>Mode of Transportation to and from School</b>   |     |      |
| Riding or being a passenger on motorcycle          | 58  | 43.0 |
| By car                                             | 26  | 19.3 |
| Being a passenger on a bicycle                     | 23  | 17.0 |
| Walking                                            | 15  | 11.1 |
| By public transportation                           | 12  | 8.9  |
| Cycling (by self)                                  | 1   | 0.7  |

## Attitudes toward Physical Activity, Self-Perceived Competence in Physical Activity, Physical Environment Facilitating Physical Activity, and Social Support from Others

The study results revealed that the participants' attitudes toward physical activity were at a good level, with a mean score of 45.28 (SD = 6.011), ranging from a minimum of 33 to a maximum of 66. Social support from others had a mean score of 38.64 (SD = 9.56), with scores ranging from 15 to 60. Self-perceived competence in physical activity yielded a mean score of 35.53 (SD = 6.94), with a minimum score of 14 and a maximum of 50. The physical environment facilitating physical activity had a mean score of 20.14 (SD = 4.19), with scores ranging from 11 to 30 (Table 2).

**Table 2** Scores of study variables (N = 135).

| Variables                                            | Score Range    |              | Mean  | SD   | Level    |
|------------------------------------------------------|----------------|--------------|-------|------|----------|
|                                                      | Possible Range | Actual Range |       |      |          |
| Attitude toward physical activity                    | 14–70          | 33–66        | 45.28 | 6.01 | Good     |
| self-efficacy                                        | 10–50          | 14–50        | 35.53 | 6.94 | Moderate |
| Physical environment supportive of physical activity | 6–30           | 11–30        | 20.14 | 4.19 | Moderate |
| Social support                                       | 12–60          | 15–60        | 38.64 | 9.56 | Moderate |

## Physical Activity of Overweight Early Secondary School Students

The study found that, overall, students' physical activity levels were at a moderate level (M = 1.74, SD = 0.66). When examining individual items, the activity most frequently performed regularly by students was rope jumping (33.3%). The activity most often performed frequently was playing video games, electronic games, or computer games that require physical movement (27.4%). The activity most commonly performed occasionally was cycling for exercise (34.8%). The activity most commonly performed infrequently was team sports such as football, basketball, volleyball, and sepak takraw (34.8%). The activity most frequently never performed was playing on playground equipment (52.6%) (Table 3 and Table 4).

**Table 3** Mean score of physical activity (N = 135).

| Statement                                                           | Mean | SD   | Level    |
|---------------------------------------------------------------------|------|------|----------|
| Exercising or playing sports for at least 60 minutes per day        | 1.65 | 0.75 | Moderate |
| Engaging in recreational activities for at least 60 minutes per day | 1.63 | 0.76 | Moderate |
| Traveling from one place to another (e.g., walking, cycling)        | 2.00 | 0.91 | Moderate |
| Overall                                                             | 1.74 | .66  | Moderate |

**Table 4** Number and Percentage of Physical Activity Participation of the Sample by Item (n = 135)

| Variables                                                            | Regularly<br>N (%) | Often<br>N (%) | Sometimes<br>N (%) | Rarely<br>N (%) | Never<br>N (%) |
|----------------------------------------------------------------------|--------------------|----------------|--------------------|-----------------|----------------|
| 1. Engaged in at least 60 minutes of total physical movement per day | 33 (24.4)          | 35 (25.9)      | 39 (28.9)          | 25 (18.5)       | 3 (2.2)        |
| <b>Exercise and Sports (at least 60 minutes per day)</b>             |                    |                |                    |                 |                |
| 2. Team sports (e.g., football, basketball, volleyball, takraw)      | 7 (5.2)            | 11 (8.1)       | 34 (25.2)          | 47 (34.8)       | 36 (26.7)      |
| 3. Running/exercise running                                          | 1 (0.7)            | 16 (11.9)      | 16 (11.9)          | 40 (29.6)       | 62 (45.9)      |
| 4. Racket sports (e.g., tennis, badminton, table tennis)             | 31 (23.0)          | 28 (20.7)      | 42 (31.1)          | 27 (20.0)       | 7 (5.2)        |
| 5. Cycling                                                           | 14 (10.4)          | 29 (21.5)      | 47 (34.8)          | 27 (20.0)       | 18 (13.3)      |
| 6. Jumping rope                                                      | 45 (33.3)          | 26 (19.3)      | 27 (20.0)          | 26 (19.3)       | 11 (8.1)       |
| 7. Swimming (pool or natural water source)                           | 8 (5.9)            | 13 (9.6)       | 20 (14.8)          | 40 (29.6)       | 54 (40.0)      |
| 8. Hula hoop                                                         | 6 (4.4)            | 16 (11.9)      | 26 (19.3)          | 41 (30.4)       | 46 (34.1)      |
| 9. Aerobic dancing                                                   | 15 (11.1)          | 32 (23.7)      | 36 (26.7)          | 27 (20.0)       | 25 (18.5)      |
| <b>Recreational Activities (at least 60 minutes per day)</b>         |                    |                |                    |                 |                |
| 10. Leisure walking (alone, with friends, or pets)                   | 15 (11.1)          | 23 (17.0)      | 28 (20.7)          | 39 (28.9)       | 30 (22.2)      |
| 11. Active video/computer games (requiring body movement)            | 31 (23.0)          | 37 (27.4)      | 36 (26.7)          | 26 (19.3)       | 5 (3.7)        |
| 12. Casual cycling                                                   | 15 (23.0)          | 31 (23.0)      | 28 (20.7)          | 43 (31.9)       | 18 (13.3)      |
| 13. Running, chasing, or play fighting with friends                  | 16 (11.9)          | 30 (22.2)      | 38 (28.1)          | 27 (20.0)       | 24 (17.8)      |
| 14. Using playground equipment                                       | 7 (5.2)            | 11 (8.1)       | 17 (12.6)          | 29 (21.5)       | 71 (52.6)      |
| 15. Skateboarding, rollerblading, or scooter riding                  | 34 (25.2)          | 30 (22.2)      | 25 (18.5)          | 26 (19.3)       | 20 (14.8)      |
| 16. Elastic band jumping                                             | 3 (2.2)            | 12 (8.9)       | 22 (16.3)          | 40 (29.6)       | 58 (43.0)      |
| 17. Thai classical dance or international folk dance                 | 7 (5.2)            | 15 (11.1)      | 24 (17.8)          | 24 (17.8)       | 65 (48.1)      |
| <b>Active Transportation</b>                                         |                    |                |                    |                 |                |
| 18. Walking short distances to shop instead of using vehicles        | 14 (10.4)          | 12 (8.9)       | 25 (18.5)          | 20 (14.8)       | 64 (47.4)      |
| 19. Using stairs instead of elevators                                | 35 (25.9)          | 29 (21.5)      | 27 (20.0)          | 24 (17.8)       | 20 (14.8)      |
| 20. Walking or cycling to school                                     | 41 (30.4)          | 35 (25.9)      | 29 (21.5)          | 18 (13.3)       | 12 (8.9)       |

The analysis revealed two significant predictors: social support from people around and self-perceived competence, which together explained 40.3% of the variance in physical activity ( $R^2 = .403$ ,  $p < .001$ ). The first factor entered into the regression model was social support from people around, which alone accounted for 31% of the variance in physical activity among overweight early adolescents ( $R^2 = 0.310$ ,  $p < .001$ ). The second factor added to the model was self-perceived competence, increasing the explained variance to 40.3% ( $R^2 = .403$ ,  $p < .001$ ). Among these factors, social support from people around had the strongest influence on physical activity in overweight early adolescents ( $\beta = 0.365$ ). The second most influential factor was self-perceived competence ( $\beta = 0.360$ ) (Table 5).

**Table 5** Factors influencing physical activity among overweight early adolescents (n = 135).\*

| Predictor Variables     | $R^2$ | $b$  | SE( $b$ ) | Beta | $t$    | $p$   |
|-------------------------|-------|------|-----------|------|--------|-------|
| Social support          | .310  | .502 | .109      | .365 | 4.601  | <.001 |
| Perceived self-efficacy | .403  | .683 | .150      | .360 | 4.534  | <.001 |
| Constant = -8.724       |       |      | 4.811     |      | -1.813 | .072  |

$$R^2 = .403, \text{Adj-}R^2 = .394, F_{(3,165)} = 44.554, p < .001$$

\* Multiple linear regression analysis.

## Discussions and Conclusion

The overall physical activity level of overweight early adolescents was found to be moderate ( $M = 1.74$ ,  $SD = 0.657$ ). The activity most frequently performed daily (7 days/week) was jumping rope (33.3%). The activity performed most often (5-6 days/week) was playing video games, electronic games, or computer games that require physical movement, such as dancing, punching, or hitting (27.4%). The activity performed occasionally (3-4 days/week) was cycling for exercise (34.8%). The activity performed rarely (1-2 days/week) was team sports, such as football, basketball, volleyball, and sepak takraw (34.8%). The activity most frequently never performed was playing on playground equipment (52.6%). It was observed that 62.5% of the participants did not engage in sufficient physical activity. This insufficiency may be attributed to the lifestyle of early adolescents with overweight status, who currently rely heavily on technology and convenience devices for daily living. Furthermore, the COVID-19 pandemic in 2020 adversely affected physical activity levels globally, as many people were confined to home-based learning or working environments.

Although the COVID-19 pandemic has subsided, the proportion of children and youth engaging in sufficient physical activity remains low, at 16.1% and 21.4% for the years 2022–2023, respectively. The key reason for insufficient physical activity among Thai children may be lifestyle changes, learning methods, and recreational habits. Historically, children spent free time playing outdoors with friends, but now much of their leisure time is spent on electronic screens. Recent data shows that only 8.7% of Thai children engage in active play, defined as unstructured physical activity for more than 2 hours per day. In contrast, screen time for entertainment exceeding 2 hours per day—recommended as a limit by Canada's guidelines—is observed in approximately 74.4% of children.<sup>7</sup> This



sedentary behavior likely contributes to the moderate overall physical activity level among overweight early adolescents.

Based on the PRECEDE-PROCEED model by Green and Kreuter (2005), specifically phase 3: Educational and Ecological Assessment, factors influencing health behaviors were analyzed. Two key predictors of physical activity among overweight early adolescents were identified: social support from surrounding individuals and self-perceived competence.

Social support from people around was the strongest facilitator influencing physical activity among overweight early adolescents ( $\beta = .365$ ). The data indicated that such support affected the behaviors of overweight adolescents through rewards, praise, acceptance, or even sanctions. Influences from relatives, friends, or other significant persons contributed to these behaviors. The participants reported receiving encouragement and praise from family members for engaging in physical activity, as well as exercising together. Family members also regulated screen time use, such as limiting phone or computer usage. Additionally, teachers played a role in providing knowledge and encouraging physical activity. Consequently, overweight early adolescents with good social support tended to engage in more physical activity. This is consistent with previous studies by Phasarakorn Thongwat<sup>13</sup>, Chalothorn Siang-sai et al.<sup>14</sup>, Anothai Phalittanont et al.<sup>17</sup>, Jatuporn Jamrongpeng et al.<sup>21</sup>, and Park et al.<sup>22</sup>

Self-perceived competence was a supplementary factor that jointly predicted physical activity among overweight early adolescents ( $R^2 = .403$ ,  $p < .001$ ). Adolescents who had higher self-perceived competence engaged in greater physical activity, as this perception serves as a direct motivation for health-promoting behaviors and indirectly influences perceived barriers and intention to plan consistent behavior. The belief in one's ability to perform physical activity is a fundamental factor driving behavior. Overweight early adolescents who are confident and perceive themselves as capable of engaging in physical activity tend to participate more frequently. This finding aligns with research by Wanida Senasutthipan et al.<sup>23</sup> and Lu et al.<sup>24</sup>

#### 1. Social Support from People Around

There should be activities that enhance social support for physical activity among early adolescents. Family members, teachers, and peers should be involved, for example, organizing activities that encourage family members to

exercise or engage in physical movement together. Skills training can be provided for parents or family members to act as ad hoc instructors. Schools should increase recreational activities that involve physical movement, such as playing on playground equipment, chasing games with friends, or electronic video games that require body movement (e.g., dancing, punching, hitting such as Wii games, Audition, or table tennis games). Additionally, traditional Thai dance or international-style dance activities can be included.

#### 2. Self-Perceived Competence

Programs or activities that promote self-perceived competence among overweight early adolescents should be developed. For example, creative group or individual activities can be organized to build confidence that students can engage in physical activity at an appropriate and consistent level.

1. The effectiveness of programs promoting physical activity among overweight early adolescents should be studied, particularly those that enhance self-perceived competence and increase social support by involving family members, teachers, and peers.

2. Physical activity behaviors of early adolescents should be studied across different geographical areas to collect data that can inform the design of tailored interventions appropriate to specific contexts.

#### Acknowledgments

This research was supported by a grant from the Graduate School, Burapha University. Special thanks are extended to the school director, all homeroom teachers for their kind cooperation, and the early adolescent students who participated in this study, making the successful completion of the research possible.

## References

1. World Health Organization. Noncommunicable diseases: Childhood overweight and obesity 2020. (Accessed on Jan. 6, 2022, at: <https://www.who.int/news-room/q-a-detail/noncommunicable-diseases-childhood-overweight-and-obesity>)
2. Department of Health. Percentage of school-aged children (6-14 years) who are beginning to be obese and obese at the district level. 2021. Health. (Accessed on Jan. 9, 2022, at: <https://dashboard.anamai.moph.go.th/dashboard/overweightstudent/index?year=2021>)

3. Pediatric Nutrition Association of Thailand. Guidelines for the prevention and treatment of obesity in children 2014. (Accessed on Jan. 20, 2022, at: [http://www.pednutrition.org/article/Guidelines for the prevention and treatment of obesity in children 2014](http://www.pednutrition.org/article/Guidelines%20for%20the%20prevention%20and%20treatment%20of%20obesity%20in%20children%202014)).
4. Joyrod S, Songthap A. Family role is fundamental in overweight prevention among school children. The Southern College Network Journal of Nursing and Public Health. 2019;6(2):270-278.
5. Sagbo H, Ekouevi DK, Ranjandriarison DT, Niangoran S, Bakai TA, Afarvi A, Dieudonné S, Kassankogno Y, Vanhems P, Khanafer N. Prevalence and factors associated with overweight and obesity among children from primary schools in urban areas of Lomé, Togo. Public Health Nutrition. 2018;21(6):1048-1056
6. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, Carty C, Chaput J-P, Chastin S, Chou R. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. British Journal of Sports Medicine. 2020; 54(24):1451-1462.
7. Thailand Physical Activity Knowledge Development Centre. Home physical activity guide. Nakhon Pathom: Institute for Population and Social Research, Mahidol University 2020.
8. World Health Organization .Physical activity 2020. (Accessed on Jan. 4, 2022, at: <https://www.who.int/news-room/fact-sheets/detail/physical-activity>).
9. Chinapong S, Maphong R, Promjun T, Amornsriwatanakul A. Physical activity in Thai children and youth aged 0-22 years: A systematic review. Journal of Health Systems Research. 2021;15(2):231-49. (in Thai).
10. Chaimay B, Woradet S. Factors associated with exercise among students in Thaksin university, Phatthalung campus. Thai Journal of Public Health. 2015; 44(3):288-299. (in Thai).
11. Patcharoen O, Wimonwatwatee T, Virutsetazin K. Predictor factors of behavior on diet and physical activity of overweight and obese students at secondary level of schools in Bangkok. Journal of Faculty of Physical Education. 2011;14(2):168-180. (in Thai).
12. Chanhom J, Numkham L. Factor affecting physical activity among people with risk of hypertension in Muang district, Lampang province. Medical Sciences. 2018;28(3):546-560. (in Thai).
13. Tongwat P, Kitreerawutiwong N. Factors predicting physical activity behaviors among grade 4-6 students in Nongkula sub-district, Bang Rakam district, Phitsanulok province. Nursing Journal of the Ministry of Public Health. 2019;29(2):24-36. (in Thai).
14. Siangsai C, Sukonthasab S. Factors related physical activities of university students in Bangkok metropolis. Journal of Sports Science and Health 2015;16(3): 63-75. (in Thai).
15. Jeihooni AK, Heidari MS, Harsini PA, Azizinia S. Application of PRECEDE model in education of nutrition and physical activities in obesity and overweight female high school students, Obesity Medicine.2019;14:1-22.doi: <https://doi.org/10.1016/j.obmed.2019.100092>.
16. Aliss EM, Sutaih RH, Kamfar HZ, Alagha AE, Marzouki ZM. Physical activity pattern and its relationship with overweight and obesity in Saudi children. Int J Pediatr Adolesc Med. 2020;7(4):181-185. doi:10.1016/j.ijpam.2020.03.007
17. Palitnonkiat A, Suebwiset P, Kannang O. Factors related to exercise behavior of physical therapy students at Huachiew Chalermprakiet University. Journal of Health Sciences and Wellness. 2018;21(42):55-64. (in Thai).
18. . Namarak R, Wacharasin C, Deoisres W. Family factors influencing exercise and eating behavior among elderly with overweight in Muang district, Nakhon Prathom province. Nursing journal CMU.2018; 45(3):46-57. (in Thai).
19. Green LW, Kreuter MW. Health program planning: An educational and ecological approach. New York: McGraw Hill;2005.
20. Amornsriwatanakul A, Nakhonket K, Ketwongsa P, Silamat S, Purakom A, Sitthileotphisan P, Chusakun C. Physical activity survey report on physical activity in Thai children and youth 2015 (2nd ed). Nonthaburi. Green Apple Graphic Printing.2015. (in Thai).
21. Jumrongpeng J, Kummabutr J, Buaboon N. Effects of a weight control program on eating, physical-activity behaviors, and bodyweight among overweight, late school-age children. Journal of Health Science Research. 2019;13(1):1-10. (in Thai).
22. Park H, Kim N. Predicting factors of physical activity in adolescents: a systematic review. Asian Nurs Res (Korean Soc Nurs Sci). 2008;2(2):113-128. doi:10.1016/S1976-1317(08)60035-3
23. Sanasuttipun W, Nookong A. The factors found capable of predicting the teenage participants' exercise and activity behaviour. Thai Journal of Nursing Council. 2015;30(2):46-59. (in Thai).
24. Lu C, Stolk RP, Sauer PJ, Sijtsma A, Wiersma R, Huang G, Corpeleijn E. Factors of physical activity among Chinese children and adolescents: A systematic review. International Journal of Behavioral Nutrition and Physical Activity.2017;14(1):1-10.