The relationship between individual internal factors and the prevention of obesity in students of junior secondary education level (Grades 7-9)

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ABSTRACT

Purpose: Obesity is a risk factor for non-communicable diseases in children contributing to their physical, mental and social effects. This study aimed to investigate the relationship between individual internal factors and the prevention of obesity in students at the junior secondary education level.

Design/Methodology/Approach: A multi-stage random selection method was used to select 273 junior secondary education level (grades 7-9) students from the province of Chachoengsao to participate as the study's sample. A questionnaire was used for data collection and was divided into 7 parts: (1) general information about the sample, (2) knowledge about the prevention of obesity, (3) attitudes towards the prevention of obesity, (4) motivation in obesity prevention, (5) habits in obesity prevention, (6) student allowance management and (7) obesity prevention behavior. The data were analyzed using frequency, percentage and correlation analysis.

Findings: Factors correlated with obesity prevention behavior were obesity prevention habits (r=0.382) and student allowance (r=0.294).

Conclusion: Parents and schools should give importance to building obesity prevention habits and encourage children to manage their allowance efficiently to be able to help prevent obesity in students at the junior secondary education level. The results from the research can be used to create a model for modifying dietary habits accordingly. The emphasis is placed on involving children in the selection of nutritious foods. Cooking substantial meals or snacks will help to develop healthy eating habits gradually. Add exercise in the form of sports games. In addition, teaching children to record their daily income and expenses for food and snacks will help them use their daily money to their full potential and build habits and values.

Keywords: *Children, Grade 7-9, Individual internal factors, Junior secondary education level, Prevention of obesity, Relationship, Student allowance.*

1. INTRODUCTION

Obesity in children (childhood obesity) is a serious problem in the United States putting children and adolescents at risk of poor health. In 2017-2020, the prevalence of obesity in people aged 2-19 years was 19.70% affecting around 14.7 million children and adolescents (Centers for Disease Control and Prevention, 2022). It is estimated that by 2030 the prevalence of obesity will be 35 million people aged 10-19 years in Africa, 36 million people in the Middle East, 73 million people in the West Pacific Region, 44 million people in the United States, 21 million people in Europe and 45 million people in South East Asia (World Obesity Federation, 2022). The causes of overweight and obesity are an imbalance between diet and exercise, the consumption of foods with high calories, high fat and high sugar foods and low physical activity or exercise (World Health Organization, 2021). Lockdown measures during the COVID-19 pandemic in 2020–2021 had an impact on children and adolescents' diets and lifestyle which increased from 2% to 13% of the population being overweight or obese as a result of less exercise and less physical activity. Children spent more than 5 hours of screen time increasing from 15% to 47% (World Obesity Federation, 2022).

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The 6th Health District Office, Easten Region, Thailand, consists of eight provinces (Chonburi, Rayong, Chanthaburi, Trat, Samut Prakan, Chachoengsao, Prachinburi, and Sa Kaeo). Obesity was found in school-age children (6–14 years) (13.5%). According to the annual reporting data obtained from the Chachoengsao Provincial Public Health Office, Thailand, obesity in children aged 6–14 years was increasing in consecutive years from 2019 to 2021. The prevalence of obesity in children for 2019 (59.70%), 2020 (59.70%), and 2021 (63.29%) (Chachoengsao Provincial Public Health Office, 2022). The Department of Health has developed growth reference standards for children aged 5-19 years to promote optimal growth and understand the actual growth status. There are three indices: weight for age, height for age and weight for height. The weight for height criteria was used in this study because it is a globally accepted indicator of overweight conditions and may identify children based on their physique who are proportional, tall and thin or short and obese. The growth status is classified into six levels as shown in Table 1 (Bureau of Nutrition, 2021).

Table 1. Interpretation of weight for height criteria of Thai children aged 5-19 years.

Weight for height	Interpretation
<-2 SD	Very thin
<-1.5 SD to -2 SD	Thin
+1.5 SD to -1.5 SD	Normal
>+1.5 SD to +2 SD	Overweight
>+2 SD to +3 SD	Early onset of obesity
>+3 SD	Obesity

Note: SD is the standard deviation.

The Office of Nutrition (2017) prepares prevention measures for obesity and malnutrition such as asking schools to reduce or stop selling soft drinks, provide free drinking water, reduce or stop selling crunchy and crispy snacks, provide more physical activities for children, monitor weight checking every month and measure the height every 6 months, encourage consumption of all food groups in an appropriate quantity, reduce high calorie foods, stop eating repeatedly, exercise at least 3 days a week, 20 minutes per time and have body movement regularly. In addition, Tattanon, Imarb, Somboon, and Wangjit (2020) have studied a model to correct the obesity problem among school-aged children aged 6-15 years through the participation of the community. This involves the collaborative efforts of four primary network partners: families, schools, communities and public health personnel with a focus on families and children at the center. Other network partners provide support. The approach emphasizes three main issues: nutritional adjustment, promotion of physical activities and creating a conducive environment. The results of implementing this model in practice showed a 4% reduction in the number of students classified as overweight, obese or severely obese. However, there was no significant difference in the average scores of obesity prevention behaviors before and after participating in the program. Jaree and Jarernvongrayab (2022) have used a self-management program affecting health behaviors and nutritional status of over nutrition students in upper primary school. Students' unhealthy eating behaviours decreased and their physical activity levels increased once the programme was put into place.

Family- and school-based obesity prevention programmes occur. However, there were still problems with obesity and being overweight among the students. A review of relevant literature and research indicated that internal personal factors are related to the prevention of obesity in students. According to a study on obesity prevention by Suksai and Jaruchart (2020) misconceptions about obesity and improper student behaviours might affect the Body Mass Index (BMI) which is an indication of obesity. Sulakkananurak and Tasing's (2021) study also revealed that factors influencing body shape transformation in adults who were obese before losing and maintaining their weight include a positive attitude towards happiness and sustainable weight loss as well as changes in lifestyle and dietary habits.

According to Setthamas's (2023) research, the most common behaviors leading to obesity and overweight include aspects related to rest, food consumption and daily physical movement. Therefore, it is crucial to foster correct attitudes towards food consumption, promote healthy eating behaviors and increase physical activity to reduce behaviors that risk obesity and overweight.

According to Resnick (1998) motivation is a critical component in improving a person's capacity to maintain and advance their own health. Motivation, an internal driving force in an individual is directly related to the initiation

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and maintenance of behavior. It plays a role in stimulating and sustaining desirable behaviors. Additionally, it has been found that a family's economic status positively correlates with health literacy regarding dietary habits and physical exercise to prevent obesity (Sripitak, Chutipattana, & Thongsamai, 2019). A family's income is a key factor that influences their power to choose nutritious food. The availability of snacks and beverages in school areas might have a negative impact on students nutritional health if a family chooses low-nutritional-value items regardless of their financial level (Puangmalai & Promkutkao, 2017).

It is crucial to research internal human elements such as behavioural, psychological and biological features as these variables influence social and health-related behavioural variations. These factors are continually associated with health conditions particularly individual characteristics which impact a person's health status. Therefore, understanding the relationship between internal personal factors and obesity prevention can be used to develop, educate and enhance skills in students to correct and optimize these personal factors, thereby reducing health issues and maintaining good health and longevity in a socially healthy manner. In this research, we explored personal factors namely knowledge about the prevention of obesity, attitude towards the prevention of obesity, motivation in obesity of prevention, habits in obesity prevention and student allowance management. These are factors affecting the weight control behaviors of students namely knowledge about the prevention of obesity, attitude towards the prevention of obesity, motivation in obesity prevention, habits in obesity prevention and student allowance management as shown in Figure 1.

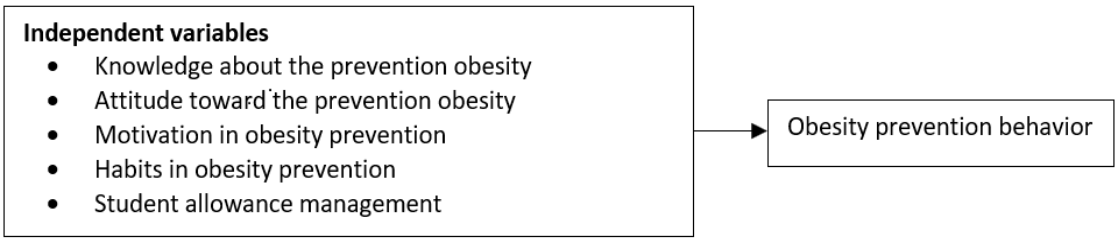

Figure 1. The conceptual framework.

2. METHODOLOGY

2.1. Study Design and Population Sampling

This survey research aimed to investigate the relationship between individual internal factors and the prevention of obesity in students at the junior secondary education level (grades 7-9) in Chachoengsao Province, Thailand. We calculated the sample size using the formula for the estimation of the population mean (Wayne, 1995). Where n = sample size, Z1-α/2 is the constant 1.96 for 95% confidence limits, p=anticipated population proportion based on a study of preventive behavior towards overnutrition of 77.4% (Puangmalai & Promkutkao, 2017) and d = tolerance of 5%, a total of 273 study subjects were selected by stratified random sampling for the study. The two requirements for the study subjects' inclusion were: 1) they had to be enrolled in grades 7-9 and 2) they had to be willing to take part in the research. The exclusion criteria for the study subjects were: 1) move out of school while data collection and 2) frequently absent more than 80 percent of class time.

2.2. Research Instruments

The data were collected using a 7 parts questionnaire consisting of 1) general information about the sample. 2) Knowledge about the prevention of obesity. 3) Attitude towards the prevention of obesity. 4) Motivation in obesity prevention. 5) Habits for obesity prevention. 6) Student allowance. 7) Obesity prevention behavior. The first part is a multiple choice and open-ended questionnaire. The second part is knowledge about the prevention of obesity, a question with a choice of correct or false answers and parts 3-7 were " Likert scale". Every part categorized into 3 groups as high, average and low. The questionnaire was qualified by the 3 experts in public health. The Item Objective Congruence Index (IOC) was tested for its reliability. All items were greater levels between 0.6-1.0. The questionnaire was piloted with 30 students who were not in the study. The reliability of the rating scale questionnaire was examined using the Cronbach alpha coefficient. The confidence value is equal to 0.867.

2.3. Data Analysis

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General information and variables investigated using descriptive statistics like frequency and percentage were presented after general data from the sample was analysed. The relationship between certain internal components and the prevention of obesity in junior secondary school students using the Pearson Correlation Coefficient was examined. A p-value <0.05 was considered statistically significant.

3. RESULTS

3.1. General Information about the Sample

A total of 273 subjects were included in the study of which 51.6% were female. 39.6% of them were 13 years old and 34.8% of them were in the 8. 70% of them had normal nutritional status. 34.1% shows a family's income is more than 30,000 Thai baht. 72.9% 51-100 Thai baht of them were money received from school. The majority of subjects engaged in computer gaming and sleeping during their leisure time (37.9% and 22.3%) (see Table 2).

Table 2. The number and percentage of samples classified by general information data (n=273).

General information data	Number	Percentage
Sex		
Male	132	48.4
Female	141	51.6
Age		
13	108	39.6
14	98	35.9
15	67	24.5
Grade		
7	89	32.6
8	95	34.8
9	89	32.6
Nutritional status		
Thin	13	4.8
Very thin	23	8.4
Normal	191	70.0
Overweight	10	3.7
Obesity onset	21	7.7
Obesity	15	5.4
Average monthly income (Thai baht)		
5,001-10,000	54	19.8
10,001-15,000	29	10.6
15,001-20,000	50	18.3
20,001-25,000	18	6.6
25,001-30,000	29	10.6
>30,000	93	34.1
Money received from school (Thai baht)		
0-50	23	8.4
51-100	199	72.9
101-150	39	14.3
>151	12	4.4
Activities in free time		
Watch TV	40	14.7
Play sports	45	16.5
Play computer games	87	31.9
Read	16	5.9
Sleep	61	22.3
Others	24	8.7

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3.2. The Levels of the Variables Studied

The findings showed that all factors, including attitude towards obesity prevention, motivation for obesity prevention, habits for obesity prevention, management of student allowance and behaviors for obesity prevention were present in the sample at a high level (68.9, 74.7, 72.9, 84.6, and 53.5). Knowledge about the prevention of obesity is 68.9% (see Table 3).

Table 3. Number and percentage of samples classified by levels of the variables studied (n=273).

Variables studied	Number (%)		
	High	Average	Low
1) Knowledge about the prevention of obesity	69 (25.3)	177 (64.8)	27 (9.9)
2) Attitude towards the prevention of obesity	188 (68.9)	77 (28.2)	8 (2.9)
3) Motivation for obesity prevention	204 (74.7)	69 (25.3)	-
4) Habits for obesity prevention	199 (72.9)	70 (25.6)	4 (1.5)
5) Student allowance management	231 (84.6)	35 (12.8)	7 (2.6)
6) Obesity prevention behaviors	146 (53.5)	110 (40.3)	17 (6.2)

3.3. The Relationship between Individual Internal Factors and the Prevention of Obesity in Students of Junior Secondary Education Level

The relationship between each internal component and the prevention of obesity in junior secondary school students was determined by correlation analysis. The findings showed that student allowance management ($r = 0.294$) and obesity prevention behaviours ($r = 0.382$) were individual internal variables associated with obesity prevention (see Table 4).

Table 4. The relationship between individual internal factors and the prevention of obesity in students of junior secondary education level (Correlation analysis) (n=273).

Independent variables	Obesity prevention behaviors	p-value
Habits for obesity prevention	0.382	<0.001*
Student allowance management	0.294	0.005*

Note: *P-value <0.05.

4. DISCUSSION

The following research findings are from a study on the relationship between individual internal variables and the prevention of obesity in junior secondary education level (grades 7-9) students.

The study results showed that the participants were overweight (16.8%) with 3.7% being classified as overweight, 7.7% as obesity onset and 5.4% as obesity. This percentage exceeded the Department of Health's aim of 10% (Bureau of Nutrition, 2022). This might be due to the high-energy food in their daily intake which exceeds the body's daily needs. Moreover, students could not be physically active and food sources are easily accessible to them near the school (Tattanon et al., 2020). Consequently, students who are obese or overweight should examine their height and weight on a regular basis and evaluate their nutritional condition once a week. It is advised to modify eating and exercise habits, keep a daily food journal to monitor and alter consumption patterns (e.g., reducing on rice and flour-based foods, adding vegetables to every meal, choosing plain milk over sweetened milk, eliminating or avoiding high fat foods and favouring baked, steamed or boiled foods over fried ones), drink enough clean water and engage in enjoyable physical activity for at least 60 minutes each day (Munsraket, 2020).

For example, the majority of the sample group (37.9%) preferred sleeping and playing computer games in their leisure time. This behavior was influenced by the long-lasting COVID-19 pandemic which significantly impacted global lifestyles including children and adolescents. The Institute for Population and Social Research, Mahidol University in collaboration with the Health Promotion Fund Office conducted a study on revitalizing physical activities in Thailand post-COVID-19. It was found that the proportion of children and adolescents (aged 5-17 years) engaging in adequate physical activities had decreased compared to previous years, with only 17.1% maintaining sufficient levels. The sedentary behavior of children and adolescents during 2018-2021 increased compared to 2012-2017 with an average exceeding 14 hours per day. In 2021, the average daily duration of

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sedentary behavior was 14 hours and 8 minutes. The pandemic situation also led to an increase in online food ordering systems making it easier for children to access high-energy foods (Katewongsa & Pongpradit, 2020) .Reducing sedentary behavior and emphasizing physical movement is crucial. Children should engage in moderately intense activity for at least 30 minutes each day when it comes to physical fitness (Munsraket, 2020).

The results indicated that habits in obesity prevention were related to the prevention of obesity. Participants with healthy practices for preventing obesity were more likely than those with unhealthy habits to prevent being overweight. It's possible that students who follow healthy diet and exercise regimens are more conscious of health issues and focus more on altering their behaviour to improve their physical and emotional well-being. As a result, they try to control their body weight by changing their eating and exercise behaviors. Furthermore, they might realize that being overweight or obese can affect their physical health (Pender, 1996) which is consistent with the study of Tamara et al.'s (2019) interventions for preventing obesity in children. According to the study, limiting food and increasing activity together can lower the incidence of obesity in students ages 6 to 12 and teenagers ages 13 to 18. Currently, students tend to snack frequently, eating large amounts more often than the body requires. The types of food consumed are usually high in energy while their physical activity is minimal. The majority of their time is spent watching television, playing video games or using the internet especially after school or during the holidays. This is frequently combined with the intake of sweets and soft beverages (Nuansin, 2018). Instilling habits of consuming sufficient nutritious food and regular exercise can prevent obesity in children. This behavior is significantly influenced by families, schools and peer groups. Parents and families, being the closest social connections and playing a crucial role in promoting children's health behaviors, are pivotal. Furthermore, peers can affect and encourage children's learning and social adaptation. They can also change the health-related behaviours of school-age children. Since children spend most of their time at school with teachers and friends, the social environment of friendships and the school setting are key in promoting and supporting healthy behaviors in addition to family upbringing and the home environment (Sutthiwarotamakul, 2017). Therefore, combating obesity requires collaboration from families, schools, communities, peers and the children themselves.

According to the study, students with allowance management prevent overweight more effectively than those without it. It is noted that the money students receive for school each day indicates their ability to choose food. Students with more daily allowance tend to make better food choices than those with less. According to Mungvongsa and Khangwa (2020) there are factors that influence senior high school students' food consumption habits at Watjuntrawart (Sukprasarnrat) school in Phetchaburi province.

Factors related to the food consumption behavior of senior high school students in Watjuntrawart (Sukprasarnrat) school in Phetchaburi province. The results of the study found that students receiving a larger personal allowance from well-off guardians tend to have healthier eating behaviors. Conversely, those with a smaller allowance are limited in their food choices. However, making healthy eating choices isn't necessarily correlated with financial success. This depends on nutritional knowledge, values, food beliefs and an environment conducive to accessing food. It is observed that the money students bring to school is often spent on snacks not including lunch, allowing them the freedom to choose snacks based on personal preference often disregarding nutritional value. Additionally, school canteens are a major access point for students to buy snacks and drinks especially during lunch breaks without any supervision or guidance on their choices (Puangmalai & Promkutkao, 2017). Additionally, the food sold near or in front of schools is often inexpensive, making it easily accessible for students. Students tend to save the money given by their parents to buy such food before returning home from school. These are often reasonably priced fried dishes, sweetened beverages and crispy snacks. According to the research conducted by Aino, Rattanagreethakul, and Junprasert (2018) school environment factors affect overweight kindergarteners in Bangkok.

The results of the study found that the type of food available around schools that is high in calories has a significant positive correlation with the rate of excessive nutrition in kindergarten children. Therefore, the decision to choose food is crucial. Parents and schools should instill good eating habits in children, teaching them to choose nutritious and beneficial foods that positively affect their health. School shops should control the sale of food focusing on offering nutritious snacks and drinks beneficial to health. Similarly, cooperation should be sought from shops around the school to provide nutritious food, milk, snacks and drinks, reducing the availability of sweet, fatty and salty foods in favor of healthier options.

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5. CONCLUSION

This study aims to investigate the relationship between individual internal factors and obesity prevention in junior secondary education students. This research will focus on knowledge, attitude, motivation, habits and student allowance management related to obesity prevention.

The study's findings included practices for managing student allowances and preventing obesity. They related to the prevention of obesity in students at the junior secondary education level. Therefore, families and educational institutions should foster preventative behaviours against obesity such as eating a variety of foods from all five food groups on a regular basis. Exercise at least 3 times a week or 30 minutes a day. In addition, children should be encouraged to plan their spending each day appropriately. Teach children to choose foods that are nutritious rather than those that are less nutritious.

Developing healthy habits in school-age children at a young age is crucial since they lack the maturity and understanding necessary to evaluate information before making decisions.

This will cultivate the ability to appropriately manage health-promoting prevention, enhancement, and self-care. Cooperation between families, schools and the community and public health professionals is necessary to instill healthy eating habits and encourage children to handle financial matters properly.

Schools are essential for imparting information, ideas and attitudes to children since they are directly related to family structures. Thus, they have a significant role in improving children's dietary behaviors through school meal management. Providing food that meets students' nutritional needs, choosing nutritionally rich menu items and enhancing knowledge about making healthy food choices and proper food hygiene are critical. Educating students on calculating the nutritional content of various foods can help them plan their daily food expenditures in line with the nutritional needs of their bodies. This approach will contribute to the students' good health and age-appropriate development. Schools must provide extra physical activities such as sports with friends in addition to physical education programmes in order to encourage students to lead active lives. Regular physical activity is crucial for preventing obesity and preserving general health, making it an integral part of school life.

Families should serve as positive role models in making healthy food choices, avoiding high-energy and high-fat foods and consuming appropriate amounts of vegetables and fruits. Involving children in meal preparation can educate them about the importance of nutritious eating. Additionally, families should guide children in reducing sedentary behaviors, such as watching television or playing computer games and encourage more physical activity. Supporting family-wide physical activities that are enjoyable and part of daily life such as sports, walking, or cycling, can establish a habit of regular exercise. This active lifestyle also extends to regular things like cleaning the house and watering the plants.

Families should also teach children to keep a daily record of income and expenses helping them to plan and manage their spending effectively. These practices can serve as examples for children to emulate and eventually adopt as habits, promoting a healthy and balanced lifestyle.

Communities or local leaders should focus on child obesity prevention. Activities that the community should carry out include public relations and education, screening services and advice on obesity prevention practices for students and parents. Providing a healthy environment by increasing access to healthy food. Encourage each family in the community to grow vegetables for consumption. Cooperate with schools, municipalities, police stations to organize hawkers and stalls. The sale of food, snacks and beverages that adversely affect health around the school is not encouraged. In addition, the budget should be supported to provide physical activity facilities and equipment for people in the community. Build a mainstay of exercise in the community. Communities should disseminate accurate information about overweight and obesity prevention through all forms of local media, such as local newspapers, broadcast towers, community radios and LINE groups.

Health personnel, such as doctors, nurses and health workers are responsible for the health care of students in the area. Participate in training teachers, health teachers and student leaders to have knowledge and skills in food intake and exercise, nutrition assessment, advising schools on the use of weighing instruments and methods, measuring height to the same standard, and modifying test results. Advise schools on how to adapt the environment to facilitate physical activity. Coordinate and care for overweight and obese students.

Thailand has an excise tax structure that allows adjustments or additions to goods that should be taxed. It considers public health interests rather than taxation for state revenue. For example, the sugar-sweetened beverages tax will help adjust consumption habits to encourage people to choose healthier foods. Therefore, the

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government should increase tax measures on foods and beverages that have an impact on health such as foods high in sodium, high in fat, high in carbohydrates, etc.

Prevention of obesity in children requires broad protection for children who are not obese and children at risk of obesity. The prevention and management of obesity in addition to modifying the child to have appropriate internal factors. Cooperation from personnel from all sectors involved in such operations should be achieved.

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This study received no specific financial support.

INSTITUTIONAL REVIEW BOARD STATEMENT

The Ethical Committee of the Naresuan University, Thailand has granted approval for this study on 11 November 2019 (Ref. No. 0515/62).

TRANSPARENCY

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

Both authors contributed equally to the conception and design of the study. Both authors have read and agreed to the published version of the manuscript.

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