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### ABSTRACT

*The pandemic of Coronavirus (COVID-19) has resulted in the imposition of home confinement and the indefinite extension of school closures. Several countries, including Malaysia, have enacted 'lockdowns,' which prohibit people from engaging in outside activities. During this period, it leads to severe repercussions on individuals' eating and lifestyle behaviour. These behaviours increased the risk susceptibility to weight gain, particularly if the quantity of daily physical activity was reduced as a result of the lockdowns period. There is a need to draw attention to the pandemic's long-term impact on children's eating behaviour and physical activity. Clearly, social isolation and stay-at-home orders issued in cities around the world restrict opportunities for children to engage in physical activity. In addition, COVID-19 may aggravate the risk of a shift towards an obesity epidemic among children. It is critical to tackle children's eating and lifestyle behaviours during COVID-19 pandemic as these are intrinsically linked to the children's cognitive development, academic performance, and disease susceptibility. The purpose of the activity was to examine the association between the scores of the Children's Eating Behaviour Questionnaire (CEBQ), Physical Activity Questionnaire (PAQ-C) and Body Mass Index (BMI) among selected school children in Pahang during COVID-19. A total of 100 schoolchildren (37 males and 63 females) parents with children aged between 9-12 years completed an online survey which included a set of questionnaires to measure their own level of physical activity (PAQ-C) as well as that of their children's eating style (CEBQ) during the lockdown period. During COVID-19, schoolchildren are not engaged in physical activity, it showed that only 32 children active compared to 68 children were inactive on doing physical activity per week. Predominantly, children underweight was 39, Normal BMI was 38 children, overweight was 21 children and obesity children was 2, from this descriptive data it showed that enjoyment of food and food responsiveness are related in this study. The Pearson Analysis indicated that there were significantly associated with BMI and CEBQ ( $P = 0.006$  to  $< 0.001$ ). The physical activity scales revealed positively related to BMI ( $P = 0.048$  to  $< 0.001$ ). In conclusion, the current findings underlined the growing need for strategies in preserving children's health and development.*

**Keywords:** Covid19, CEBQ, Physical activity, School children, Eating behaviour

## INTRODUCTION

The current outbreak of the coronavirus disease 2019 (COVID-19) is a public health epidemic and a global challenge which originated in the People's Republic of China's Hubei Province, has spread to many other countries (Velavan & Meyer, 2020). The World Health Organization (WHO) Emergency Committee declared a global health emergency on January 30, 2020, based on increasing case notification rates in Chinese and international locales. China bears the heaviest morbidity and mortality load as of the middle of February 2020 (Velavan & Meyer, 2020). Medical symptoms of the condition, consisting of fever, cough, nasal inflammation, nausea, and other signs of upper respiratory tract infections, typically begin in less than a week in symptomatic patients (Guan et al., 2020). As an emergency precaution, governments have told residents to stay at home and have closed schools to deter the transmission of the virus and it affects more than 150 million children and teenagers in 165 countries as of March 26, 2020. As the government told so, closure of school has been proved to cause unhealthy weight gain among children like happened during summer break at United States (Von Hippel & Workman, 2016).

In addition, the Malaysian government also announced that students should study at home (MyGOV, n.d). Unfortunately, study at home causes frequent use of digital media can lead to sedentary habits, screen addiction, increased obesity and metabolic disorders, as well as poor sleep and vision (Susilowati et al., 2021). Some descriptive research performed in many Asian countries during the last five years found that young children were exposed to large quantities of screen time from television, smartphones, and other types of handheld media technology, even though they were not using them (Tamana et al., 2019). Less physically active among children have been found and eventually become obese as they grow up into adulthood due to less physical activities as a result of urbanised lifestyle (Law et al., 2020). This is also important to look at as previous research has documented that physical activity plays an important role in physical and psychosocial health and wellbeing for children and young people (Biddle et al., 2019). Worldwide, a growing body of evidence indicates that low physical fitness and inactivity have been associated with the increased prevalence of lifestyle non-communicable diseases among children and adolescents.

Thus, possible to reduce or minimise the risk of obesity in children by way of physical exercise, compared to healthy-weight kids, while children who are obese have functional restrictions (Hong et al., 2016). Physical activity plays an important role in the health, growth and development of children. The reduction of physical activities has the potential to lead to severe problems such as decreased fitness levels, a lack of exercise, stress, obesity, and adult illnesses (Hong et al., 2016). This indicates that physical activity has a big impact on the role of children's health. Rise in overweight and obesity children in Malaysia can now be seen clearly. One out of every three Malaysian children are overweight or obese, accounting for 30 percent of the population (Von Hippel & Workman, 2016). Typically, these children are still classified as teenagers or young adults. Obesity and overweight were shown to be common among teenagers, with irregular and occasional meals, low vegetable intake, and frequent snacking and most of the children practice unhealthy diet patterns (Genena & Salama, 2017). Aside from that, an individual's lifestyle is another aspect that contributes to obesity. The frequency with which a person performs physical activity is one of the lifestyle factors that has the biggest influence on obesity. Individuals who do not participate in enough physical activity and spend too much time on screens during the weekend are more likely to become overweight

or obesity (O'Brien et al., 2018). In order to develop effective strategies to combat obesity among school children, there is a need to generate data on the eating behaviour and their physical activity level of primary school children in selected geographical regions. The purpose of the activity was to examine the association between the scores of the Children's Eating Behaviour Questionnaire (CEBQ), Physical Activity Questionnaire (PAQ-C) and Body Mass Index (BMI) among selected school children in Pahang during COVID-19.

## **METHOD**

### *Sampling Design*

The research design that has chosen to run the study by using the descriptive research (cross-sectional survey) which determine groups which are non-experimental involved in the study. The sampling techniques used in the study are convenient sampling categories. School children are involved in this sampling. The primary goal of this sample is to learn more about a specific phenomenon rather than making statistical judgments, especially when the population is tiny and specific. The process of recruiting the participant involves volunteering by answering the questionnaire through provided or distributed. The sample size for the participant was indicated by using Krejcie and Morgan (1970). According to Krejcie and Morgan 1970, the sample size will be 100 respondents.

### *Participants*

Researchers choose snowball sampling that can be used to recruit schools name participants via other participants and the sample is not easy to reach (Goodier, 2011) as not all primary school children have their own smartphone to answer the questionnaire in google form. In this research, researchers get in contact with teachers from Sekolah Kebangsaan Chedong Jaya, Maran, Pahang (SKCJ). The teacher was invited to be a researcher in a WhatsApp group that involved the parents/guardian of the children in the group. The subjects' legal guardian/parent who want to participate voluntarily in this study must give the phone with an open-link to their children to answer the questionnaire through their smartphone (for 10 years and above) and proxy-reported by parents/legal guardian as their proxies (for children younger than 10 years old). All participants will be brief on the objective, purpose and significance of the study, procedures involved, what the study needs from them and why they were chosen as the samples in the WhatsApp group. The individual demographic data will be filled for information in the google form such as gender, age, weight, height and parental income.

### *Instruments - Physical Activity Questionnaire for Older Children (PAQ-C)*

The Physical Activity Questionnaire for Children (PAQ-C) was a self-administered, 7- day recall instrument. It was developed to assess general levels of physical activity throughout the elementary school year for students aged 8-14 years old (Kowalski et al., 2004). In Malaysia, primary school children aged 7-12 years old were eligible to answer this questionnaire with students aged below 10 years old being proxy-reported by their parents or legal guardian (Wong et al., 2016). The PAQ-C investigated moderate and intense physical activities 7 days before filling it up (therefore including the weekend). This questionnaire consists of 9 questions about sports and games, physical activities in school and leisure. Each is worth 1 (did not

practice any activity) to 5 (practiced activities on all weekdays) and the final score is the average of the questions. In the end, the mean score of the 9 items of questions was classified as:  $< 2.04$  = 'low activity',  $2.04 - < 2.9$  = 'moderate activity',  $\geq 2.9$  'high activity' (Wong et al., 2016). The item scale correlations were all above 0.30, and the scale reliability was acceptable for both females ( $\alpha = 0.83$ ) and males ( $\alpha = 0.80$ ) (Kowalski et al., 2004). The test retest reliability for the PAQ-C ranged from  $r=0.75$  to 0.82 and internal consistency reliability values (coefficient alpha) indicated good value that ranged from 0.812 and 0.879 (Mohammadzadeh, 2020) This questionnaire is widely used in research, in order to assess physical activity level of large and small populations at minimal cost (Kowalski et al., 2004).

The questionnaire was administered in two-language (English and Bahasa Malaysia). PAQ-C in the Malay version was adapted (Nor Azian et al., 2016). This Malay version questionnaire had a medium to strong reliability and validity in determining physical activities of older children since the results of standardized Cronbach alpha were 0.75-0.77 (Wong et al., 2016).

The questionnaire has 7 constructs (World Health Organization, 2020), namely:

1. Organized or structured physical activity,
2. Physical Education (PE) related physical activity,
3. Recess breaks physical activity,
4. Lunch break physical activity,
5. Outside of school physical activity,
6. Weekend and leisure time physical activity, and
7. Frequency of engaging in physical activity in the last week.

#### *Child Eating Behavior Questionnaire (CEBQ)*

The CEBQ questionnaire was administered in two language English and Bahasa Melayu, which is the administrative language in Malaysia. The CEBQ is a 35-item tool that measures eight factors (factors) using a five-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always). The 8 factors contained 3 to 6 items: Satiety Responsiveness (5 items, e.g., My child gets full up easily); Slowness in Eating (4 items, e.g., My child takes more than 30 min to finish a meal); Food Fussiness (6 items, e.g., My child is difficult to please with meals); Food Responsiveness (5 items, e.g., Given the choice, my child would eat most of the time); Enjoyment of Food (4 items, e.g., My child looks forward to mealtimes); Desire to Drink (3 items, e.g., If given the chance, my child would always be having a drink); Emotional Undereating (4 items, e.g., My child eats less when s/he is tired) and Emotional Overeating (4 items, e.g. My child eats more when anxious). The CEBQ subscale scores were calculated by the mean score from the sum of the items divided by the number of items answered in each dimension. The entire 35-item instrument is rated on a 5-point Likert scale (ranging from never to always), where higher scores reflect a higher intensity of the specific eating behaviors. The scores for 5 of the opposite phrasing items were reversed based on the instrument instructions. It showed good internal consistency for the CEBQ subscales used in a population of Malaysian children, whereby the Cronbach's  $\alpha$  coefficients ranged from .70 to .85 (Tay et al., 2016).



### Statistics

The data in the study will be analyzed using the Statistical Package for Social Sciences (SPSS) version 26 software. Descriptive statistics in the form of frequencies, means  $\pm$  standard deviation ( $\bar{x} \pm SD$ ) will be used for applicable variables. The significance that will be identified in this study is  $p < 0.05$ , which refers to a 5% chance that a significant result is a false positive. The data had been analysed using Pearson correlation to identify the association between Body mass index (BMI) and the Children Physical Activity Questionnaire (PAQ-C) and Children Eating Behavior Questionnaire (CEBQ) among school children.

## RESULTS

### *Socio-demographic characteristics*

A total of 100 school children from seven to twelve years old of Sekolah Kebangsaan Chedong Jaya, Maran, Pahang (SKCJ) participated in this study. Table 1 shows that 37% of the respondents were males and 63% were females. The study sample for body mass index (BMI) with underweight (39%), normal (38%), overweight (21%) and obesity is only (2%).

*Table 1. Characteristics of study respondents*

Characteristic	Male n%	Female n%	Total n%
BMI (kg/m <sup>2</sup> )			
Gender	37 (37)	63 (63)	100
Underweight	8 (21.62)	31 (49.21)	39 (39)
Normal	20 (54.05)	18 (28.57)	38 (38)
Overweight	9 (24.32)	12 (19.05)	21 (21)
Obesity	0 (0)	2 (3.17)	2 (2)

According to the BMI status of school children, only quarter of the students were in the normal BMI range (38%). Although nearly half of school children suffered from nutritional issues, obese, overweight and underweight condition. A study conducted in a rural area of Maran, Pahang found that they suffered from obesity and underweight conditions because they were addicted to an inactive lifestyle with PAQ- C ( $67.56 \pm 14.11$ ) and CEBQ ( $89.63 \pm 15.25$ ).

*Table 2. Nutritional status and physical activity status of children, by gender*

Characteristic	Male Mean + SD	Female Mean + SD	Total Mean + SD
Age	10.05 ± 1.26	10.3 ± 1.27	10.18 ± 1.27
Height (cm)	143.21 ± 6.60	142.9 ± 4.15	143.08 ± 5.38
Weight (kg)	44.35 ± 11.03	39.5 ± 10.09	41.93 ± 10.56
BMI (kg/m <sup>2</sup> )	2.03 ± 0.69	1.76 ± 0.88	1.89 ± 0.78
PAQ-C	68.41 ± 12.28	66.71 ± 15.94	67.56 ± 14.11
CEBQ	93.11 ± 14.76	86.14 ± 15.74	89.63 ± 15.25

Data were expressed as means ± standard deviations; Abbreviations: SE, standard error; BMI, body mass index; PAQ-C, Physical Activity Questionnaire for Children; CEBQ, Child Eating Behavior Questionnaire

*Table 3. Association of body mass index (BMI) between Physical Activity Questionnaire for Children (PAQ-C) and Child Eating Behavior Questionnaire (CEBQ) among school children*

Characteristic	PAQ-C	CEBQ
<i>r</i> value	0.198	0.275
<i>p</i>	0.048	0.006

Table 3 showed that, the Pearson analysis indicated that there were significantly associated with BMI and CEBQ ( $r = 0.275$ ,  $p = 0.006$ ). The physical activity scales revealed positively related to BMI ( $r = 0.198$ ,  $p = 0.048$ ). According to the results a clear relationship could be established between BMI of the school children and physical activity level ( $p < 0.05$ ). Thus, there was also a clear relationship between the children's eating behavior and their BMI.

## DISCUSSION

The current study was set out with the purpose of identifying the physical activity and eating behavior among primary school children of SKCJ during COVID-19 pandemic outbreak. The most obvious finding that emerged was the current trend in physical activity and children eating behavior participation across gender of the school children of the stated school during pandemic outbreak which require the children to learn from home according to their own class timetable. This study found that girls were low in overall physical activity. When examined the physical activity (PA) by domains, it was found that girls scored lower in during recess break PA, outside of school PA, weekend and leisure time PA and frequency of engaging in PA in the last week than boys. Girl's scores are higher only in organized or structured PA, physical education-related PA and lunch break PA. Girls were low in overall physical activity because girls were linked with weaker influences at the school and family levels and as a result of lower involvement in extracurricular sport (Wong et al., 2016). This finding corroborates with the

previous research as well as Malaysian data that discovered boys were more active than girls and association with the BMI (Wong et al., 2016).

The finding of the current study revealed that the children were moderately active in organized sport. This finding was corroborated with a study (Schmidt et al., 2020) when they found a positive participation in organized sport among the school children during the strictest lockdown season. Physical education class in Malaysia is compulsory, even during this pandemic outbreak, they were given their task to do at home and the teachers supervised them closely through class WhatsApp group, the children will give the picture or video as the proof they did the task that was given to them. However, there are various obstacles in the execution of physical education in Malaysian schools, including the replacement of the classes with teaching of other examination subjects, lacking sports facilities, equipment, and qualified physical education teachers (Sanuddin & Hashim, 2018). In general, interesting and varied content in each program to be delivered is very important so that the learning process can run smoothly and motivate children to participate in each activity that has been provided. Thus, this study, similar to the previous study, stated that systematic programs need to be implemented to reduce the burden of parents during PDPR and BMI association with physical activity (Sanuddin & Hashim, 2018).

Malaysian dietary intake consists of high-fat foods and calories that lead them to practice a sedentary lifestyle. One of the common habits practiced by Malaysians is skipping their breakfast which leads them to gain weight and addiction to unhealthy eating habits, including eating junk foods. Elementary school students also think that the convenience of junk food is an attraction for them: they are relatively cheap, and they are quick and easy to eat. Current research showed that CEBQ is valuable for identifying specific dietary patterns, which can be regarded as important and changeable determinants related to the development and maintenance of abnormal body weight status (Spahić & Pranjić, 2019), which can be used for preventive considerations for parents to know the importance of nutrition education for their children, focusing on the principles of healthy eating and increasing the level of physical activity, positive child eating behaviours and positive parental feeding practices. Thus previous study similar with this study association between BMI and CEBQ.

Previous studies mainly examined children's eating behaviors, using BMI as the only indicator of nutritional status. Therefore, studying dietary behaviors related to nutritional indicators other than BMI may provide a better understanding of the problems of overweight and obese children. Therefore, it is limited by the results of this study (Tay et al., 2016). However, diet is an important part of a person's survival, in today's obesity environment, food intake that exceeds energy requirements is common, which in turn will lead to consumption stimulation instead of physical hunger, but mainly pleasure (hedonic hunger). In contrast, previous research has shown that the link between picky eaters and children's BMI is inconclusive (Santos et al., 2011).



## CONCLUSION

This study has been able to provide insights into the school children's eating behaviour and their physical activity level. These findings highlight the positive association between BMI with physical activity and children eating behavior during COVID-19 pandemic outbreak. This is crucial as it could help to generate data on the necessary goals and targets for tailoring existing programmes. As a result, more effective techniques for combating obesity are required, which must be properly executed.

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### *Conflict of Interest*

The authors declare that they have no conflict of interest.

### *Author's Contributions*

All authors contributed equally to this work and approved the final version to be published.

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