

SOCIOECONOMIC DISPARITIES IN PHYSICAL ACTIVITY, EATING BEHAVIOUR AND BODY MASS INDEX AMONG MALAYSIAN PRIMARY SCHOOL CHILDREN: IMPLICATIONS FOR CHILD WELL-BEING AND SOCIAL DEVELOPMENT

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Abstract: *Socioeconomic disparities can influence children's opportunities to engage in healthy lifestyles through differences in family resources, living environments, access to recreational opportunities, and food related practices. Understanding these disparities is important for promoting equitable child health and sustainable social development. This study examined differences in physical activity, eating behaviour, and body mass index (BMI) among Malaysian primary school children according to family socioeconomic status (SES). A cross-sectional design was employed involving 91 primary school children aged 8–11 years from Jengka, Pahang, Malaysia. Physical activity was assessed using the Physical Activity Questionnaire for Older Children (PAQ-C), while eating behaviour was evaluated using the Child Eating Behaviour Questionnaire (CEBQ). Anthropometric measurements were obtained to determine BMI. Participants were categorised according to family socioeconomic groups, namely B40, M40, and T20. Multivariate analysis of variance (MANOVA) was used to examine differences in the study outcomes across socioeconomic groups. The findings demonstrated significant differences in physical activity ($p = .044$), eating behaviour ($p = .006$), and BMI ($p = .015$) across socioeconomic categories. Most participants demonstrated moderate-to-high levels of physical activity, although variations were observed between socioeconomic groups. These findings indicate that family socioeconomic circumstances are associated with differences in children's health-related behaviours and weight status. Addressing such disparities requires context-sensitive interventions involving families, schools, and*

communities to ensure that children from different socioeconomic backgrounds have equitable opportunities to adopt healthy lifestyles.

Keywords: *Socioeconomic status; physical activity; eating behaviour; body mass index; primary school children; child well-being; social inequality*

Introduction

Childhood represents a critical stage for establishing behavioural patterns that can influence health and well-being throughout the life course. Among the behaviours established during this period, regular physical activity and healthy eating are particularly important because they contribute to physical development, weight management, psychological well-being, and the prevention of non-communicable diseases. Conversely, inadequate physical activity and unhealthy eating behaviours may contribute to childhood overweight and obesity and subsequently increase the risk of adverse health outcomes later in life (Cunningham et al., 2022; Chen et al., 2023). Children's health behaviours, however, do not develop independently of their social and family environments. Socioeconomic circumstances can influence the resources, opportunities, and support available to families in promoting healthy lifestyles. Family income, parental education, occupational circumstances, neighbourhood characteristics, access to recreational facilities, and the availability of nutritious food may shape children's physical activity and dietary practices (Tarro et al., 2022). Consequently, differences in socioeconomic status (SES) may contribute to inequalities in children's health behaviours and developmental outcomes.

Evidence suggests that children from socioeconomically disadvantaged households may experience greater barriers to adopting healthy lifestyles. Limited access to safe recreational spaces, organised sports, transportation, and appropriate facilities may restrict opportunities for physical activity. Similarly, household economic circumstances can influence food availability, meal patterns, and children's exposure to different food environments. Wong et al. (2022), for example, highlighted associations between family socioeconomic status, early-life activities, and subsequent physical fitness. Socioeconomic differences in children's eating behaviours have also been reported in Malaysia, particularly during periods of social disruption such as the COVID-19 pandemic (Joseph Louis & Tyug, 2021). The family environment is particularly important because parents and caregivers play a central role in shaping children's health-related behaviours. Parents may influence physical activity through encouragement, role modelling, transportation, financial support, and participation in family-based recreational activities. They also shape children's dietary behaviours through food availability, feeding practices, household routines, and attitudes towards food (Al Yazeedi et al., 2021). Families that provide supportive environments for physical activity and healthy eating may therefore contribute to the development of healthier behavioural patterns among children.

Eating behaviours developed during childhood are also important because they may persist across subsequent stages of life. Ward et al. (2016) emphasised the relationship between eating behaviours and physical activity during childhood, while Ługowska et al. (2020) reported associations between eating behaviour and physical fitness. Regular engagement in physical activity may coexist with other health-promoting behaviours and contribute to children's overall physical and psychological well-being. The relationship between socioeconomic circumstances and children's health behaviours can also be understood through Social Cognitive Theory. The theory proposes that behaviour is shaped through reciprocal interactions between personal

characteristics, behaviour, and environmental influences. Within the context of childhood health, family practices, parental modelling, social support, environmental opportunities, and children's individual perceptions may interact to influence physical activity and eating behaviour. Thus, socioeconomic circumstances may operate not only through financial resources but also through the social and physical environments in which children develop their behavioural patterns.

Despite increasing attention to childhood health, socioeconomic inequalities in children's physical activity and eating behaviours remain important concerns. Malaysian families experience diverse socioeconomic circumstances, and these differences may translate into unequal opportunities for children to participate in physical activity and maintain healthy eating practices. Understanding these variations is particularly relevant for designing interventions that do not assume that children from different socioeconomic backgrounds experience identical opportunities or barriers. Furthermore, addressing inequalities in children's health behaviours has implications beyond individual health. Promoting equitable access to healthy lifestyles contributes to children's well-being, social development, and the broader objective of reducing health inequalities. This perspective is consistent with Sustainable Development Goal (SDG) 3, which emphasises good health and well-being, and SDG 10, which calls for reducing inequalities within populations. Therefore, this study aimed to examine differences in physical activity, eating behaviour, and body mass index among Malaysian primary school children according to family socioeconomic status. By examining children from the B40, M40, and T20 socioeconomic groups, the study provides evidence on how family socioeconomic circumstances may be associated with children's health-related behaviours and weight status.

Literature Review

Socioeconomic Status and Children's Health Behaviour

Socioeconomic status is a multidimensional concept that reflects differences in economic and social resources available to individuals and families. Income, educational attainment, occupation, financial security, and social position can influence living conditions and access to health-promoting resources. Within families, these factors may affect children's opportunities to participate in organised physical activity, access recreational environments, and consume nutritious foods.

Previous studies have demonstrated relationships between socioeconomic status and physical activity among children. Gerber et al. (2021), for example, reported associations between household socioeconomic status, physical activity, and cardiorespiratory fitness among primary school children. Similarly, Ke et al. (2022) found that socioeconomic status was associated with physical activity among children and adolescents, although the magnitude and direction of these associations could vary according to demographic characteristics.

Nevertheless, the relationship between SES and children's physical activity is not always consistent. Salem et al. (2022) reported no significant relationship between socioeconomic status and physical activity and motor development in early childhood. Such variations suggest that socioeconomic status may interact with age, family characteristics, environmental conditions, and cultural contexts rather than operating as an isolated determinant of children's behaviour.

Family Environment and Physical Activity

Families provide one of the earliest social environments in which children's attitudes and behaviours are established. Parents can encourage active lifestyles by participating in physical activity with their children, providing transportation to recreational activities, facilitating access to sporting opportunities, and acting as behavioural role models.

Regular physical activity provides numerous benefits during childhood, including improved physical fitness, cardiovascular and metabolic health, bone development, and psychological well-being. Participation in sport and physical activity during childhood may also contribute to continued physical activity during adulthood (Eime et al., 2013).

However, opportunities to engage in physical activity are influenced by the environments in which children live. Accessibility to walking paths, recreational facilities, public transportation, safe neighbourhood environments, and organised sporting opportunities may either facilitate or restrict participation (Yu et al., 2022). Such environmental factors may themselves be influenced by socioeconomic conditions.

Eating Behaviour and Family Socioeconomic Environment

Children's eating behaviours are shaped by complex interactions between individual characteristics and the family food environment. Parents and caregivers determine much of the food available within the household and influence children's food choices through feeding practices, modelling, encouragement, and family routines.

Children who are exposed to supportive home environments with greater availability of nutritious food may have more opportunities to establish healthy dietary practices. In contrast, economic and environmental constraints may limit food choices and influence children's eating behaviours. Tarro et al. (2022) demonstrated that parental feeding practices and children's eating behaviour may differ according to socioeconomic neighbourhood characteristics.

In the Malaysian context, Joseph Louis and Tyug (2021) identified sociodemographic disparities in children's eating behaviours during the COVID-19 lockdown. Such findings highlight the importance of examining eating behaviour within the broader socioeconomic and family context rather than treating children's food-related practices as purely individual choices.

Physical Activity, Eating Behaviour and Child Well-Being

Physical activity and eating behaviour are interconnected components of a healthy lifestyle. Research suggests that children who participate regularly in physical activity may also demonstrate healthier lifestyle patterns (Kolanowski et al., 2022). Nevertheless, the relationship is complex because both behaviours are influenced by family practices, social relationships, environmental opportunities, and individual preferences.

Social Cognitive Theory provides a useful perspective for understanding these relationships. Children's behaviours are influenced by interactions between individual characteristics and environmental factors, including family dynamics, social relationships, and opportunities for participation. A supportive family environment may encourage physical activity and healthier eating practices, while socioeconomic constraints may limit the resources necessary to maintain these behaviours.

Accordingly, examining physical activity and eating behaviour alongside socioeconomic status may provide a more comprehensive understanding of children's health-related behaviours. Such evidence can support the development of interventions that recognise the different circumstances experienced by families across socioeconomic groups.

Method

Research design

This study is a cross-sectional study. The cross-sectional design is a study that is conducted at a single point in time. The data were collected from different individuals and the variables without influencing the participants. The survey will be given to the participants, seven until eleven years old, parents or guardians were asked to evaluate the participant's physical activity on their behalf for that week and Child Eating Behavior Questionnaire (CEBQ). The researcher will collect the survey a week later to analyze the data.

Sampling Design

The sampling used for this study is random. The study subjects are children aged between 7 – 11 years old from Jengka, Pahang. The sample size for this study was determined by using the fishbowl technique, which is from 521 primary schools in Pahang. The chosen area is Maran, Pahang, which has 52 primary schools. The selected district from the fishbowl technique is Jengka, Pahang, which has 25 primary schools. Out of 25 primary schools, 2 school was chosen during the sample size. The effect size was chosen based on the ($d=0.2$), specifying to small effect size, ($d=0.5$), indicating to medium effect size, ($d=0.8$), showing to large effect size (Burns et al., 2019). The alpha significance value chosen is .05 for controlling the error of data. To estimate the sample size will use the G*Power Version 3.1.9.7 sample size calculation. Based on the independent variable test a calculation with a small effect size ($d=0.25$), alpha significance value of .05, and test power is 0.95 sample size for this study is 42 divided by three groups (B40, M40, and T20). Therefore, the researcher has chosen to target a total of 91 subjects for this study due to the possible missing data and the 20% dropout rate. To facilitate the subject selection process for each class that has been selected and take into account the number of students absent, sick, and moving.

Instruments

Body Mass Index (BMI)

Body Mass Index (BMI) is used for anthropometry of primary school students before testing height, and weight. BMI can be measured using a calculator, and the formula for BMI is body weight (kg) divided by height (m)². BMI divided into obesity is ≥ 30 kg/m², average weight 18.5 – 24.9 kg/m², underweight < 18.5 kg/m², and overweight 25.0 -29.9 kg/m² (Cone, Benjamin, Alfson, & Demetriades, 2021).

Physical Activity Questionnaire for Older Children (PAQ-C)

The Physical Activity Questionnaire for Children (PAQ-C) is 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, Crocker & Faulkner, 2004). In Malaysia, primary school children aged 7-12 years old are eligible to answer this questionnaire with students aged below 10 years old are being proxy-reported by their parents or legal guardian (Wong et al, 2016). The PAQ-C investigates 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', ≥ 2.9 'high activity' (Wong et al., 2016).

The questionnaire will be administered in two-language (English and Bahasa Malaysia). PAQ-C in Malay version was adapted from Nor Azian, Norhafizah, Azahadi, Hasnan, Azli & Noor Safiza (2016). This Malay version questionnaire has a medium to strong reliability and validity in determining physical activities of older children since the results of standardized Cronbach alpha are 0.75-0.77 indicating that PAQ-C (M) had strong internal consistency.

The questionnaire has 8 constructs (Wong et al, 2016), namely:

1. Organized or structured physical activity,
2. Physical Education (PE) related physical activity,
3. Recess break 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 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 Cronbach's α coefficients ranged from .70 to .85.

Statistics

The data obtained in this research were analyzed using the IBM SPSS Statistics Version 28.0 software. The significance value that will be identified is $p < 0.05$, which refers to a 5% chance that a significant result is a false positive. The data will be analyzed using MANOVA to compare the children's physical activity level and eating behavior based on the socioeconomic status of the family.

Result

Socio-demographic characteristics

Table 1 shows the demographic data for all the variables in this study. The frequency age T20 for 8 years old (n=7), 9 years old (n=7), 10 years old (n=5) and 11 years old is (n=6). Next, the frequency age is M40 for 8 years old (n=7), 9 years old (n=4), 10 years old (n=6) and 11 years old (n=13). The frequency age B40 for 8 years old (n=10), 9 years old (n=8), 10 years old (n=9) and 11 years old is (n=9). The mean average for age T20 is 9.4, and the standard deviation is 1.15, the age M40 group mean, and the standard deviation is (9.83±1.23) and for age B40 is (9.47±1.16). Next, the gender frequency of the primary school children (n=91) indicates that the male for T20 (n=11) and female (n=14). The M40 group for males is (n=14) and females (n=16). Next the B40 group for male is (n=16) and female is (n=20). The frequency for the BMI category for T20 is the highest is normal (n=12), M40 is also normal and overweight (n=12), and B40 is normal (n=15). Physical activity categories show frequency for T20 the highest frequency is a high activity (n=14), the highest frequency for M40 is a high activity (n=23), and B40 also has the highest frequency is high activity (n=18). The data detected no missing data and was a valid observation of the data set.

Table 1. Demographic Data

Characteristic	Frequency (n)	Percentage (%)	Mean±SD
Age (T20)			9.4±1.15
8	7	28	
9	7	28	
10	5	20	
11	6	24	
(M40)			9.83±1.23
8	7	23.3	
9	4	13.3	
10	6	20.0	
11	13	43.3	
(B40)			9.47±1.16
8	10	27.8	
9	8	22.2	
10	9	25.0	
11	9	25.0	
Gender (T20)			1.56±0.51
Male	11	44.0	
Female	14	56.0	
(M40)			1.53±0.51
Male	14	46.7	
Female	16	53.3	
(B40)			1.56±0.50
Male	16	44.4	
Female	20	55.6	

BMI Category (T20)			2.44±0.77
Underweight	2	8	
Normal	12	48	
Overweight	9	36	
Obesity	2	8	
(M40)			2.30±0.79
Underweight	5	16.7	
Normal	12	40	
Overweight	12	40	
Obesity	1	3.3	
(B40)			1.97±0.77
Underweight	11	30.6	
Normal	15	41.7	
Overweight	10	27.8	
Obesity	0	0	
Physical Activity Category (T20)			2.56±0.51
Low (<2.04)	0	0	
Moderate (2.04 – 2.09)	11	44.0	
High (≥2.9)	14	56.0	
(M40)			2.77±0.43
Low (<2.04)	0	0.0	
Moderate (2.04 - <2.9)	7	23.3	
High (≥2.9)	23	76.7	
(B40)			2.44±0.61
Low (<2.04)	2	5.6	
Moderate (2.04 - <2.9)	16	44.4	
High (≥2.9)	18	50.0	

Table 2 shows that the results of physical activity level (PAQ-C) have significant differences between T20, M40 and B40 based on the dependent variable, $F(2, 88) = 3.230, p = .044$, Wilk's $\Lambda = .784$; partial eta squared = .114. Therefore, results after comparing all the dependent variables there is significant difference among all the socioeconomic status categories based on Bonferroni. Next, the results for eating behavior (CEBQ) and body mass index (BMI), also showed significant differences between T20, M40, and B40 shown in the table 2 below.

Table 2. Multivariate analysis of variance (MANOVA) of different PAQ-C, CEBQ and BMI subscales according to SES

Source of Variance	F(P)
PAQ-C	3.23(0.044)
CEBQ	5.48(0.006)
BMI	4.39(0.015)

Discussion

These findings highlight the importance of considering socioeconomic status when examining physical activity levels, eating behaviors, and BMI in children. It is important to recognize the impact of the family environment on children's physical activity and eating behaviors and to develop interventions that address these factors (Rhodes, Guerrero, Vanderloo, Barbeau, Birken, Chaput, et al., 2020). Therefore, past studies also showed a significant difference between physical activity level and socioeconomic. According to Wong et al (2016), the study results are significant between children's physical activity level with sociodemographic variables due to the use of a large, nationally representative sample of Malaysian students; the generalizability of this study's findings is its greatest asset. In contrast to their study and this study, the study conducted in a selected school in Jengka did not include ethnicity as a variable, unlike another study that did. It is because the school where the data were collected only had one ethnic group, which is Malay. Moreover, this study does not focus on ethnicity since it wants to determine the difference between physical activity level and the family's socioeconomic status.

The study conducted by Ke et al. (2022) found that higher socioeconomic status (SES) was positively correlated with greater levels of physical activity among children and adolescents in China. The authors also noted that different socioeconomic status factors affect students differently across genders and age groups. On the other hand, a study conducted in Malaysia by Mohd Nasir et al. (2021) found significant differences in eating behaviors, physical activity, body mass index-for-age (BAZ), and cognitive function among primary school children from different socioeconomic backgrounds. While Ke et al. (2022) focused on gender and grade as factors that impact the socioeconomic status of the family, Mohd Nasir et al. (2021) classified children into different socioeconomic status categories. The American Psychological Association (APA) defines socioeconomic status as encompassing not just income but also educational attainment, occupational prestige, and subjective perceptions of social status and social class. SES can affect overall human functioning, including physical and mental health, and is a consistent and reliable predictor of a vast array of outcomes across the lifespan.

In contrast to the findings of some studies, Salem, Elhadidy, and Salem (2022) found no significant differences between physical activity and socioeconomic level. The authors noted that socioeconomic status may only impact a child's middle and late childhood on physical activity and motor development. This study aimed to assess the association between socioeconomic status, physical activity and motor development in early childhood. The results showed that socioeconomic status did not have a significant impact on physical activity and motor development. It is important to note that socioeconomic status encompasses not just income but also educational attainment, financial security, and subjective perceptions of social status and social class. Low socioeconomic status and its correlates, such as lower educational achievement and poverty, can have a negative impact on physical and mental health outcomes. Children from low socioeconomic households and communities may develop academic skills slower than children from higher socioeconomic groups. Additionally, low socioeconomic status increases the risk of motor skill impairment among children (Van der Walt, Plastow, & Unger, 2020).

As a practitioner, it is important to recognize the influence of physical activity on children's overall well-being and the role that families play in promoting a healthy lifestyle. Encouraging families to participate in physical sports together and providing education on the benefits of physical activity can be an effective way to promote healthy behaviors. Additionally, being

aware of the impact of media on children's acquisition of active and healthy lifestyles can help practitioners develop strategies to counteract negative influences and provide children with the tools they need to make informed choices. Overall, the discussion surrounding the results of physical activity levels, eating behaviors, and BMI among different socioeconomic status categories emphasizes the need for comprehensive approaches that take into account family dynamics, support, and socioeconomic factors to promote healthy lifestyles in children.

Conclusion

This study demonstrates significant differences in physical activity, eating behaviour, and BMI among Malaysian primary school children from different family socioeconomic groups. The findings reinforce the importance of considering socioeconomic circumstances when examining children's health-related behaviours and well-being. Although individual and family choices remain important, children's opportunities to adopt healthy lifestyles are also shaped by the social and economic environments in which they live. Family resources, parental support, access to physical activity opportunities, and the home food environment may interact to influence children's behavioural patterns. Consequently, efforts to promote healthier lifestyles among children should extend beyond individual behaviour modification. Schools, families, communities, and relevant stakeholders should work collaboratively to create environments that provide equitable opportunities for physical activity and healthy eating across socioeconomic groups. Addressing these disparities may contribute to improved child well-being while supporting broader objectives of reducing health inequalities and promoting sustainable social development in Malaysia.

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