

## Impact of Singapore's COVID-19 control measures on home-based physical activity in children

### Dear Editor,

Children and adolescents, with age ranging from 5 to 17 years old, are recommended to accumulate an average of 60 minutes per day of moderate- to vigorous-intensity physical activity (PA) across the week, and to include muscle- and bone-strengthening activities for at least 3 days per week.<sup>1</sup> School-going children in Singapore were confined to their homes for 7 continuous weeks due to the circuit breaker, the national lockdown measures to curb the spread of COVID-19. We conducted a retrospective study to describe the characteristics of home-based PAs that these children engaged in, and the challenges of home-based PAs encountered during the circuit breaker.

An online survey was conducted for a month in June 2020, after the lifting of the circuit breaker. The study recruited primary and secondary school students (aged 7 to 17 years old), and surveyed their activities in the preceding 7 weeks during the circuit breaker. The survey was disseminated to the public via KK Women's and Children's Hospital's social media channels and posters placed within the hospital premises. The survey consisted of 6 sections: demographics, characteristics of PA, home-based learning (HBL), use of electronic devices for PA, sedentary behaviour (SB), and safety and challenges encountered when doing home-based PAs. The questions, were based on international PA questionnaires and modified to suit the local context.<sup>2,3</sup>

All participants provided informed assent and parental informed consent. All responses were also anonymised. The study was exempted from SingHealth Centralised Institutional Review Board (CIRB Ref. No: 2020/2542). Data were analysed using cross-tabulations and association of the variables was tested using chi-square test. A *P* value of less than 0.05 was considered statistically significant. Analyses were performed using SAS software version 9.4 (SAS Institute Inc, Cary, US).

There were 296 responses: 61% were primary school (PS) students and 59% were girls. The majority (63%) lived in public Housing and Development Board flats, followed by 27% in private condominiums and apartments, and 10% in landed houses. More than half (60%) reported doing PAs from 1 to 3 days weekly and the most frequent PA duration was 15–30 minutes per day (32%). In terms of intensity, 77% reported

their PAs as moderate or vigorous. Overall, only 4% of PS and 5% of secondary school (SS) students met the daily PA recommendation. PS and SS students engaged in different types of PA as 48% of PS students did aerobic activities, whereas 51% of SS students did muscle-strengthening activities. More PS students (72%) also required a partner when doing PAs. Three-quarters of the participants received HBL physical education sessions and most sessions (78%) were held once or twice per week.

Almost three-quarters (74%) of the respondents used electronic devices for PAs. The computer was most frequently used (50%), followed by the handphone (24%); there was higher usage of handphone for PAs in SS (38%) students. Online streaming, such as YouTube, was the most popular medium (59%). With regards to SB, most (35%) spent 2 to 4 hours in SB daily but more SS students (29%) reported above 6 hours of SB.

Only 4% of the participants sustained injuries when doing home-based PAs and the injuries were musculoskeletal or blunt trauma in nature. The 2 main challenges encountered were the lack of space (38%) and lack of motivation (15%). On the whole, home-based PAs received slightly favourable ratings as the overall satisfaction mean score was 5.5, based on a 10-point Likert scale (0: least satisfactory; 10: most satisfactory). The survey results are summarised in Table 1.

Studies on the PA levels of Singapore children and adolescents before COVID-19 showed a worrisome trend as they could only meet 40% of the PA recommendation at best,<sup>4</sup> but a more recent study by Ting et al. showed that 0 out of 233 adolescents achieved the daily PA recommendation.<sup>5</sup> Our study revealed that the lockdown measures further curtailed school-going children PAs as most (95%) were unable to achieve the recommended amount of PAs. Contributing factors include the lack of outdoor activities and organised sports, limited access to recreational facilities, and inability to do PAs with friends.<sup>6</sup> Although distance-based PA programmes in selected patient groups had equivocal results,<sup>7</sup> our findings suggested that HBL probably created opportunities for home-based PAs, as more than half reported the same frequency of PA sessions for both home-based PAs and HBL.

Table 1. Correlations of education level with characteristics of physical activities, electronic device and media use, sedentary behaviour and safety concerns and challenges encountered (expressed as a percentage within each level)

<b>Characteristics of home-based physical activities (PA)</b>		
<b>Frequency (per week)</b>	<b>Primary school</b>	<b>Secondary school</b>
1 day	21.5	20.9
2 days	17.1	22.8
3 days	20.9	16.1
4 days	10.4	11.4
5 days	11.0	9.5
6 days	4.4	4.7
7 days	14.3	14.2
<b>Duration (per day)</b>		
<15min	22.6	16.1
15–30min	34.8	31.4
30–45min	22.6	16.1
45–60min	10.4	20.0
>60min	9.3	16.1
<b>Intensity</b>		
Light	24.8	19.0
Moderate	64.0	62.8
Vigorous	11.0	18.0
<b>Main type of PA<sup>a</sup></b>		
Muscle-strengthening activities	22.0	51.4
Aerobic activities	48.0	21.9
Ball games	5.5	4.7
Racket games	2.2	4.7
Others	22.0	17.1
<b>Physical activity partner<sup>a</sup></b>		
Yes	72.3	37.1
No	27.6	62.8
<b>Electronic device and media used for PA</b>		
<b>Electronic device</b>		
Yes	74.5	74.2
No	25.4	25.7
<b>Type of device<sup>a</sup></b>		
Television	8.1	1.2
Computer	52.5	48.7
Tablet	20.0	7.6
Handphone	14.8	38.4
Wearable device	0.7	0.0

Table 1. Correlations of education level with characteristics of physical activities, electronic device and media use, sedentary behaviour and safety concerns and challenges encountered (expressed as a percentage within each level) (Cont'd)

<b>Characteristics of home-based physical activities</b>		
<b>Frequency (per week)</b>	<b>Primary school</b>	<b>Secondary school</b>
<b>Type of device<sup>a</sup></b>		
Game console	2.2	3.8
Others	1.4	0.0
<b>Type of media</b>		
Online stream	61.4	56.4
Social media	2.2	8.9
Mobile application	13.3	11.5
Video game	5.9	5.1
Others	17.0	17.9
<b>Sedentary behaviour</b>		
<b>Total time (per day)<sup>a</sup></b>		
<2 hours	32.5	17.1
2–4 hours	33.7	37.1
4–6 hours	20.9	20.9
6–8 hours	7.7	16.1
>8 hours	4.9	8.5
<b>Safety concerns and challenges encountered</b>		
<b>Injury encountered</b>		
Yes	2.2	5.7
No	97.7	94.2
<b>Challenge encountered</b>		
Lack of time	2.5	7.4
Lack of space	64.7	41.9
Lack of equipment	9.2	13.5
Lack of electronic device	0.8	1.2
Lack of partner	3.3	3.7
Lack of knowledge	0.8	1.2
Lack of skill	2.5	0.0
Lack of motivation	14.2	30.8
Others	1.6	0.0

<sup>a</sup>  $P < 0.05$ 

The study highlighted 2 differences in home-based PAs between PS and SS students. Firstly, PS students mainly engaged in aerobic PAs, such as running, while SS students mostly participated in muscle-strengthening

PAs, such as push-ups. This could be related to the misconception that muscle-strengthening PAs is unsafe for young children and thus the lack of exposure.<sup>8</sup> Secondly, more PS students engaged in PAs with a

partner and Keyes et al. also reported that parents need to be active in the presence of their children.<sup>9</sup> Electronic devices and online media are essential tools for distance-based connections.<sup>10</sup> This was reflected in the study as almost three-quarters of the participants used electronic devices and online media for home-based PAs. These findings may highlight certain considerations when designing home-based PAs for the respective educational levels and the required equipment or resources.

A major concern was high SB during the circuit breaker as 73% of participants exceeded 2 hours of daily SB and the current World Health Organization recommendation was to limit SB, particularly in recreational screen time.<sup>1</sup> The excessive amount of SB in Singapore adolescents found in previous studies was also evident in our study as higher proportion of SS students reported SB above 2 hours daily.<sup>5,11</sup> Another concern was the injury risk due to the limited space of most homes in Singapore. The study showed that home-based PAs could be performed safely as only 4% reported musculoskeletal or blunt trauma injuries. To minimise these concerns, home-based PA programmes should include instructions to reduce SB and injury risks.<sup>12</sup>

This study has certain limitations. The survey was subjected to recall bias, and recruitment was only possible after lifting of the circuit breaker due to logistical difficulties. The design of our study, which used subjective measures, limited the comparison with previous studies, which used objective measures. Participants tended to over-report their PA level in surveys.<sup>4</sup> The participants formed a small representation of all school-going children in Singapore and a larger sample size would be more ideal.

Lockdown measures were necessary to curb the spread of COVID-19 but they significantly limited PAs in school-going children. The study showed that school-going children were receptive towards and able to adapt to home-based PAs. These findings revealed certain considerations and required resources when designing home-based PAs, including HBL, as we support children and adolescents to achieve adequate PAs in the current pandemic.

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