

Teachers' and parents' perspectives on the feasibility of a preschool-based behavioral intervention to prevent obesity: An embedded qualitative study within ToyBox Study Malaysia

Abstract

The aim of this qualitative study, an embedded component of ToyBox Study Malaysia (TSM), was to elicit the perspectives of teachers and parents regarding the implementation of TSM. TSM is a preschool-based behavioral intervention program aimed at improving healthy energy balance-related behaviors among young children attending preschools. The qualitative study adopted a descriptive-interpretive methodology, and triangulated data collected through semi-structured focus groups with artifacts collected. The setting involved rural and metropolitan preschools in Sarawak and Peninsular Malaysia, respectively. In Sarawak, 11 teachers and 20 parents from six intervention preschools participated in this study. In Peninsular Malaysia, 14 preschool teachers and 7 assistant teachers representing all 15 intervention preschools participated in the study. Data were analyzed thematically and four overarching themes were identified: impact of TSM on the children's knowledge and practices of healthy energy balance-related behaviors; spheres of influence upon the children's energy balance-related behaviors; constraints and affordances related to the implementation of TSM; and prospective sustainability of TSM. The triangulation of data from teachers, parents, and the artifacts related to TSM enabled the corroboration of evidence to support the themes identified. This study provides evidence on the reciprocal interactions between the teachers and parents who played key roles in facilitating behavioral change in the children, and the children who, in turn, served as change agents beyond the preschool. Furthermore, the mediational tools such as the TSM crockery and availability of healthy food and water led to the reported behavioral changes at both rural and metropolitan settings.

Keywords: preschool, obesity, healthy eating, physical activity, early care and education prevention, public health

Introduction

Childhood obesity is a global problem of the 21st century (World Health Organization [WHO], 2016). Being overweight and obese in children poses serious public health consequences and health related risks such as high blood pressure, high cholesterol, and Type 2 diabetes, psychological problems such as depression and anxiety, and antisocial risks such as bullying, stigma, and social isolation (Beck, 2016; Centers for Disease Control and Prevention, 2020).

Childhood obesity is also related to reduced academic performance (OECD, 2019). Healthy-weight children are more likely, compared with children who are obese, to attain greater educational grades in school (OECD, 2019). The trajectory of obesity begins early and becomes less malleable when children are older (Brown et al., 2019). Moreover, negative impacts of obesity in childhood track through into adulthood, thereby contributing to the greater risk of premature death and disability (WHO, 2020).

The global prevalence of childhood obesity is over 41 million in young children under the age 5 years (WHO, 2016). In Malaysia, the National Health and Morbidity Survey 2016 reported prevalence of overweight among children under five years of age in Sarawak, Kuala Lumpur and Selangor, respectively at 7.6%, 6.2% and 3.7% (Institute of Public Health [IPH], 2016). Another nation-wide survey, SEANUTS Malaysia, reported a higher prevalence of overweight/obesity at 16.0% and 17.1%, respectively among urban and rural preschoolers aged 4-6 years (Poh et al., 2013). The SEANUTS survey also found that young children had irregular mealtime habits with one in five children consuming snacks three times per day, and one in ten consuming fast foods more than once a week (Chong et al., 2016), while another study in Kuala Lumpur found that only 12.6% of preschoolers achieved physical activity and sedentary time recommendations, whereas thrice that number (38.7%) did not achieve either (Lee et al., 2021).

In line with this situation and the public health calls to prioritize the prevention of childhood obesity (OECD, 2019; WHO, 2020), early childhood is crucial for providing intervention programs. Furthermore, early childhood is a critical period for preventing obesity (Baur & Garnett, 2019), as although childhood obesity is known to be multifactorial (Ang et al., 2013), the genetic influences on adiposity are less important than environmental factors at this stage (Silventoinen et al., 2016) when habitual healthy eating and physical activity practices are being established (Brown et al., 2019; Ramos et al., 2020). Many nutrition and healthy lifestyle intervention programs for the younger age groups have been reported in Malaysia, including for primary school children (Koo et al., 2020) and adolescents (Ishak et al., 2020). However, to the best of our knowledge, until we planned the ToyBox Study Malaysia, there had been no previous reports of similar studies conducted among preschoolers in Malaysia.

ToyBox Study Malaysia

ToyBox Study Malaysia (TSM; <http://toybox-study.my/about-us.html>) was designed and implemented between 2017 and 2019. It was a collaboration between universities in the United Kingdom ([UK], University of Roehampton and Durham University) and Malaysia (Universiti Kebangsaan Malaysia and Universiti Malaysia Sarawak). TSM was based on the ToyBox Study (Manios et al., 2012, 2014), which was a large-scale behavior and lifestyle modification program involving six European countries and was designed to be a preschool-based and family-involved intervention. Given that no prior obesity prevention program aimed at preschool-aged children had been conducted in Malaysia, a feasibility study of the widely published ToyBox Study (e.g., Manios et al., 2012; 2014) was appropriate to ascertain its feasibility in the Malaysian context. Similar to the original ToyBox Study, the aim of TSM was to improve healthy energy balance-related behaviors among preschoolers (ages 4 to 6) by focusing specifically on four key targeted behaviors: (1) drinking water, (2) increasing

physical activity, (3) eating healthy snacks and meals, and (4) reducing sedentary behavior over a 24-week intervention (see Figure 1). TSM was conducted at government-funded preschools, which were managed by the Department of Community Development (KEMAS) under the Ministry of Rural Development, Malaysia.

[Figure 1 about here]

In order to conduct the feasibility study, the ToyBox Study original intervention materials were adapted to suit the Malaysian sociocultural and environmental context. Several meetings on adapting the materials attended by the project investigators were held between April and August 2017. The materials were translated into the Malaysian national language (i.e., Malay language). The participants in Sarawak comprised indigenous ethnic groups, such as Iban, Bidayuh, and Sarawak Malays, while the participants in Peninsular Malaysia were of Malay ethnicity. Therefore, the cultural, natural, and contextual diversity at the two sites comprising Sarawak and Peninsular Malaysia were considered to ensure that adaptations from the original ToyBox Study were suitable to these two locales. For example, the image of a character drinking from a glass while standing next to a tap was substituted with the same character drinking from bottled water as drinking boiled water is recommended in Malaysia.

A one-day Theory of Change (ToC) workshop, involving discussions with the key stakeholders (i.e., teachers, parents, KEMAS officers) was held across both sites in May 2017. The aim of the ToC workshop was to: (1) explore the perception of the participants on the issue of obesity; (2) identify the factors contributing to the success of implementation of TSM; and (3) discuss the potential barriers and solution to the implementation of TSM. From the ToC workshop, the perspectives of the participants regarding the practical aspects of the study and adapting the content of ToyBox Study to the Malaysian socio-cultural milieu were obtained and used to inform the training of teachers and the implementation of TSM. For

example, the stakeholders from Sarawak requested for the supply of filtered water and safe drinking water. Train the Teachers program was raised as an important implementation strategy.

Subsequently, a 2-day Training of Teachers (TOT) workshop was conducted in December 2017 at both sites by the investigators¹ to train the teachers from the intervention preschools on ways to embed the TSM program into the daily business-as-usual curriculum at the preschools (see Figure 2). The hands-on TOT workshop provided teachers with the ability to apply the four key targeted behaviors at the preschool. The teachers were trained regarding the TSM General Guidelines Module, which included information regarding the TSM program, ideas for using the TSM program at the preschool and at home, the implementation schedule during the school year, and suggestions for collaboration with parents. Additionally, the teachers were also provided with a Class Activity Guide module for each of the four key targeted behaviors. Each Class Activity Guide comprised three main sections: (1) Setting Environmental Changes at the Preschool, (2) Child Performing the Actual Behavior, and (3) Classroom Activities. For example, for the Eating and Snacking module, the Setting Environmental Changes provided teachers with tips on choosing the right serving size for the child; the Child Performing the Actual Behavior included tips on eating and snacking at the appropriate time, preparing food in an interesting way (see Figure 2), and involving children in the food preparation process; and the Classroom Activities included the Kangaroo and Friends stories, sensory perception games around eating, experiments, and ideas on excursions (see <http://toybox-study.my/about-us.html> for details).

[Figure 2 about here]

¹ The investigators had undergone a Train the Trainer workshop prior to running the TOT workshop.

In addition to the modules, the preschools were also provided with materials and equipment needed to conduct the TSM activities, such as kangaroo and animal hand puppets, balls, sensory games, water dispensers, child size cups, t-shirts for the children, and quarter-quarter-half plates (*suku-suku-separuh* in Malay [SSS]) (Authors, 2018; see Figure 3). Information sharing between the teachers and the researchers was supplemented via a free multiplatform messaging app (WhatsApp), which all the teachers had access to and could share evidence of activities that had taken place at the preschools. Outreach to parents were also incorporated through the use of nine newsletters, eight tip cards, and four posters, which the parents could implement reinforcement activities together with their children at home. With the top-down commitment of the management of KEMAS to the TSM program, all the teachers from the intervention preschools carried out the planned implementation. During the intervention period, each teacher from the intervention preschool filled in a monthly teacher logbook, which informed the fidelity² to the intervention.

[Figure 3 about here]

Towards the end of the intervention, an excursion was organized for the children to experience the outdoors (e.g., farm, park) and to relate with the real-life experiences in line with the four energy balanced-related behaviors. The parents were encouraged, via newsletters, tip cards, and personal communication between the teachers and the parents, to make environmental modifications at home, to become good role models, and to implement the healthy behaviors jointly with their children (Manios et al., 2012; 2014; Authors et al., 2018).

The feasibility of the adapted ToyBox Study program was evaluated through a pilot randomised controlled trial (RCT). This RCT compared the effects of the Toybox Study

² Details regarding the fidelity to intervention has been captured in the process evaluation documentation led by WLC.

program in preschools that participated in the experimental group in terms of the aforementioned four key energy balance-related behaviors and the business-as-usual preschools. The preschools in the experimental group received four weeks of each key behavior followed by two weeks of repetition amounting to 24 weeks of intervention in total (see Figure 1; Authors, 2018). The sequence of intervention was as follows: drinking water, physical activities, eating and snacking, and sedentary behavior. The teachers were encouraged to execute daily interactive classroom activities based on the training they had received and the comprehensive teacher's guide.

The effects of the intervention on children's health-related behaviors were measured at baseline and post-intervention. Measurements included children's height, weight and waist circumference (assessed using anthropometry), food intake (assessed with a food frequency questionnaire), and physical activity behavior (assessed using accelerometry), and teachers' and parents' feedback (questionnaire and focus group discussion – see Aim of the Study).

Aim of the Study

The aim of this qualitative study was to elicit, interpret, and analyze the teachers' and parents' perspectives about the implementation of the TSM program. The embedded qualitative study provided a secondary role in the TSM project, which was based primarily on quantitative data (Creswell, 2008). In particular, the perceptions of teachers and parents who were from two sites, namely Sarawak and Peninsular Malaysia, regarding their experiences, the impact of TSM on the children, and possible continued use of the program post-intervention, were investigated. It was anticipated that a better understanding of teacher, parent, and child experiences could help pave the way for future improvements, scale ups, and impact of TSM in other parts of Malaysia, within the school- and community-setting.

Methods

Design

A descriptive-interpretive qualitative methodology was adopted for this study (Creswell, 2008; Elliot & Timulak, 2021). Multiple semi-structured focus group discussions (FGDs) were conducted at post-intervention with various groups of preschool teachers and parents of the participating children. In addition, artifacts relating to the study were collected (see Collection of Artifacts).

Participants

Teachers, assistant teachers, and parents were recruited to this embedded study from preschools at which classes participated in the TSM intervention program. Prior to the commencement of the study, ethical approval was granted by the Human Research Ethics Committee of Universiti Malaysia Sarawak and the Research Ethics Committee of Universiti Kebangsaan Malaysia. Written informed consent was provided by all the participants prior to the FGD sessions.

Sampling strategy

There were a total of 9 focus groups. At the rural sites in Sarawak (Asajaya, Bau, and Lundu), the recruitment and data collection took place from 5 October to 15 November 2018. Given the sparse locality of the preschools, the interviewers (MA and GNJA) travelled to the preschools according to a planned schedule (i.e., one preschool per day). Six intervention preschools (out of 7), which represented the indigenous groups (Iban and Bidayuh), were recruited to participate in this study. One face-to-face FGD per preschool was conducted at the respective preschool. Each FGD was comprised of 1-3 preschool teacher(s) and 3-4 parents (housewives), who volunteered for the FGD (see Table 1). All FGDs were conducted in the Malay language, the mean duration was 25 minutes (range: 11-49 minutes).

At the urban sites in Peninsular Malaysia (Kuala Lumpur and Selangor), the recruitment and data collection took place on 30 November 2018. All 15 intervention preschools, comprising 14 teachers (out of 15 teachers; randomly divided into 2 FGD groups)

and 10 assistant teachers (1 FGD group), participated in the face-to-face FGDs (see Table 1); all FGDs were conducted in the Malay language, 45-60 minutes in duration, by YNH, ATR, and research assistants. In contrast to the Sarawak site, the urban Peninsular Malaysia FGD groups met at a meeting room in a central location. Due to time constraints, the working parents in Peninsular Malaysia were not included in the study (see Limitations).

[Insert Table 1 about here]

Procedure

A topic guide was adapted from Griffin et al. (2014) and tailored for the semi-structured FGD sessions (see Table 2). FGDs enable participants to feed off each other's ideas. The topic guide, which comprised 10 questions, focused on eliciting the perspectives of teachers and parents regarding the four key behavioral interventions: water drinking, physical activity, healthy eating and snacking, and reduction of sedentary behaviors and the possibility of the continued use of the program post-intervention. All semi-structured FGD data were voice recorded, transcribed verbatim, and anonymised immediately by the research assistants (MA and YNH) who conducted the FGD sessions.

[Insert Table 2 about here]

Collection of Artifacts

Artifacts, such as photographs and videos, of children's participation in the four healthy energy balance-related behaviors were compiled for data corroboration (See Figures 4-6). The compilation was made possible with the help of teachers who updated the researchers regularly through the WhatsApp groups; one group each for Sarawak, Kuala Lumpur, and Selangor. The project investigators across both sites then shared the evidence with the UK team. The artifacts enabled the investigators to monitor the outcome of TSM continuously during the intervention study.

[Insert Figures 4, 5 and 6 about here]

Data analysis

Data analysis from the FGDs was based on the qualitative data analytic framework by Braun and colleagues (2006; 2016), which involves six iterative phases: 1) Familiarize with the data, 2) Generate initial codes, 3) Identify themes, 4) Review the themes, 5) Define and name the themes, and 6) Produce the report. To ensure the trustworthiness of the data analysis, the approach detailed by Nowell et al. (2017) was adopted. The first author (JL) and the fourth author (YNH) independently read and re-read the transcripts from the Sarawak site and Peninsular Malaysia site, respectively, and then independently generated initial codes and searched for themes by using a data-driven approach. A word processing software, Microsoft Word 2016, was used for data analyses. Both authors (JL and YNH) then presented the qualitative data analyses to the UK and Malaysian research team for researcher triangulation and peer debriefing. There were common themes identified by JL and YNH. Subsequently, the first author reviewed the initial themes and had prolonged engagement with the data in its entirety; prepared coding labels and notes, and derived a coding framework. A combined approach to analysis was undertaken to enable the finalized themes to be identified inductively through the FGD data and deductively from existing literature on similar studies (e.g., Griffin et al., 2014). The process of refining, applying, and refining the analytical framework was repeated until no new codes were generated. The final analytical framework was applied to each FGD transcript. Data was charted using a matrix according to the themes using Microsoft Word. Potentially important and interesting quotes were highlighted for reporting purpose. After the final draft of the report had been prepared, the themes and sub-themes were vetted by the team members and a team consensus was reached after discussions³.

³ For the purpose of documenting the process evaluation of TSM, the second author [WLC] also independently read the FGD records and confirmed the themes that were extracted from the data.

Data triangulation

To strengthen the data analysis, we triangulated the FGD data (teachers from both sites and the parents from Sarawak) with the data from the artifacts (photographs and videos), which were collected over the course of the 24-week intervention program, to corroborate clear patterns of evidence regarding the preschool-based behavioral intervention. For example, FGD data on healthy eating and snacking was triangulated with photos of the preschoolers eating from the quarter-quarter-half plates (See Figure 3); FGD data on the teachers' active roles on water drinking behavior were triangulated with the evidence of the water stations prepared by the teachers (See Figure 4).

Results

Teacher characteristics are presented in Table 3. Based on the corroboration of data from the FGDs and evidence from the artifacts, 8 subthemes were identified and grouped into four major themes: (1) impact of TSM on the children's knowledge and practices of healthy energy balance-related behaviors; (2) spheres of influence upon the children's energy balance-related behaviors; (3) constraints and affordances related to the implementation of TSM; and (4) prospective sustainability of TSM in Malaysian preschools (see Table 4).

[Insert Table 3 about here]

[Insert Table 4 about here]

Theme 1: Impact of ToyBox Study Malaysia on the children's knowledge and practices of healthy energy balance-related behaviors

Sub-theme 1: Behavioral change among the children

One of the findings regarding the implementation of TSM that was reported by the teachers and Sarawak parents together with corroboration from artifacts was the children's behavioral change related to the four energy balance-related behaviors. The participants across both sites observed changes in the preschoolers' drinking behavior and preference for

boiled water instead of sugar-sweetened beverages. The impetus for drinking more water among the children was because water drinking is a key behavior targeted by the intervention and through the funded TSM project, water drinking stations and dispensers were distributed to the preschools (see Figure 5). Example quotes are presented below:

On a daily basis, they drink a lot of water; ever so frequently they drink water.

(Teacher 2)...They [the children] do not drink sweetened drinks and neither do they bring sweetened drinks. If they run out of water, they will go to the water dispenser and top up their water bottle. (Teacher 1) (FGD 1)

Before [ToyBox], the children always bring sweetened drinks to school...after following this program and after they were taught that they should drink water to quench their thirst. Now it is ok because all can follow and they are no longer bringing sweetened drinks to school. (Teacher 1, FGD 2)

Yes, there is a change [at home]...last time [my child] always drink gassy drinks and when [my child] comes home [my child] always drink bottled sweetened drinks but these days, seldom...always drink boiled water or milk. (Parent 2, FGD 4)

[The children did not need to be asked to drink water, they drink water by] themselves...initially we asked them to drink...definitely, at the initial stages, we always asked them to drink [water]...but later they themselves said... “Teacher, I want to drink...teacher I want to go and drink..” ...They will go and drink [water] automatically. (Teacher 1)...Although they brought their own water from home, but they will still drink water from the preschool. (Teacher 3)...Maybe the water [from school] tastes more delicious (all laugh). (Parent 1) (FGD 5)

From my previous experience, the kitchen was too far for the children to get the water, boiled water. Now ToyBox already sponsor, so no more “fighting,” there is water near [the classroom]. So the children are diligent in drinking water. (Assistant Teacher 4, FGD 9)

Similarly, the overall positive impact on physical activity behaviors was reported across both sites. The participants in Sarawak reported that the children had always been active and so did not have any problems in terms of physical activity while the participants in Peninsular Malaysia reported that there were changes in the active behaviors of the children from being inactive to becoming more active.

[Before and after ToyBox] in terms of activities, there is a lot of movement...when sitting down, they will move...so probably we could say that it is more or less the same...it is just that ToyBox is more about providing ideas regarding other activities. (Teacher 2)...Exposure to new activities. (Teacher 1) (FGD1)

[In terms of physical activities] They play more. (Parent 2 – 4, Grandmother)...They watch less TV...maybe they will watch certain stories...like cartoons...but to sit in front of the TV only, no...They prefer to play outside...ride bicycle outside. (Parent 2)...If my grandchild wants to play outside it is a bit difficult because of the big road...we need to be careful...we hear of kidnapping cases...my grandchild plays by himself inside the house. (Grandmother) (FGD 3)

For me, if we want to expose them to the excursion, that is the best...for real knowledge...we expose [them] to the outside world together with the animals and plants. (Teacher 1, FGD 4)

The participants also reported behavioral changes in the children's eating habits. The children became more willing to try new foods and they were less choosy. There was reduced consumption of unhealthy snacks such as salty snacks and increased intake of fresh fruits. The children knew that they should follow the serving size of the quarter-quarter-half plate. These encouraging behavioral changes in the daily practices related to eating healthy meals and snacks were reported across both sites.

After ToyBox, there are many changes. (Teacher 1) In the way they [the children] eat...before this, they were choosy. (Teacher 2) They did not like to eat vegetables. (Teacher 1)...They would pick out the vegetables and put it on the side of the plate. (Teacher 2) But now they know how to eat vegetables. All are ok except one child who does not eat vegetables. (Teacher 1)...[In terms of snacking] like chocolates and sweets, before ToyBox, we did not encourage it because it is already in the syllabus on balanced diet, so we have emphasized not taking sweets and anything that is sweetened are not encouraged, so it is not a problem even before ToyBox. (Teacher 1) (FGD 2)

Before [ToyBox, my child] did not know how to eat vegetables but now my child knows how to eat [vegetables]...already ok...some [vegetables my child] has never tasted but now already know how to try out...for example carrots and onions...[my child] knows how to eat. (Parent 2, FGD 4)

[After following the ToyBox program], they eat less snacks and more of healthy food. (Parent 1, FGD 6)

Ok. The children from not liking to eat vegetables to eating vegetables. Also, they eat more fruit according to the SSS plate. The teachers have to follow also although the teachers are not thin. (Teacher 4, FGD 8)

In terms of reducing sedentary behavior, there were also reported behavioral changes. The participants agreed that the children were naturally active, so there was less of a problem regarding sedentary behavior in comparison to food intakes and water drinking. Additionally, the children had the opportunity to learn more about the various flora and fauna while being active through an excursion that was planned for them toward the end of the intervention program.

The excursion...was the most fun...the most impactful...some of the children have never been exposed to the world out there...some of the children did not know about certain trees, but after we had explained to them, then they know. Like the previous excursion according to the theme...like the visit to get to know the local fruits and there was a visit to the mini zoo, so they get to see the animals they have never seen before...they get to see “live” and never touched the animals before...so they have the opportunity to touch the animals such as the rabbit and they were so excited about touching the rabbit...because before this they did not have the opportunity to do all that...they can smell the cow dung and they say “Eh, so smelly (laughter)...they asked “What is it? Soil or dung?”...so after the excursion according to the theme, when we go back to the theme and repeat [in class] about the excursion, they know...when I asked them “What is the color of the horse?”, they were able to answer “brown”...when a friend says “purple,” they say, “it is wrong, the color of a horse is brown and white only (all laugh)...they know already...so there is a lot of positive impact. (Teacher 1, FGD 1)

Now I notice that they watch less TV...they prefer to play. Previously, my child loves to watch TV but now they only watch TV for a while and then they go out to play. (Parent 1)...My child seldom watch [TV] these days. (Parent 2)...In school, it is the same...the most is five minutes and after that they will play. (Teacher 1)...Yes, they hardly sit still. (Teacher 2) (FGD 2)

The children who were not active became more active. They have more energy...of all the modules, the children love the [Sedentary module] because in the middle of some class work, I would say ok, let's take five, so we start jumping on the spot and also star jump. The children are cooperative. They really enjoy the activity. (Teacher 7, FGD 7)

Sub-theme 2: Influential roles of the mediational tools and contextualized learning

The TSM crockery such as the colourful quarter-quarter-half plates, cups, water bottles, and t-shirts served as mediational tools, which function to bring awareness regarding the action and the goals in relation to the tools (Gillespie & Zittoun, 2010). For example, the TSM cups brought more awareness to the children regarding healthy drinking habits. The quarter-quarter half plates helped the children to apply healthy eating habits; the specific compartments on the plate helped to ensure balance and moderation in food intake. These mediational tools seemed to motivate the children to drink and eat balanced meals.

Furthermore, the participants from Peninsular Malaysia reported that the drinking station and water dispenser that were placed within easy reach of the children enhanced the children's water drinking habit. The children did not have to wait for the water to be served nor did they need to go to the kitchen when they wanted to drink. This not only made water drinking easier for the children, it also eliminated the children's potential exposure to danger when they entered the kitchen unsupervised. The ToyBox quarter-quarter-half plate, however, may

have been more effective with the rural preschools than the urban preschools (see Theme 3: Constraints and affordances related to the implementation of ToyBox Study Malaysia).

Even in terms of eating, they also follow the SSS...[they] do not ask for more food. (Teacher 2)...they love the plate because it is colourful...and some of them choose certain colors...so we set [fix for them] because all the plates are the same...it is ok...that means that from the measurement of food, we can control for the children who are overweight. (Teacher 1) So yes, [they are able to control in terms of eating]. (Teacher 1 and Teacher 2) (FGD 1)

They [ToyBox team] provide water bottle to encourage them [the children] to drink boiled water. (Parent 2, FGD 3)

My child loves to wear the t-shirt every day. They [sic] are attracted by the kangaroo. (Parent 2, FGD 4)

Based on my experience, they love to eat from the [SSS] plate provided by ToyBox. I am N. They love it that we measure the food and fruits, so they are excited about eating. (Assistant Teacher 5)...I am S. Before [ToyBox] the children did not drink enough water. But after [ToyBox] they love to drink water, if one child drinks, all will follow. They love the SSS plate too because they are colourful. The girls usually want the pink color; the boys want the blue color. (Assistant Teacher 2, FGD 9)

Surprisingly, the teachers from Sarawak reported that the quarter-quarter-half plate could be used to increase the portion eaten by undernourished children in the rural locations. Furthermore, there were children who did not seem to change in terms of their eating habits.

From the food serving size aspect, because there are obese children, [we] can control their food intake, but there are also children who are undernourished, we have to double the SSS portion. (Teacher 2) However, there are children who reject food from the beginning until now. From before the [ToyBox] program began until after the [ToyBox] program ended; it is still the same. (Teacher 1) (FGD 1)

Sub-theme 3: Extended influence of ToyBox Study Malaysia from school to home: children as change agents

The participants from both sites acknowledged the influence of TSM not only on the children but also their families. The children demonstrated their ability to be change agents when they encouraged siblings and family members to drink water at home. The children loved the quarter-quarter-half plate so much they also use the concept of the quarter-quarter-half plate at home and encourage their family members to use the quarter-quarter-half plate concept and the water bottle. Through the children, the relatives and siblings at the villages (Sarawak site) became attracted to the ToyBox concept. Furthermore, the children taught parents not to eat sweetened cereal. These aforementioned observations and the following interview excerpts as reported by teachers and parents illustrate the TSM children's influential role as change agents on other family members beyond the preschool setting to the home environment. Thus, young children were the key transmitters of school-based behavioral programs on obesity prevention and they were capable of helping their families adopt healthier energy balance-related behaviors. Furthermore, the children's role as change agents fostered the parents' role in reinforcing and supporting healthy behaviors at home.

There is the baby plate, like the SSS [plate], my child uses that plate at home...something like the SSS [plate]. (Parent 3, FGD 1)

My nephew from another school said “Auntie, I would also like to follow the [ToyBox] program...[I] want the same bottle...the bag too...[He asked] “Why did my teacher not give me?” (Parent 4, FGD 1)

Yes, from the aspect of the activities...because it was suitable, they [the children] enjoyed doing the activities...even when they returned home, they wanted to do the same activities that was conducted by the ToyBox people at school...my child taught his sister at home and asked her to boil water. (Parent 1, FGD 2)

[At home] my child tells me don't eat this...[you] will get fat. (Parent 2, FGD 4)

Really influence [other siblings]...like his younger sibling sees the brother drink lots of water, the younger sibling also want to follow suit...he starts to follow...and he also does not play much [electronic gadgets] ...he likes to play outside...he follows his brother. (Parent 2) My child drinks a lot of water at home and invites his sister and brothers to do the same. (Parent 3) It is really obvious...he will take some water for his younger brother...using his own bottle...he follows how his teacher does it. (Parent 1) (FGD 5)

We prepared sandwiches that attracted the children's attention. After they had gone home, parents would ask, “What did you teach last night? Because the child asked the parents to buy bread and carrot and all that because they want to give...they want to try at home. So we can see that there is cooperation from the parents. Praise God, but there are some things that we did not get the cooperation of the parents...but it is ok...they know about nutrition and about the food pyramid. (Teacher 4, FGD 8)

Theme 2: Spheres of influence upon the children's energy balance-related behaviors

Sub-theme 4: Teachers' role in influencing healthy behaviors

Teachers appeared to play a key role in fostering the children's four key targeted behaviors of the TSM program. The teachers were strict with the children by not allowing them to bring sugar-sweetened beverages and food to school. The teachers also controlled the children's food intake (portion size and balance meal) during meal time. They also reminded parents not to allow children to bring sugar-sweetened beverages and fried foods to the preschool. Furthermore, the teachers came up with creative ways to overcome the challenges of the picky eaters. For example, the teachers used creative food presentation to entice the children to finish their food. There was evidence that teachers from Peninsular Malaysia used their influential roles to encourage parents' participation in the TSM program and to play their part to reinforce those four behaviors at home by sharing interesting food presentation photos of sandwiches and fruits through the Whatsapp group.

So it is our role as teachers to give the undernourished children more food to eat...we will ask them to eat more...and if they do not want, we cannot do anything...and secondly in terms of the awareness of parents...this program is not only conducted at the preschool, but also at home it should be practiced...meaning that the parents should have the awareness about food intake...don't give too much processed food and don't give too much oily food to the obese [children]...for the undernourished, in order to tackle it, maybe [we] have to use other approach...meaning that [we] need to introduce the healthy eating [concept]...for example, at the beginning of the year, parents will allow their children to bring sweetened drinks, but we will throw, and replace it with mineral water. That is our role as teachers to let parents know what we do at the preschool and what parents need to know that we do at the preschool...practice how it is done...for more seasoned parents, they know and we

remind the parents not to allow their children to bring sweetened drinks. (Teacher 1, FGD 1)

The teachers are the role models of the children...what they say, the children will follow because they believe what the teachers say more than what the parents say. For example, when teachers ask the children to drink boiled water. That is just one example. (Parent 2, FGD 3)

We can only control them [their food intake] in school only...that is why I emphasize right from the beginning of the year that [they] cannot bring sweetened drinks and unhealthy snacks...that is all...and the parents already know that [they] cannot pack any [such] food for the children...if there is, the teacher will take [from the children]. (Teacher 1, FGD 5)

We prepared the sandwiches in the shape of human and then we sent the photos to the parents. They were so excited about the ToyBox program and they really like it. (Teacher 1, FGD 8)

Most of the time, I involve the parents. I tell them about what we were learning for the week, such as fruits and vegetables. So, they bring the vegetables. It does not matter what type of vegetables. We introduce the vegetables to the children; apart from activities, we prepare vegetable soup. All the children will cut up the vegetables. We will handle the hot stuff. I place the rice cooker where it is reachable. All will take part to cook the soup. Even though they do not like vegetables, once the soup is cooked, the

children will take the food because they have participated in the cooking activity.

(Teacher 5, FGD 8)

Ok, based on my experience. First, before this [ToyBox program], when we teach, we did not even prepare an area like a station for them to drink. So when we have the ToyBox experience, we put in the effort to prepare a water station for the children. So, from my experience, I arrange the cups and healthy snacks. This is my experience. The children also have their own experience because in the class, there was a place to drink, but it was not as beautiful as what ToyBox gave to us. This is my experience with the Water Drinking module. (Teacher 1, FGD 8)

Sub-theme 5: Parents' role in reinforcing healthy behaviors

The perspectives of parents were elicited for the Sarawak FGDs. Although the Peninsular Malaysia parents were not part of the FGDs, the teachers reported their observation of parents' role in reinforcing healthy behaviors. Some parents from Sarawak reported that they tried to actively align the home practices with what was taught in the preschool as their children began to want similar practices at home (e.g., buy vegetables and fruits for consumption at home). Teachers from both sites acknowledged the important roles of parents in reinforcing healthy practices. The parents were reported to have taken part in reinforcing their children's healthy behaviors at home. Regarding the Peninsular Malaysia (urban) parents, the teachers reported that parents cooperated by buying vegetables for the school activities and they also bought ingredients for meal preparation at home as requested by their children. According to the teachers from the urban site, not all parents, however, have the awareness regarding healthy food intake. Interestingly, when asked whether the mothers assisted or influenced their children to prevent obesity, a mother from Sarawak reported that it was her child who taught her about eating cereal with reduced sugar.

For me, [it is] my child who teaches me. Like if the cereal is too sweet after adding sugar, he will say it is too sweet and request for the cereal to be less sweet just like how his teacher tells him in school. (Parent 4, FGD 1)

[Our role as mothers is to]...take care of food intake...if at home, if they want to eat, I will give...I will ask them first because if they have already eaten at school, they do not want to eat at home. (Parent 3)...If it is my child,...I notice that if he drinks, one cup of water is not enough...my child needs two cups [of water]. (Parent 1)...I do not let my child eat chocolates or sweetened foods. (Parent 2)...If my child wants to drink sweetened drinks, I will give colored drinks for taste only. (Parent 1, FGD 2)

[In terms of snacking], there is change...and sweets, that has stopped...just that crackers, ice-cream have reduced a little bit...I do not want to give...don't want to practice that thing... (Parent 2, FGD 4)

Eating unhealthy snacks...less than usual...it is allowed only during weekends...weekdays [they are] not allowed. (Parent 1, FGD 5)

Some parents who have the awareness want to follow the program, some do not want to follow the program. Actually, they are lazy to fill in the questionnaire. (Teacher 4)
Another parents, [about] wearing the accelerometry, they immediately say no [to participate in TSM]. (Teacher 6) Actually, wearing the accelerometry is not the problem, rather filling the questionnaire is. (Teacher 3, FGD 8)

Theme 3: Constraints and affordances related to the implementation of ToyBox Study Malaysia

Across both sites, the participants reported that there were constraints in terms of space for physical activity and for the movement break activities within the ToyBox sedentary program. Additionally, the kangaroo stories, which highlights the key behaviors provided in each guide book, were reported by the teachers from Sarawak to be difficult for the children because they had limited reading skills. The participants suggested that future improvements should include simpler stories and using picture prompts for children to interpret the stories. On the other hand, the teachers from Peninsular Malaysia reported that they had improvised the stories to be presented by using hand puppets and animated voices to creatively retell the story. The teachers (from Sarawak) also reported that some games with hard materials were unsuitable. Children cried when they were running and were hit by their friends with the cardboard rolls. In terms of equipment, there were mixed findings. Teachers from 3 out of 6 Sarawak preschools reported that certain equipment for physical activity was insufficient and the teachers requested for items such as cones, big balls, and hula hoops, which the preschools were supplied with previously, but had ceased receiving due to budget cuts. Unique to the Peninsular Malaysia site was the teachers' perception that the quarter-quarter-half plate was too small for the children, in particular for the 5 to 6-year-old preschoolers.

Sub-theme 6: Constraints: space constraints, difficult stories, and unsuitable games

[This program] is suitable to be included in the syllabus at KEMAS...at least we have ideas about the types of activities we can run...yes, agree [that this program should be included into the KEMAS activities] because like now we are not given any sports equipment...if before there was supply of hula hoops...but now, not at all because of budget allocation...so with the materials from ToyBox at least we now have the materials that we can use with the children...so it is like having sports equipment in the school. (Teacher 1, FGD 1)

All the [equipment] is enough...more than enough. (Teacher 2)...But actually, the hula hoops are also needed for the children...and the cones because it can be used for other activities. (Teacher 1)...The hula hoops, we used to push the hula hoop with the hand around the field and all that but now it is difficult because of the limited space for physical activities...for certain physical activities, there is really a limitation in terms of space. (Teacher 2) ...Yes, [it is the problem with space to run the program]. (All)...Like now, we have to stop certain activities because the space is not available, so more towards light activities like playing board games and easy activities...such as dancing and singing...also need to change the materials, use softer materials like I have mentioned before, use softer materials...if possible, use materials that are thinner...like foam. (Teacher 1, FGD 1)

*The [kangaroo] stories are too long...so [it was] very difficult...(Teacher 2)
Yes...because [the children's] reading skills are still lacking. (Teacher 1, FGD 1)*

Like the activities, the equipment that were provided really helped in the movement activities of the children...because the items that were provided were suitable for our activities...in terms of the equipment, this my suggestion, like the basketball is still not enough...I had requested for cones...big balls...hula hoops...basketballs. (Teacher 2, FGD 2).

So far there are more advantages for us to see their physical, mental, and creativity...in terms of weaknesses, I think there are no major constraints except that there are insufficient materials for the activities...that is all. (Teacher, FGD 4)

I have one problem. My class is too small. There is lack of space for me to do the activity. So if I want to carry out the activity, I have to move the chairs and tables. That is the problem that I face. (Teacher 1, FGD 8)

The [SSS plate] is too small. It seems very small. The plate is not suitable. When we place the food [in the SSS plate], it gets messy when they eat. I only use the [SSS plate] for certain menus. For soups, I do not use the [SSS plate]. So we put only a little bit in the plate. If there is more food, then the food would spill. If it is for noodles, then it is fine, but for rice, it might be messy. The [SSS plate] for the 3 to 4 year-old [children] is fine. When [the children] are 5 to 6 years old, their hands become bigger and it [SSS plate] is not suitable for them. Initially, it is messy but after training them, they know. They will just take a little bit of food. We can control the food, but they are allowed to add more. I tell them that it is ok, take a little bit first, then you can add some more. Then they know, so there is no mess, they can control. That is why we say that the plate is too small for eating. (Teacher 8, FGD 7)

Sub-theme 7: Affordances: materials, activities, and easy integration of ToyBox into the existing curriculum

In terms of the affordances, the participants reported that the water dispenser was a great help to the teachers. Furthermore, the water station and materials attracted the attention of the children. The quarter-quarter half plates were also useful for regulating the amount of food consumed and tailored to the needs of the child. The materials were helpful and the activities were practical and became routine exercise for the children. The TSM program was easily integrated into the school curricular (30 minutes). The teachers also reported that the tip cards and bulletins for parents were useful.

In terms of the activities, like the equipment provided helps a lot in the movement activities for the children...because the materials that are provided are suitable for their activities. (Teacher 2, FGD 2)

Because...there is the bulletin...so that can help parents to better understand this program. (Teacher, FGD 3)

[In terms of the equipment] definitely the equipment is enough. (Teacher 1) Thank you because of the equipment...really grateful because [we were] given the equipment. (Teacher 3) [The equipment] is all ok...because the things are according to the standard of the children...there are no sharp items. (Teacher 1) (FGD 5)

[The program takes 30 minutes] is ok for us. (Parent 3) Actually, the activities are similar to our syllabus...that is why there is no problem to implement this program. It helps actually. (Teacher, FGD6)

For the Water Drinking module...the children were attracted to the [water] cooler, because we have placed the cups...so they drink frequently and so they wanted to go to the toilet very often. From a positive aspect, it is good that they like to drink water. However, the negative aspect, we felt that frequent water drinking was disruptive to the teaching and learning process. (Teacher 8, FGD 7)

Theme 4: Prospective sustainability of ToyBox Study Malaysia

Overall, the teachers reported that the TSM program did not disturb the learning process of the traditional curricular. The teachers and parents (Sarawak site) agreed that TSM should be included in the KEMAS syllabus. However, the Peninsular Malaysia teachers

expressed their concern that their preschools should be provided with sufficient equipment and materials to carry out the program post-intervention. The following promising aspects of TSM were reported by the participants across both sites.

Sub-theme 8: Preliminary indicators of sustainability

[This project]... it should continue (Parent 1)...we don't mind. (Parent 1-3)...it is up to the ToyBox team...as long as ToyBox wants to continue. (Teacher)...If I am the head of KEMAS, I would definitely like to continue because there are a lot of free things. (Assistant Teacher)... [I] agree [that TSM be included in the syllabus because] there a lot of advantages and can help in the children's activities. (Teacher, FGD 2)

[When the program has ended, should continue the program because] if the ToyBox team and the [KEMAS] higher management agree, we will be very honoured...there is no problem...because the program is not a burden...the program is not a burden to us as teachers...except we need to record in the thick book-that is a burden and we need to provide a report every week...because the activity is already in the KEMAS activities...so the [TSM] program can be embedded into the syllabus and it is not a burden for us. (Teacher)...[if the Ministry of Education includes the program in the syllabus], we agree. (Teacher and Parents, FGD 6)

Discussion

The aim of this qualitative study was to elicit the perspectives of teachers and parents regarding the implementation of TSM across Sarawak and Peninsular Malaysia. Overall, the teachers acknowledged the benefits of the TSM preschool-based program, in particular for the children and their families, and their own roles and responsibilities in carrying out the activities and having partnerships with parents while carrying out the program. The teachers served as role models and authoritative voices, which provided the children with the

knowledge to enact the four key energy balance-related behaviors of the intervention. The teachers also played influential roles on the parents through continuous communication. The perspectives of the teachers provided evidence that the program has the potential to foster positive healthy energy balance-related behaviors among the preschoolers through buy-in from both the teachers and the parents (Natale et al., 2014).

The findings from this study suggest there was home-school collaboration, with the parents also taking active roles in reinforcing their children's new knowledge and behavior with regards to drinking water, increasing physical activity, eating healthy snacks and meals, and reducing sedentary behavior.

Moreover, the children played the role of change agents by influencing their family members to also adopt the four energy balance-related behaviors at home. At the Sarawak site, being close-knit village communities, the study revealed that the children could influence siblings and other relatives from the village to adopt new healthy lifestyles. Even though the children were very young, they could convince their family to reduce the levels of sweetness in foods just like how it was practiced at the preschool.

The mediational tools introduced by the researchers in the ToyBox program, such as the colorful and memorable quarter-quarter-half plate, water bottle, cups, and water dispenser, supports the long-held child development theories by Jean Piaget and Lev Vygotsky that concrete representations can help learners understand and internalize concepts learned (Darling-Hammond, 2019; John-Steiner & Mahn, 1996; Vygotsky, 1978). Our study supports Vygotsky's theory on the role of mediational tools in helping the children to internalize new ideas and concepts (Vygotsky, 1978). The quarter-quarter-half plate demonstrated promising utility in preventing overeating among the children. This suggests that the plate, as a mediational tool, served to regulate the portions consumed. Surprisingly, the teachers at the Sarawak site thought that the plate could alternatively be used to increase

the food portions of under-nourished children in the rural areas, which might be important given that 22% of children in Malaysia are stunted and this proportion has been increasing (IPH, 2019). Overall, these findings suggest that childhood obesity prevention and intervention programs should tailor their interventions according to the educational philosophical underpinnings such as the cognitive development of preschoolers (Brouse & Chow, 2009).

The teacher training offered by TSM appeared to increase the impact of the intervention, as many teachers reported that the majority of the children were attracted to the creatively plated food and overcame food fussiness and food neophobia (Smith et al., 2016). The teachers put in effort to practice their new knowledge, including role modelling, which led to the children being willing to try new foods and to engage in the cooking activity. These educational experiences provided the necessary scaffolding and enculturation towards foods that children disliked. The practical cooking aspects, including preparation and eating the vegetables that the children typically avoided, became an enjoyable collaborative activity. The active engagement of the children in food preparation is an important aspect of behavioral change intervention. Furthermore, the influence of ToyBox concepts from the school to the home are encouraging, supporting the promotion of healthy lifestyles through active participation of teachers and schools (Clarke et al., 2015), which holds promise for extended influence from the school to the home given the child's role as a change agent (Bresee et al., 2016; Jakobovich et al., 2019; Milakovich et al., 2018).

Overall, these findings can be closely mapped to the Social Cognitive Theory (SCT), which describes human behavior as a result of dynamic interactions between personal, behavioral, and environmental factors (Knol et al., 2016). The present study revealed that the reciprocal interactions between the personal (teachers' roles and sense of responsibility), behavioral (children's knowledge and practices), and environmental (mediational tools,

parental support, and availability of fruits, vegetables, and water⁴) factors led to the reported behavioral changes which started at the preschool and extended to the home through three key stakeholders, namely the teachers, children, and their parents, in the TSM preschool-based study. Taking water drinking as an example; according to the teachers, they were able to guide the children in reducing the consumption of sugar-sweetened beverages; this influential role of the teachers was made possible with the availability of drinking water and accessibility of a water station that was placed within reach by the children in the classroom; the children helped themselves to the water whenever they wanted to drink water; they independently filled up their ToyBox water bottles, which served as a mediational tool; and the teacher and parent FGD data revealed their support for water drinking. Thus, the dynamic interaction between the personal, behavioral, and environmental factors fostered healthy behavior of water drinking in children.

One threat to the success of the implementation was space constraints, but the teachers were able to modify the activities so that it could be conducted within the limited space available. Moreover, while the TSM materials such as puppets, ideas, equipment for active and fun games were useful, the teachers opined that the equipment was insufficient. As part of the program implementation, the teachers were expected to make modifications to the classroom environment (Authors et al., 2018), which is a balancing act of ensuring the validity and reliability of the program implementation in the midst of constraints. However, it is beyond the scope of the present study to assess the impact of the constraints on the fidelity,

⁴ The availability of fruits, vegetables, and water was an improvement of what had been traditionally available at the preschools and was emphasized more during the TSM study. For example, there were disparities in the availability of water at the preschools. Some preschools in Sarawak lacked basic resources such as clean tap water. With the introduction of TSM, these basic resources became more readily available (e.g., after filtered water and water dispensers were distributed to the preschools). Furthermore, the ToyBox module emphasized water drinking instead of sugar-sweetened beverages.

validity, and reliability of the program implementation. Ultimately, both researchers and school authorities need to be sensitive to the constraints faced by the teachers so that similar programs can be more successful in the future.

Limitations and Future Directions

The focus group discussions with the participants at both sites have important limitations. The participants at the Sarawak site were comprised of teachers and mothers in the same focus group per preschool, due to limited time and resources, and so may have prevented more candid answers from both parties. On the other hand, in the urban locale of Peninsular Malaysia, working parents were not invited to the focus group discussions, which may have limited the perspectives of parents from the metropolitan locations. The different duration of interviews for both rural and urban settings was unanticipated; this difference could be attributed to more participants per FGD at the Peninsular Malaysia site and their more verbose explanations. Overall, the duration of the interviews that differed across both sites did not negatively impact data collection. Although both sites shared substantial common findings, there were nuanced differences, such as the lifestyles of the parents (i.e., stay-home mothers in the rural areas versus working mothers in the urban areas), which require more in-depth qualitative studies including ethnographic methodology to ascertain the long-term sustainability of intervention programs such as TSM. The voices of fathers at both sites were notably absent. Despite these limitations, the participants from both sites shed light on the areas of success and improvements for the further implementation of TSM. Future directions for this and similar studies could include examining the triarchic roles of children, peers, teachers, and parents as mutual change agents of healthy energy balance-related behaviors within the preschool and beyond. It is also warranted that future studies examine the impact of implementation constraints on the fidelity, validity, and reliability of the overall program. Finally, while the teachers and Sarawak parents reported their openness and desire

for the possible sustainability of the ToyBox practices post-intervention, the maintenance of knowledge and practices and sustainability at both rural and metropolitan sites, both of which have similar yet nuanced sociocultural differences, warrants investigations (Herlitz et al., 2020).

Conclusion

This embedded qualitative study, which served as a secondary role in the ToyBox Study Malaysia project, has contributed to the evidence base on a deeper understanding of the implementation of ToyBox concepts across two sites with different demography, locale, and sociocultural characteristics. Key stakeholders such as teachers and parents were included in the focus group discussions. Their perspectives provided favorable support that the TSM preschool-based behavioral intervention demonstrated impact in the knowledge and practices regarding energy balance-related behaviors. The study findings are valuable in allowing teachers' and parents' views to inform the design of future early childhood health promotion programs such as ensuring that sufficient and suitable materials including physical space for the activities are included in the program planning. The nuanced differences across both rural and urban sites suggest that the voices of teachers and parents provide crucial insights into the purposeful planning and implementation of similar programs in the future and program implementers should be cognizant of the sociocultural and demographic diversity of participants. Overall, the findings suggest that TSM is a promising early prevention and intervention program for empowering teachers, children, and parents and fostering healthy energy balance-related behaviors in a collaborative manner from the school to the home and vice-versa.

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