

Effectiveness of *ToyBox* Intervention to Reduce Sedentary Behaviour among Pre-school Children: A Case in Malaysia

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ABSTRACT

Children have been found to spend more time on gadgets in learning and passing leisure time especially in the era of this new millennium. Besides, modern parents also claim that gadgets possess additional education function for children in acquiring new information. Nonetheless, on the flip side of using gadgets, little is known about the intervention in reducing sedentary behaviour, which mainly refers to prolonged sitting, especially among pre-schoolers. Thus, the present study investigates the effectiveness of *ToyBox* intervention in Malaysia to reduce sedentary behaviour among pre-schoolers (n = 281) via primary caregivers' self-reports. In addition, the Mann Whitney U test displayed significant variances between the experimental group and the control group in reducing sedentary behaviour among five-year-old and six-year-old pre-schoolers. Besides, the Wilcoxon Signed-Rank Test revealed significant differences in the experimental group before and after treatments among four-year-olds, five-year-olds, and six-year-old pre-schoolers. Interestingly, Split-plot ANOVA analysis showed that the interaction terms of groups and treatment were significant, where the treatment for experimental groups was significantly lower in sedentary behaviour after treatment. As a result, the *ToyBox* intervention in Malaysia is indeed a promising intervention to reduce sedentary behaviour among pre-schoolers.

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INTRODUCTION

The traditional setting for children's play, either at home or at a childcare setting has undergone several primary changes among the new millennials. Back in the 90s, children were engaged actively in outdoor activities and played traditional toys. Meanwhile, in this new digital age, gadgets are accessible for all ages. Children's play activities have transformed from outdoor physical time to indoor screen time. In fact, younger children are performing better in tapping and swiping when consumed in tablets or mobile phones instead of writing, colouring, arranging blocks or sharing toys with peers. For instance, a whopping 98% of parents in Southeast Asia allow children aged three to eight to use devices (the Asian Parent Insight, 2014). This scenario illustrates that the children's play world is influenced by adults (Kernan, 2007), whereby adults agree that screen viewing has helped improve children in learning, and more importantly, to keep them silent.

As such, sedentary lifestyle among children is on the rise. Children, at present times, play gadgets in sitting or lying position and are engaged in sedentary behaviour, where physical activities are lacking (Dan, Mohd Nasir, & Zalilah, 2011; He, Piche, Beynon, Kurtz, & Harris, 2011; Keating, 2011;). Moreover, it has been claimed that sedentary behaviour may cause obesity behavioural issues (Manios, et al., 2012; Ramirez, et al., 2011; Sharifah, Nur Hana, Ruzita, Roslee, & Reilly, 2011), and drop in academic achievement

(Tremblay, et al., 2011). In fact, sedentary lifestyles and physical inactivity along with increased access to junk food and drinks can be considered as major risk factor for obesity among young children. According to reports from the National Health Morbidity Survey (2015), more than 7% of children in Malaysia under the age of five can be identified as overweight. The overall prevalence of obesity among children below the age of 18 years in Malaysia was reported to be 30%, with Perlis and Melaka having the highest prevalence rate of 36%. Furthermore, urban areas were reported to have high prevalence rate (31%) compared to rural areas (29%). One of the possible explanation for the differences in obesity prevalence among urban and rural areas could be sedentary lifestyle adopted by people in urban areas. Obesity can seriously affect a child's development, overall health, and quality of life, and can lead to further health related complications such as asthma, cardio-vascular problems, Type 2 diabetes, and sleeping disorders. As sedentary lifestyle is considered one of the most important causal factors related to obesity among children, therefore, it is necessary to intervene and make systematic efforts to improve the quality of life of young children by encouraging an active lifestyle.

On the other hand, as for childcare setting, Haelle (2015) reported that physical activities engaged by pre-schoolers had dramatically decreased and they had been found to be no longer active within recent years. Most of the time, they listened to

their teachers in sitting position and lacked physical interaction with peers. Furthermore, in line with the statistics concerning gadget use, sedentary habits are rampant because children prefer sitting down to perform their daily activities. Hence, in order to prevent these negative consequences, there is a dire need to introduce intervention to promote healthy living, especially for those who hate exercising and love indulging in screen time (Alatraqchi et al., (2014).

Indeed, several interventions targeted to reduce screen time have been established (Bergh et al., 2014; Dwyer et al., 2013; Finch et al., 2014; Manios et al., 2012; Salmon, 2010). Some interventions have targeted parents (Birken et al., 2012; Haines et al., 2013) while others involved both parents and children (Carson et al., 2013; Verloigne et al, 2012). On the other hand, a few classroom interventions only focused on children, and teachers were encouraged to be instrumental in providing these interventions. With that, the *ToyBox* (Manios et al., 2014) is one of the most systematic interventions that has focused upon preschool children in their classroom setting by involving teachers to reduce sedentary behaviour. The original *ToyBox* was developed to build and to evaluate a cost-effective kindergarten-based, family-involved intervention scheme, in order to prevent obesity in early childhood in Europe. Besides, the *ToyBox* involved ten European countries (Greece, Germany, Belgium, the Netherlands, Spain, Norway, UK, Poland, Bulgaria, and Luxembourg) and it was coordinated by Yannis Manios

from Harokopio University. The manual consisted of drinking water, physical activity, eating and snacking, and sedentary behaviour. Nonetheless, this present study only adopted the sedentary behaviour manual, which is relevant to the objectives set, after permission was granted by the pioneer to conduct a test in Malaysia.

The intervention mapping protocol (IMP) is a systematic evidence-based protocol for preschools from *ToyBox* intervention. IMP practices are designed to reduce sedentary behaviour among pre-schoolers (De Decker et al., 2014). In fact, six steps are incorporated: 1) conducting needs assessment, 2) preparing matrices of change objectives, 3) selecting theory-informed intervention methods and practical strategies, 4) producing intervention components and materials, 5) planning programme adoption and implementation, and 6) evaluation planning. This six-step guide explains the need and the importance of conducting intervention. This protocol also helps to plan and evaluate the effectiveness of certain treatment in reducing sedentary behaviour, especially among pre-schoolers.

Hence, after determining the need for treatment to reduce sedentary behaviour via *ToyBox* intervention, the present study examined the following: 1) before and after the experiment between the experimental groups and control groups in sedentary behaviour among 4-, 5-, and 6-year-old pre-schoolers, as well as 2) before and after the treatment between experimental groups

and control groups among 4-, 5-, and 6-year-old pre-schoolers. As such, the following hypotheses were formed:

- H1a: There is insignificant difference between the experimental groups and control groups in their level of sedentary behaviour among 4-, 5-, and 6-year-old pre-schoolers before the treatment.
- H1b: There are significant differences between the experimental groups and control groups in their level of sedentary behaviour among 4-, 5-, and 6-year-old pre-schoolers after the treatment.
- H2a: There is significant difference before and after the treatment within the experimental groups among 4-, 5-, and 6-year-old pre-schoolers.
- H2b: There is insignificant difference before and after the treatment within the control groups among 4-, 5-, and 6-year-old pre-schoolers.
- H3a: There are significant interaction effects before and after the treatment for experimental groups.

METHODS

The present study applied true experiment pre-test and post-test design after considering the availability, advantages, and disadvantages of experimental design. According to Creswell (2014),

true experiments are the most powerful experimental designs in research due to the randomly assigned participants to experiment and control groups equally to reduce potential threats (Campbell & Stanley, 1963).

Participants

As suggested by Schulz and Grimes (2005), by using type I error of 0.05 and power of 0.80, it is usually acceptable to apply in randomization, where 200 is acceptable for sample size. As a result, the sample size for pre-schoolers in the present study (n = 281) were well beyond the total estimated in the intervention. Table 1 shows the demographic of pre-schoolers and Table 2 shows the demographic of a total of 42 pre-school teachers. Recruitment of participants took place from October 2015 until December 2015. Besides, the following criteria were set to select the pre-schoolers as participants: 1) they were free from participating in any other clinical trial or other health-oriented project during the academic years (2015-2016) to prevent bias during intervention, 2) pre-schoolers' participation rate was calculated, whereby if the participation rate was lower than 50%, the pre-schooler(s) would be excluded from the study, and 3) the ratio for teacher and pre-schoolers is 1:25 in a class (Heng, 2008).

Table 1
Demographic variables of pre-schoolers

Variables	Experimental group		Control group	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Gender				
Male	66	47.8	65	45.5
Female	72	52.2	78	54.5
Age				
4-year-old	46	33.3	53	37.1
5-year-old	45	32.6	50	35.0
6-year-old	47	34.1	40	28.2
Total	138	100	143	100

Measures

Primary Caregiver Questionnaire (PCQ).

Sedentary behaviour was measured by using subjective measurement (PCQ, self-report with 15 items) from primary caregivers in order to understand screen based-sedentary behaviour at home. The measurement scales for each item ranged from 1 (strongly disagree) to 5 (strongly agree). Besides, the pre- and post-tests were evaluated by the primary caregivers. Cronbach's Alpha in the present study was .60 and is acceptable in psychology (Loewenthal, 2004). The rule of thumb of acceptable Cronbach's Alpha values, according to George and Mallery (2003), is below .50.

Table 2
Demographic variables of preschools' teachers

Variables	Frequency (N)	Percentage (%)
Gender		
Male	6	14.3
Female	36	85.7
Age		
20-25	8	19.0
26-31	20	47.6
32-37	10	23.8
38-43	2	4.8
44-49	2	4.8
Education Level		
SPM	15	35.7
STPM	2	4.8
Diploma	14	33.3
Degree	11	26.2
Total	42	100

ToyBox Intervention. The *ToyBox* intervention (Manios et al., 2012) was adopted as a series of game-based approach with involvement of teachers to reduce sedentary behaviour among pre-schoolers. It is a reliable intervention as it has been tested in ten Europe countries (Belgium,

Bulgaria, Germany, Greece, Poland, Spain, the Netherlands, Norway, UK and Luxembourg). As such, the intervention was approved by Manios et al. (2012) to be replicated in Malaysia. There were two types of movement breaks which were involved: 1) short movement breaks (1-5

minutes), and 2) long movement breaks (15 – 30 minutes). Short movement breaks comprise seven types of games, which are intended to break sedentary lifestyle and to help improve the interactions between pre-schoolers. First, the spin the wheel is compulsory for every morning before class starts. This is to generate an active mode before pre-schoolers learn something new. The second game is playing after two lessons of class. Teachers can choose any

game from the classroom guideline (refer Table 3).

Long movement breaks consist of four types of movements to introduce the benefits of playing fun games as a substitute to gadget use. Pre-schoolers are asked to provide their opinions about gadget use and how they plan to reduce the usage at home. Teachers explain the benefits of physical activity instead of screen time, and token (sticker) is given if the pre-schoolers actually decrease their screen time at home.

Table 3
Differences of ToyBox intervention in Europe and ToyBox intervention in Malaysia

Games	<i>ToyBox</i> Intervention Europe	<i>ToyBox</i> Intervention Malaysia
Short movement breaks (1-5 minutes)	15 games - Imitating marching - Playing puppets - Belly drawing in the air - Painting in the air - Keeping the balance - Hiding your belly! - Nothing seek, nothing found - Picture game - Fireworks	7 games selected - Spinning the wheel - Going around - Playing statue - Flamingo - Mirror image - Hands, you need to listen! - My Friend is in the middle
Long movement breaks (15-30 minutes)	12 games - I am sad because I don't have a friend - Walking a tightrope - Looking is stopping - Sit still! Don't move! - Move, move, move! - Collage of fun activities - No tv signs	5 games selected Weekly Calendar Gadget bingo Alternatives to play gadgets Find a friend Celebrate breaking free of being sedentary and increasing social skills
Kangaroo storytelling (30 minutes)	3 stories (3 eliminated) - Adventure at the Forest - Little Kangaroo and Friends Search for Mrs. Owl - Little Kangaroo's Magic Socks	none

The original *ToyBox* intervention focused on four levels: 1) setting environmental changes in the classroom, 2) children implementing the actual behaviour (water consumption, healthy snacking, physical activity, and interruption of sedentary time) in the kindergarten, 3) teachers implementing fun classroom activities (such as stories, experiments, games) with active participation of the whole class, as well as 4) active involvement of parents to apply environmental changes and implement these lifestyle behaviours, together with their children, at home (www.toybox-study.eu). The present study selected only children who implemented the actual behaviour in sedentary behaviour and teachers who implemented selected fun classroom activities. Thus, the present study employed a slightly different design method, in comparison to the original *ToyBox* intervention in Europe, due to several limited resources in Malaysia.

Furthermore, based on the original classroom activity guide in reducing sedentary behaviour (Table 3), the *ToyBox* intervention in Malaysia only selected seven short movement breaks and five long movement breaks for the seven-week intervention period. The reasons for the games to be excluded during training workshop were: 1) teachers and pre-schoolers were not comfortable to perform the activities (*belly drawing in the air, painting in the air*), which require standing upright in the classroom. Besides, teachers

in Malaysia punish children by asking them to stand on desks, which is inappropriate to be implemented as a classroom game; 2) teachers were not confident in using puppets to teach pre-school children (*playing puppets*); 3) pre-schoolers aged four and five could hardly understand the steps to perform the activities and lengthy time was required to explain the pictures with body parts during pilot experiment (*keeping balance, hiding belly, picture games, nothing seek, nothing found, fireworks*). Therefore, the teachers suggested to exclude the nine games to achieve better intervention results.

In addition, the long movement breaks were reduced from 12 games to five games only due to the following reasons: 1) limited space to perform some activities (*I am sad because I don't have a friend, walking along a tightrope, looking is stopping*). These activities require empty space to perform and pre-schoolers have to run in a circle; 2) pre-schoolers showed lack of interest in some games (*sit still, don't move, move, move, move*); and 3) some games were similar to the others (*collage of fun activities, no tv signs*).

Lastly, the kangaroo storytelling activity has varied cultural values in Malaysia compared to that in the European countries. Pre-schoolers preferred local stories and fairy tales during storytelling. Some teachers also revealed that they did not have storytelling time during lessons and this posed a challenge for them to perform in classrooms. Therefore, the storytelling part

in the classroom guideline was withdrawn due to the low response obtained from the teachers.

Procedure

Ethical permission for the present study was sought from the Malaysian Ministry of Education. Furthermore, headmasters/headmistresses from selected preschools were contacted to discuss the intervention. Upon teachers' expression of interest to participate, informed consents were gathered from the teachers and parents before the study was carried out. Three preschools from Pahang and Kuala Lumpur participated voluntarily with full commitment. Data collection started in February 2016 and ended in September 2016. After the informed consents were received from teachers and parents, the teachers were given a one-day workshop and training on how to conduct the intervention. Besides understanding the goals of the intervention, the teachers were asked to demonstrate and share their methods with other teachers in order to improve the intervention. Moreover, a pilot experiment was conducted ($n = 20$ for experimental group, $n = 20$ for control group) to test the classroom activities guide and protocol. The results showed that the selected games were indeed suitable to be carried out in preschools and the teachers expressed positive comments after treatment was carried out.

DATA ANALYSES

Non-parametric tests were used to analyse the data as assumption-free tests were employed with fewer assumptions (Field, 2013). The data were ranked based on the lowest scores up to the highest scores. The data retrieved for the present study were not normally distributed and therefore, the Mann-Whitney test was applied to compare before and after the experiments between experiment and control groups. Other than that, the Wilcoxon rank-sum test was conducted to test within the experimental and control groups for before and after treatments. In order to test the interaction effect for the treatment, Split-plot ANOVA analysis was used by using repeated measure ANOVA. This was to test the interaction effect of the *ToyBox* intervention. All data were analysed using IBM SPSS statistics version 20. After that, the data were screened for scores of mean, standard deviation, minimum, maximum, skewness, kurtosis, and outliers.

RESULTS

For the first objective, the Mann Whitney U Test was conducted to assess the before and after experiments between the experimental and control groups in determining the level of sedentary behaviour among 4-, 5-, and 6-year-old pre-schoolers.

Table 4

Before and after experiment: Mann Whitney U Test between experimental groups and control groups in levels of sedentary behaviour

Sedentary behaviour	N	Mean rank		Z		Sig	
		Before	After	Before	After	Before	After
4-year-old	99						
Experiment	46	55.02	44.21	-1.662	-1.909	.097	.056
Control	53	45.65	55.03				
5-year-old	95						
Experiment	45	45.13	40.53	-.974	-2.526	.330	.012
Control	50	50.58	54.72				
6-year-old	87						
Experiment	47	48.05	37.19	-1.675	-2.808	.094	.005
Control	40	39.24	52.00				

Table 4 shows that before the treatment, both the experiment and the control groups were equal and insignificant for 4-year-old ($U = -1.662, p > .05$), 5-year-old ($U = -.974, p > .05$), and 6-year-old ($U = -1.675, p > .05$) pre-schoolers. On the other hand, 5-year-old ($U = -2.526, p < .05$) and 6-year-old ($U = -2.808, p < .05$) pre-schoolers were found to display significance in reducing sedentary behaviour in the experiment groups, compared to control groups after treatment. Hence, null hypothesis 1a was accepted and insignificant difference was discovered between experimental groups and control groups for the level of sedentary behaviour among 4-, 5-, and 6-year-old pre-schoolers before treatment. Meanwhile, null hypothesis 1b was partially accepted as only 5-year-old and 6-year-old pre-schoolers showed variances between the experimental and control groups for their level of sedentary behaviour after treatment.

On the other hand, for Objective 2, the Wilcoxon Signed-Rank Test was applied to test the before and after treatment within experimental and control groups. Based on Table 5, it was found that the treatment was able to reduce the sedentary behaviour exerted among the experimental groups for 4-year-old ($Z = -5.491, p < .05$), 5-year-old ($Z = -4.206, p < .05$), and 6-year-old ($Z = -5.774, p < .05$) pre-schoolers. However, surprisingly, the control groups also exhibited significance in reducing sedentary behaviour for 4-year-old ($Z = -4.363, p < .05$) and 6-year-old ($Z = -4.522, p < .05$) pre-schoolers, but not for 5-year-old ($Z = -1.330, p > .05$). Thus, null hypothesis 2a was accepted and a significant difference was revealed before and after treatment within the experimental groups among 4-, 5-, and 6-year-old pre-schoolers. Besides, null hypothesis 2b was partially accepted and only 5-year-old pre-schoolers showed no difference for before and after treatment within control groups.

Table 5
Experimental and Control Group: Wilcoxon Signed-Rank Test before and after the treatment in sedentary behaviour

Sedentary Behaviour	N	Median		Z		Sig	
		Experimental	Control	Experimental	Control	Experimental	Control
4-year-old	99						
Before	46	43.00	43.00	-5.491	-4.363	.000	.000
After	53	42.00	42.00				
5-year-old	95						
Before	45	44.00	44.00	-4.206	-1.330	.000	.184
After	50	42.00	43.00				
6-year-old	87						
Before	47	44.00	44.00	-5.774	-4.522	.000	.000
After	40	42.00	43.00				

Further investigation to probe interaction effects was conducted with a split-plot ANOVA. Table 6 summarises that the between-groups factor was not found to be significant, whereas the within-subject factors was significant. In other words, there was a significant effect in reducing pre-schoolers' sedentary behaviour, $F(1,$

$279) = 225.396, p < .000$. Interestingly, the interaction term of groups and treatment were found significant as well, $F(1, 279) = 74.454, p < .000$, where the treatment for experimental groups was significantly lower in sedentary behaviour after treatment (refer Figure 1).

Table 6
Summary of results of Split-Plot ANOVA

Source	SS	df	MS	F	p
Between-subjects					
Groups	13.357	1	13.357	1.879	.277
Error	1983.359	279	7.109		
Within-subjects					
Treatment	175.621	1	175.621	225.396	.000
Group x treatment	58.012	1	58.012	74.454	.000
Error	217.387	279	.779		

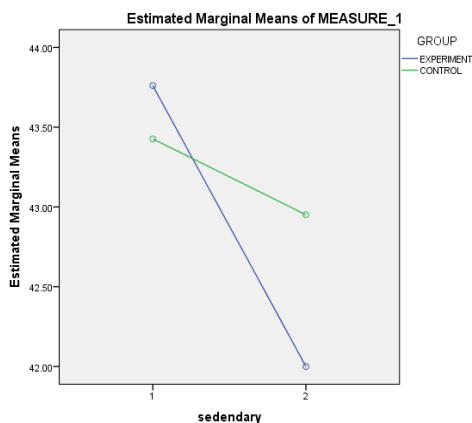


Figure 1. Graph of Cell Means for Sedentary Behaviour

DISCUSSION

Objective 1: Before and After the Experiment for Experimental and Control Groups in Sedentary Behaviour among 4-, 5-, and 6-Year-Old Pre-Schoolers

The seven-week intervention showed a small positive result in reducing sedentary behaviour among pre-schoolers. The 5-year-old and 6-year-old pre-schoolers showed significant results in reducing sedentary behaviour at home, as reported by primary caregivers. These findings imply that game-based approach is indeed a promising method to apply during early childhood education in pre-schools. The teachers also play a vital role in promoting healthy lifestyle, besides focusing on curriculum during pre-school. One of the issues in pre-school education in Malaysia as denoted by Majzub (2013), is related to teaching and learning in pre-school classrooms. The present findings also help to add to the existing knowledge, in

which pre-schools should have quality staff training (Puteh & Ali, 2013) in teaching with a holistic game-based approach in classroom learning. Besides, pre-schoolers learn better in a cheerful environment through positive interaction with peers and teachers (Abu Bakar, 2010). In relation to this, the majority of pre-school teachers is have only high school qualification, with inadequate teaching experience or a repertoire of good teaching skills. In comparison, in Singapore, most recently in 2013, the qualification requirements for pre-school teachers were increased from certificate to diploma level (UNESCO, 2016). Prior to knowledge of teaching, pre-school teachers have been unaware of the sedentary lifestyle of pre-schoolers, which includes prolonged sitting in the classroom.

Based on the results, the 4-year-old pre-schoolers showed no variance after treatment. Based on a preliminary interview study carried out by Hon, Chua and Hashmi (2016), teachers reported that 4-year-old pre-schoolers lacked communication skills and were quiet in pre-schools. They showed no response during classroom learning and their comprehension was poor. This was due to the adaptation of pre-schoolers in the early stage and their comprehension of instructions was still at an alteration stage. Nonetheless, compared to older pre-schoolers, they performed better in communication, in expressing themselves, and in following instructions whenever required. This finding demonstrates that 4-year-old pre-schoolers need more attention and efforts by pre-school teachers to educate

them with varied strategies through a variety of games. Furthermore, in comparison, in the Republic of Korea, the programmes organised for children aged 3 to 5 years old in Early Childhood Care and Education (ECCE) focus on a holistic perspective on child development, are centred on the child, and revolve around play activities (UNESCO, 2016). Additionally, the combination of play activities and child development alleviates anxiety and stress among pre-schoolers with poor cognitive development.

Thus, the present study has helped to introduce an effective game-based approach in teaching to promote healthy lifestyle. For example, in order to break the sedentary lifestyle among 4-year-old children, teachers can choose *Flamingo*, instead of *Hands, you need to listen!*. This is because, *Flamingo* helps to increase physical activity, generate higher concentration, induce relaxation during stressful moments, and offer improved motor coordination through soothing music. On the other hand, the latter requires a lot of instructions that make the 4-year-old pre-schoolers barely understand the movements in the game.

Objective 2: Before and After the Treatment within Experimental and Control Groups among 4-, 5-, and 6-Year-Old Pre-Schoolers

It was found that the 5-year-old pre-schoolers in the control groups showed insignificant results after the experiment between the experimental and control groups. Thus, the control groups represented

a good comparison group before and after treatment. Surprisingly, both the experimental and control groups showed significant results after treatments, as the control groups displayed a significant decrease in sedentary behaviour for 4-year-old and 6-year-old pre-schoolers. Moreover, according to Campbell and Stanley (1963), there is possibility for interaction between selection and X even though the participants were equally assigned into experimental and control groups. In precise, the greater the amount of cooperation involved, the greater the amount of interference of routine, and the higher the refusal rate, the more opportunity there is for a selection-specificity effect. Simply put, the present study lacked awareness concerning refusal rate and most of the teachers claimed that this treatment was hostile, along with extra work. In spite of that, the experimental groups showed some positive results in reducing sedentary behaviour, as depicted in the primary caregivers' self-reports.

Nevertheless, despite the positive results observed in reducing sedentary behaviour among children who participated in the experiment, the current study has limitation in terms of its methodology. The limitation of the present study refers to the difficulty in obtaining full commitment from the pre-schools to participate in the present study. Of the 20 pre-schools approached, only three pre-schools agreed to give full participation in the experiment, and the other principals disagreed with the experiment. In fact, some principals addressed the objectives of decreasing sedentary behaviour as being

opposed to their teaching, but they did agree that gadget use among pre-schoolers has increased. For instance, a principal argued that pre-school is a period for pre-schoolers to fulfil the criteria of readiness before pursuing primary school. In addition, the children are encouraged to instil quiet attitude during class and to master writing simple alphabets. As such, there is no doubt that Asian countries have adopted a holistic curriculum for pre-schools to ascertain that these pre-schoolers can perform paper-pencil activities, instead of focusing on social development.

Moreover, due to poor participation of pre-schools, the cluster randomised trial could not be carried out in the present study and thus, generalisation of results could not be attained, in comparison to the original *ToyBox* intervention (Manios et al., 2014). Moreover, objective measurement was not adopted in the present study, as inconsistency was present in monitoring the children's activities within the seven-day period (Dwyer et al., 2013) during the pilot experiment. Other than that, Biddle, Petrolinim and Pearson (2014), Steeves, Thompson, Bassett, Fitzhugh, & Raynor (2012), and LeBlanc et al. (2012) emphasised that self-report could spell out the types of sedentary behaviour, especially among younger children. However, the pre-test and post-test design is proficient enough to provide some positive effects upon reducing sedentary behaviour for 5-year-old and 6-year-old pre-schoolers, as mentioned earlier.

Furthermore, it would have been interesting if the evaluation protocol of the present study had included a group of policymakers to promote healthy lifestyle through collaboration with pre-schools. However, these preliminary results have helped to expose the importance of staff training and the upkeep of quality among the pre-schools. Beyond doubt, it is crucial for early childhood teachers to promote play in pre-schools (Tarman & Tarman, 2011), besides increasing physical activities in the syllabus. Moreover, the teachers who participated in the present study displayed anxiety and stress about the content in the syllabus and further neglected the aspect of social development for pre-schoolers. As such, it is utmost essential to determine the quality of pre-schools in relation to social skills (Broekhuizen, Mokrova, Burchinal, Garrett-Peters, & the Family Life Project Key Investigators, 2016), and a vast untapped area is open for researchers to explore the effectiveness of *ToyBox* intervention in enhancing social skills in future studies.

CONCLUSION

As a conclusion, the results obtained from the true experimental pre-test and post-test design has been generally acceptable to test the effectiveness of *ToyBox* intervention in Malaysia, specifically among pre-schoolers. Furthermore, the guide for classroom activities was revised, whereby only seven games were selected for short movement breaks, and five for long movement breaks. Besides, even though sedentary behaviour

is a new term for the teachers, sedentary behaviour exerted by these pre-school children was successfully reduced through the implementation of games in pre-schools on a daily basis. With that, a follow-up study for further intervention is underway.

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REFERENCES

- Abu Bakar, N. (2010). The practitioners' awareness on the effectiveness of play in developing prosocial behaviour among preschool children in Malaysia. *Literacy Information and Computer Education Journal (LICEJ)*, 1(1), 11-18.
- Alatraqchi, A. G., Bakar, M. A. F. B. A., Mohamad, F. A. B. A. B., Kadir, A. I. B. A., Yahya, N. A. B. M., Juhari, N. A. B., ... & Rahman, N. I. A. (2014). Awareness of tadika's (kindergarten) children towards healthy lifestyle in Kuala Terengganu. Malaysia. *Journal of Applied Pharmaceutical Science*, 4(6), 115-122. doi: 10.7324/JAPS.2014.40618
- Bergh, I. H., van Stralen, M. M., Bjelland, M., Grydeland, M., Lien, N., Klepp, K. I., ... & Ommundsen, Y. (2014). Post-intervention effects on screen behaviours and mediating effect of parental regulation: The health in adolescents' study – a multi-component school-based randomized controlled trial. *BMC Public Health*, 14(200), 1-12.
- Biddle, S. J. H., Petrolinim, I., & Pearson, N. (2013). Interventions designed to reduce sedentary behaviours in young people: A review of reviews. *British Journal of Sports Medicine*, 1-5. doi:10.1136/bjsports-2013-093078
- Birken, C. S., Maguire, J., Mekky, M., Manlhiot, C., Beck, C. E., & Degroot, J. (2012). Office-based randomized controlled trial to reduce screen time in preschool children. *Pediatrics*, 130(6), 1110–1115.
- Broekhuizen, M. L., Mokrova, I. L., Burchinal, M. R., Garrett-Peters, P. T., & the Family Life Project Key Investigators. (2016). Classroom quality at pre-kindergarten and kindergarten and children's social skills and behaviour problems. *Early Childhood Research Quarterly*, 36, 212-222.
- Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Boston: Houghton Mifflin Company.
- Carson, V., Salmon, J., Arundell, L., Ridgers, N. D., Cerin, E., & Brown, H. (2013). Examination of mid-intervention mediating effects on objectively assessed sedentary time among children in the Transform-Us! cluster-randomized controlled trial. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 62.
- Creswell, J. W. (2014). *Educational research: planning, conducting and evaluating quantitative and qualitative research*. Boston: Pearson.

- Dan, S. P., Mohd Nasir, M. T., & Zalilah, M. S. (2011). Determination of factors associated with physical activity levels among adolescents attending school in Kuantan, Malaysia. *Malaysian Journal of Nutrition, 17*(2), 175-187.
- De Decker, E., De Craemer, M., De Bourdeaudhuij, I., Verbestel, V., Duvinage, K., Iotova, V., ... & Cardon, G. (2014). Using the intervention mapping protocol to reduce European preschoolers' sedentary behaviour, an application to the *ToyBox*. *International Journal of Behavioural Nutrition and Physical Activity, 11*(19), 1-18. doi: 10.1186/1479-5868-11-19
- Dwyer, M. V. O., Fairclough, S. J., Ridgers, N. D., Knowles, Z. R., Fowweather, L., & Stratton, G. (2013). Effect of a school-based active play intervention on sedentary time and physical activity in preschool children. *Health Education Research, 28*(6), 931-942.
- Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th Ed.). London: Sage Publication Ltd.
- Finch, M., Wolfenden, L., Morgan, P. J., Freund, M., Jones, J., & Wiggers, J. (2014). A cluster randomized trial of a multi-level intervention, delivered by service staff, to increase physical activity of children attending center-based childcare. *Preventive Medicine, 58*, 9-16.
- George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference. 11.0 update* (4th Ed.). Boston: Allyn & Bacon.
- Haelle, T. (May 18, 2015). (CBS News). *Pre-schoolers not getting enough physical activity in child care*. Retrieved September 10, 2015, from <http://www.cbsnews.com/news/preschoolers-exercise-physical-activity-in-child-care/>
- Haines, J., McDonald, J., O'Brien, A., Sherry, B., Bottino, C. J., & Schmidt, M. E. (2013). Healthy habits, happy homes: Randomized trial to improve household routines for obesity prevention among preschool-aged children. *JAMA pediatrics, 167*(11), 1072-1079.
- He, M., Piche, L., Beynon, C., Kurtz, J., & Harris, S. (2011). Screen-related sedentary behaviours of school-aged children: Principals 'and teachers' perspectives. *Health Education Journal, 70*(1), 32-38.
- Heng, K. C. (2008). Child care in Malaysia: Then and now. *International Journal of Child Care and Education Policy, 2*(2), 31-41.
- Hon, K. Y., Chua, B. S., & Hashmi, S. I. (2016). Why gadget usage among pre-schoolers should matter to teachers? A pilot study. *GESJ: Education Science and Psychology, 3*(40), 98-111.
- Keating, S. (2011). A study on the impact of electronic media, particularly television and computer consoles, upon traditional childhood play and certain aspects of psychosocial development amongst children. *International Journal for Cross-Disciplinary Subjects in Education (IJCDSE), 2*(1), 294-303.
- Kernan, M. (2007). *Play as a context for early learning and development: A research paper*. Ireland: National Council for Curriculum and Assessment.
- LeBlanc, A. G., Spence, J. C., Carson, V., Connor Gorber, S., Dillman, C., Janssen, I., ... & Tremblay, M. S. (2012). Systematic review of sedentary behaviour and health indicators in the early years (aged 0–4 years). *Applied Physiology, Nutrition, and Metabolism, 37*(4), 753-772. doi:10.1139/H2012-063

- Loewenthal, K. M. (2004). *An introduction to psychological tests and scales* (2nd Ed.). Hove, UK: Psychology Press.
- Majzub, R. M. (2013). Critical issues in preschool education in Malaysia. In *Proceedings of the 4th International Conference on Education and Educational Technologies (EET'13)* (pp. 150-155). WSEAS Press.
- Manios, Y., Grammatikaki, E., Androutsos, O., Chinapaw, M. J. M., Gibson, E. L., Buijs, G., ... & Mouratidou, T. (2012). A systematic approach for the development of a kindergarten-based intervention for the prevention of obesity in preschool age children: the *ToyBox*-study. *Obesity Reviews*, 13(s1), 3-12. Retrieved from <http://dx.doi:10.1111/j.1467-789X.2011.00974.x>
- NHMS. (2015). *Institute for Public Health. National Institutes of Health, Ministry of Health Malaysia. National Health and Morbidity Survey*, Kuala Lumpur.
- Puteh, S. N., & Ali, A. (2013). Preschool teachers' perceptions towards the use of play-based approach in language and literacy development for preschool. *Malaysian Journal of Learning and Instruction*, 10, 79-98.
- Ramirez, E. R., Norman, G. J., Rosenberg, D. E., Kerr, J., Saelens, B. E., Durant, N., & Sallis, J. F. (2011). Adolescent screen time and rules to limit screen time in the home. *Journal of Adolescent Health*, 48(4), 379-385. doi:10.1016/j.jadohealth.2010.07.013
- Salmon, J. (2010). Novel strategies to promote children's physical activities and reduce sedentary behaviour. *Journal of Physical Activity and Health*, 7(3), 299-306
- Schulz, K. F., & Grimes, D. A. (2005). Sample size calculations in randomised trials: Mandatory and mystical. *Family Health International*, 365(9467), 1348-1353.
- Sharifah W. W., Nur Hana H., Ruzita A. T., Roslee R., & Reilly, J. J. (2011). The Malaysian childhood obesity treatment trial (MASCOT). *Malaysian Journal of Nutrition*, 17(2), 229-236.
- Steeves, J. A., Thompson, D. L., Bassett, D. R., Fitzhugh, E. C., & Raynor, H. A. (2012). A review of different behaviour modification strategies designed to reduce sedentary screen behaviour in children. *Journal of Obesity*, 2012, 1-16. doi:10.1155/2012/379215
- Tarman, B., & Tarman, I. (2011). Teachers' involvement in children's play and social interaction. *Elementary Education Online*, 10(1), 325-337.
- The Asian Parent Insight. (2014). *Mobile device usage among young kids: A Southeast Asia study*. Singapore: Samsung Asia Pte Ltd.
- Tremblay, M. S., LeBlanc, A. G., Kho, M. E., Saunders, T. J., Larouche, R., Colley, R. C., ... & Gorber, S. C. (2011). Systematic review of sedentary behaviour and health indicators in school-aged children and youth. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), 98. Retrieved May 29, 2014, from <http://www.ijbnpa.org/content/8/1/98>
- UNESCO. (2016). *New horizons: A review of early childhood care and education in Asia and the Pacific*. France: United Nations Educational, Scientific and Cultural Organization.
- Verloigne, M., Bere, E., Van Lippevelde, W., Maes, L., Lien, N., Vik, F. N., ... & De Bourdeaudhuij, I. (2012). The effect of the UP4FUN pilot intervention on objectively measured sedentary time and physical activity in 10–12-year-old children in Belgium: the ENERGY-project. *BMC Public Health*, 12(1), 805.