

[Singapore] 5-year-olds in Singapore during the pandemic: A survey exploring their 24-hour integrated activity, digital media use and quality of relationships in relation to the Singapore Integrated 24-Hour Activity Guidelines for Early Childhood

Authors: [Sirene Lim*](#), [Jiayao, Li*](#), [Randolph Tan*](#), [Christine Chen**](#)

Affiliations: *Singapore University of Social Sciences

** Association for Early Childhood Educators (Singapore)

Introduction: Singapore Context

Singapore is a city-state with a total population of 5.45 million, of which 3.99 million are residents (i.e., citizens and permanent residents); and its resident unemployment rate was relatively low at 3.5%, as at end December 2021 (Ministry of Manpower, 2022). The infant mortality rate is also comparatively low at 1.8 per 1000 live births but the nation's total fertility rate has fallen steadily over the last decade to 1.12 births per female (Department of Statistics Singapore, 2021a). The average size of resident households is 3.22 persons and 78.7% of the resident population live in subsidised public housing (also known as "Housing Development Board/HDB dwellings") and such flat ownership is high at 87.9% (Department of Statistics Singapore, 2021b).

Historically, Singapore's first settlements were established from AD 1298-1299, subsequently ruled by five kings of ancient Singapura and it was a thriving city due to its geographical location as a natural meeting point of sea trading routes and a stopover for the likes of Arab dhows, Buginese schooners, Chinese junks, and Portuguese ships. Throughout the 1800s, Singapore became a British colony and continued to serve as an important trading port in the region, but for the British East India Company. Its economic activities attracted diverse groups of migrant people ranging from wealthy business folk as well as labourers looking for work and they all came from as far as China's different Southern provinces, South India, Sri Lanka and they mixed with indigenous ethnic Malays and Arabs from the Southeast Asian region.

Since the nation became a republic in 1965, it has remained a multicultural, multilingual, multi-religious and multi-ethnic society, with English as its language of commerce. Singapore's resident population comprises 74.2% Chinese ethnicities, 13.7% from Malay ethnic groups, and 8.7% from Indian ethnicities (Department of Statistics Singapore, 2021b). With a limited land area of just over 720 square kilometres, Singapore has an urbanised city landscape with high-rise buildings and an economy that is driven by manufacturing and service sectors.

During the pandemic, Singapore only had a nation-wide lockdown ("circuit-breaker") from 7th April – 1st June 2021 but it remained vigilant with contact tracing, safe management measures such as compulsory mask-wearing (even in preschools), intermittent and temporary closures of work/school sites whenever there were cases of infections, international border closures, restrictions in group sizes for public and home gatherings. By and large, childcare centres/kindergartens and schools remained mostly operational and

open to children after the circuit breaker period with a mixture of online and in-person classes especially for the older age groups (primary and secondary schools).

Purpose

In this paper, we report findings gathered from a multi-nation survey study of children's well-being. The intent of this eight-nation study, led by Child Research Network Asia (CRNA), was to act swiftly during a drawn-out pandemic to obtain a snapshot of mothers' and children's situations across different settings and provide an opportunity for professional conversations and policy engagement.

Given the school closures and movement restrictions that have become common across countries, the focus of this report is on answering these questions:

- a) To what extent did the children in this sample meet Singapore's Integrated 24-hour Activity Guidelines for young children? What were key factors influencing children's 24-hour movement?
- b) What did mothers think about their child's use of digital devices and what did parental involvement look like?
- c) How happy were the children and what was the quality of their closest relationships like during that period of time?

Methodology

In this survey design, one questionnaire was administered to a convenient sample of mothers between mid-September to mid-November 2021 through the local Association for Early Childhood Educators Singapore (AECES) which contacted local childcare centres/kindergartens to approach individual mothers. Print copies of the questionnaire were initially couriered to the childcare centres/kindergartens for respondents to fill out when they dropped off or collected their child; subsequently, when some centres had to close intermittently due to cases of COVID infections, the questionnaire was set up online and 26 of the respondents completed the online version.

The questionnaire was available in English language. It asked respondents about the COVID-19 situation in the country; and required them to self-report on demographics of mothers (household members, employment, education, household income) and children (age, gender, birth order, number of siblings). It also had questions about types of childcare supports, distribution of household chores, views on parenting, their child's activities, number of friends, sleep duration, use of screen time, parent involvement. Two standardised measures were included: a) Child and Youth Resilience Measure (CYRM-R) (Resilience Research Centre, 2018). and b) KINDL-R Questionnaire for Measuring Health-Related Quality of Life in Children and Adolescents (Bullinger, Mackensen, & Kirchberger, 1994). In addition, a translated version of a Japanese measure of parents' emphasized aspects in childrearing was also included.

In this report, we focus on presenting data that is relevant to children's 24-hour integrated activity, their use of digital devices and the close relationships they had during that period of the pandemic.

Data analyses were performed using SPSS version 26.0. All variables were examined for their distribution, outliers and missing data before analysis. Descriptive statistics were used to examine the demographic characteristics of the respondents and the variables measured through the questionnaire. Correlational analyses were conducted to examine possible associations between independent variables such as parents' level of confidence, parenting attitudes and beliefs on children's screen-based behaviour, quantity of sleep, and their emphasized aspects in childrearing.

Sample

The questionnaire was administered to a convenient, self-selected sample of mothers (N = 136) with 5-year-olds (69 males and 67 females). Majority (81%) of the respondents had full-time employment and only 1 out of 136 of the corresponding 5-year-olds did not attend childcare or kindergarten. This is comparable to national trends even though preschool education is not compulsory in Singapore. With 60% of the respondents having at least an undergraduate degree qualification, the group is more educated than what was reported on Singapore's 2020 population census (Department of Statistics Singapore, 2021).

Findings

Overview

At the time of responding to the questionnaire, mothers in Singapore were not experiencing nation-wide lockdown due to COVID-19 although 47% of them were still very concerned about the spread of the virus. 94% of the respondents were already vaccinated against the coronavirus and 48% were fairly satisfied with the local measures to curb the spread of infection.

Despite the pandemic, 15% of the respondents saw an increase in household income while 28% experienced a decrease and 11% no change in income. All but one child attended childcare or kindergarten; when their 5-year-old was not in the childcare centre or kindergarten, 22% of mothers reported that they had assistance from babysitters or domestic helpers, whereas 31% relied on grandparents/relatives and another 32% relied on their spouse/partner to care for the child.

In the following sections, we report descriptive findings of children's integrated activity patterns – sleep, screen-based sedentary behaviour (SB), and physical activity (PA); children's uses of digital devices and their mothers' involvement; as well as the quality of relationships that children had during the period of study.

[A] Children's integrated 24-hour activity patterns

In this section, we report results relating to children's sleep duration, screen-based sedentary behaviour (SB) and time spent playing freely indoors and outdoors and compare our results with those of similar studies. The World Health Organisation (WHO) developed a set of integrated 24-hour activity guidelines focused on children's entire movement spectrum throughout the day and night: physical activity, screen-based sedentary behaviour (SB) and sleep.

In January 2022, Singapore launched its Integrated 24-hour Activity Guideline for children below age 7 (CPCHS & AMS, 2022). Table 1 shows a summary of findings against this guideline.

Table 1: Summary of findings for sleep, SB, PA

	Singapore Recommendations	Findings
Sleep	10 to 13 hours for 3-to 5-year-olds; 9 to 11 hours for 6-year-olds	63.1% had less than 10 hours of sleep (half of whom had less than 9 hours)
Sedentary screen-based behaviour	Less than 60 minutes per day	On average, children in this sample spent around 140 minutes on digital devices daily, with about half the time spent on watching TV/DVD.
Physical activity	At least 180 minutes per day, of any intensity; daily outdoor play is recommended	On average, children spent about 47 minutes on outdoor free play after school; and about 128 minutes on free play indoors. In total, children spent less than the recommended 180 minutes on free play, assumed to involve physical activity. It is not known, though, if the time spent on indoor and outdoor free play is of high physical intensity.

A1. Sleep

In this study's sample, 63.1% (n = 86) had less than 10 hours of sleep, out of which half (n= 46) of children had less than 9 hours of sleep. This is below the 10 to 13 hour per night recommendation for children aged 3 to 5 in the Singapore Integrated 24-hour Activity Guidelines (2022).

We examined if sleep duration is associated with parenting confidence ["I am concerned whether my child is inferior to other children"] and found that the amount of sleep differed depending on their level of concern. Those who had expressed higher levels of concern ("Fairly so" or "Very much so") had larger proportions of children sleeping less than 8 hours (24.1% and 18.9% respectively), with only about 27% of children having at least 10 hours of sleep. In contrast, larger proportions (54.5% and 46.2%) of those who had expressed lower levels of concern ("Not at all" or "Not so much") reported their child sleeping at least 10 hours per night and meeting this aspect of the 24-hour Guideline (See Figure 1).

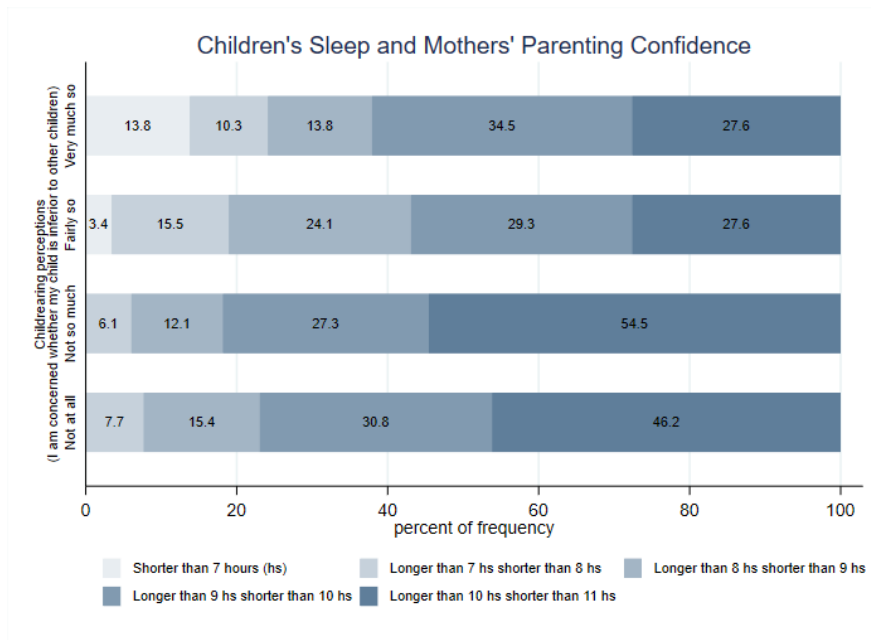


Figure 1. Children's sleep and mothers' parenting confidence

A2. Screen-Based Sedentary Behaviour (SB)

It is common for young children in Singapore to have access to digital devices such as mobile phones, tablets, computers and TV. Bernard et al (2017) reported that 91% of Singaporeans owned a smartphone, 41% a tablet and 60% had at least 3 screen devices.

In this study, 13% of respondents allowed their child to use digital devices freely without supervision while 29% did not allow their child to do so at all. 19% of the respondents indicated that their 5-year-old often had to attend online classes conducted by the childcare/kindergarten and/or enrichment programme; this is likely to be a consequence of the pandemic, as seen around the world.

On average, children spent around 140 minutes on digital devices daily, with the most time spending on watching TV/DVD (M=69.11, SD=56.81). It is important to note that among all the participants, 5% of the children (n=7) spent 0 minutes on devices, almost 13% (n=17) of the participants spent 300 or more minutes daily on devices.

As recommended by the Singapore Guideline, the daily SB for children below age 7 is 60 minutes. The total average duration of digital media usage amongst children in this current sample has exceeded the recommended length by more than 2 times (Table 2). Results from one-sample t-test also showed that there is a significant difference ($p < .001$) between the sample mean (137.33 min) and the recommended duration of 60 minutes per day.

Table 2: Length of time (minutes) children spent on digital devices

	N	Mean (SD)	Min	Max
Watching TV/DVD (minutes)	135	69.11 (56.81)	0	240
Using watch/smartphone (minutes)	135	31.56(46.12)	0	240
Using tablet (minutes)	135	36.67 (51.53)	0	240
Total digital device usage (minutes)	135	137.33 (115.11)	0	540

We examined if children’s SB is associated with parenting confidence [“I am concerned whether my child is inferior to other children”] and found a positive association. Those who expressed higher levels of concern (“Fairly so” or “Very much so”), had higher proportions (27.6% and 51.7% respectively) of children spending at least 4 hours watching TV/DVD or using tablets and smartphones (Figure 2).

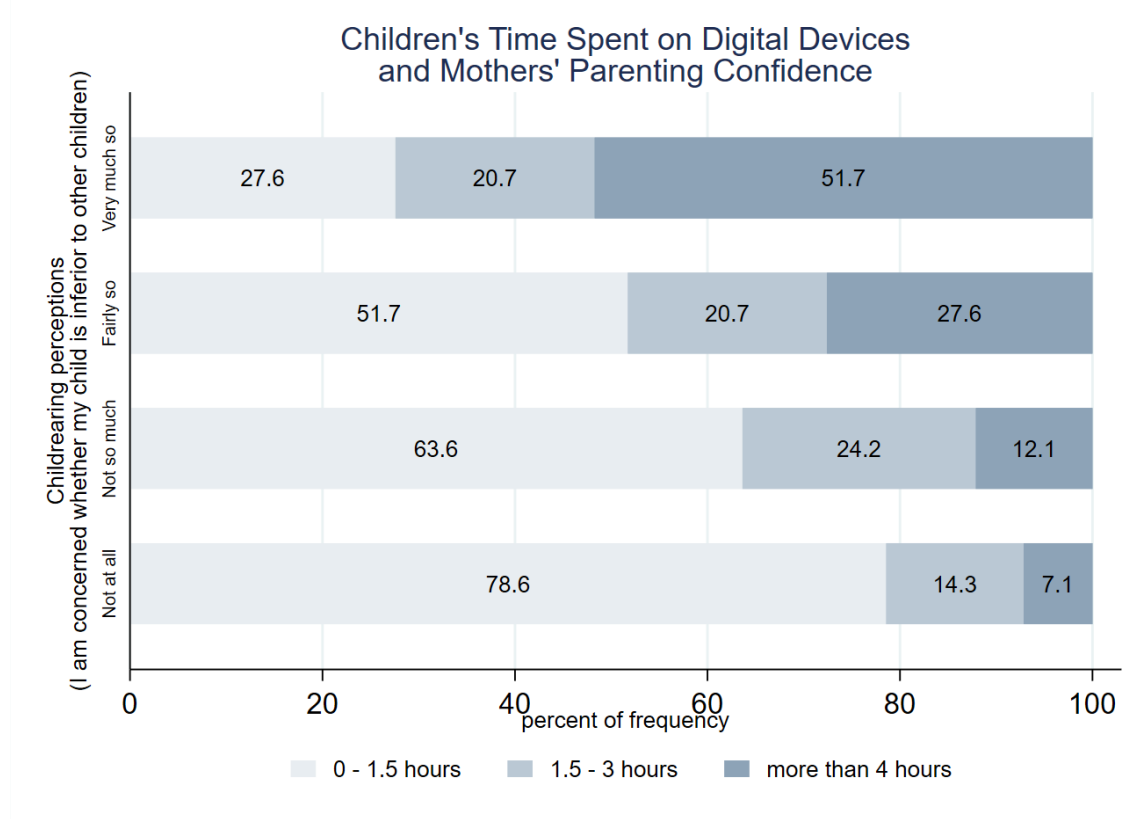


Figure 2. Children’s Time Spent on Digital Devices and Parenting Confidence

A3. Physical Activity (PA)

Compared to the duration that children spent on digital devices, children appeared to spend more time on non-screen time activities, which included playing indoors and outdoors, and studying at home (see Table 3). However, this finding does not include information on the

time that children spent in outdoor play at school and the questionnaire did not gather information on the total duration that children spent outdoors on moderate and vigorous physical activity daily.

Nevertheless, it is notable that children spent little time on outdoor free play after school (M=47.11, SD=47.86). Children also tended to engage in enrichment classes which could be online (M=2.6, SD=1.34) more frequently than in local community activities (M=1.53, SD=.81) during the pandemic.

This group of mothers observed some change in their children’s time – 64% of mothers felt that children spent less time on outdoor free play outside of childcare/kindergarten during the pandemic, while 55.1% of the mothers believed that children spent more time on indoor activity, and 54.4% of the mothers responded that children spent more time on digital devices during the pandemic (see Table 3).

Table 3. Changes in children’s time use: duration of activities

	Playing freely outdoors		Playing freely indoors		Use digital devices	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Increased	15	11.0	75	55.1	74	54.4
Has not changed	32	23.5	45	33.1	53	39.0
Decreased	88	64.7	15	11.0	8	5.9
No answer	1	.7	1	.7	1	.7
Total respondent	136	100	136	100	136	100

[B] Children’s Digital Media Use and Parent Involvement

Given that more than half the respondents had noticed an increase in their child’s use of digital devices, it was also notable that almost half of the mothers (n=58 and n=66) did not change their attitude towards young children’s use of digital devices and did not see their child’s use of digital media for entertainment or for ‘studying’ as negative.

Table 4 shows how children used digital devices in their daily lives. Among all the 17 digital media uses listed in the questionnaire, “listen to music” is the most mentioned purpose (M=4.13, SD=1.08, see Table 4), the least mentioned is to “watch the news” (M=2.04, SD=1.13). Other popular usage of digital devices included: draws pictures (including colouring books) (M=3.96, SD=1.32), watches video clips (M=3.87, SD=1.08), and enjoys programs for physical exercise (M=3.84, SD=1.32).

Table 4. Purpose of digital devices usage in children's daily life

	N	Min	Max	Mean (SD)
Watches video clips.	135	1	5	3.87(1.08)
Takes photos.	135	1	5	3.33(1.10)
Plays with letters and numbers.	136	1	5	3.63(1.27)
Reads books/picture books (including e-books).	136	1	5	3.65(1.37)
Enjoys learning a foreign language.	135	1	5	2.66(1.33)
Draws pictures (including colouring books).	135	1	5	3.96(1.32)
Listens to music.	136	1	5	4.13 (1.08)
Enjoys programs for physical exercise.	136	1	5	3.84(1.31)
Plays games.	135	1	5	3.76(1.38)
Talks on the phone, sends emails, or uses SNS.	136	1	5	2.30(1.16)
Watches the news.	136	1	5	2.04(1.13)
Searches for information (including studying).	136	1	5	2.17(1.21)
Does homework from the childcare facility or school.	134	1	5	3.08(1.48)
Does studying other than homework from the childcare facility or school.	136	1	5	3.21(1.43)
Participates in online classes (including childcare facility, school, or enrichment classes)	136	1	5	3.29(1.30)
Watch programs distributed from the childcare facility, school, enrichment classes or cram school.	136	1	5	3.04(1.22)
Communicates using video chat apps	136	1	5	3.04(1.37)

Table 5 shows how mothers were involved during their child's digital media use. Mothers were not very likely to let children use digital media alone ($M=2.76$, $SD=1.02$), and they tended to keep an eye on them ($M=3.43$, $SD=.65$) and support them when they engaged in difficult activities on digital devices ($M=3.43$, $SD=.64$). In general, mothers in the current sample are very aware of children's usage of digital devices.

Table 5. Types of mothers' involvement in children's digital media use

	N	Min	Max	Mean (SD)
He/she watches/uses it alone freely.	135	1	4	2.76(1.02)
Parents choose what he/she watches/uses.	136	1	4	3.24(.90)
Keep an eye on my child when he/she is using/watching it.	136	1	4	3.43(.65)
Talk to my child in line with the content my child is using/watching.	136	1	4	3.33(.70)
Watch/use together with my child.	136	1	4	3.10(.76)
Encourage to decide time length of use/viewing.	136	1	4	3.37(.72)
Research together when something he/she does not know comes up.	135	1	4	3.12(.80)
Support my child so that he/she can do difficult activities.	135	1	4	3.43(.64)

A simple linear regression (one-way ANOVA) was calculated to predict children's duration of screen time use based on the type of parental involvement. A significant regression equation was found [$F(8,124) = 8.804, p < .001$]. The result suggests a negative relationship between parental involvement and children's duration of screen time use – that letting children play alone without supervision did not seem to lead to more hours of screen time. Children's predicted screen time duration is equal to -71.518 ($\beta = -.63, p < .001$), and having parents talk to children when using digital devices seems marginally associated to the increased time children spend on screen daily ($\beta = .19, p < .05$).

[C] Children's happiness and quality of relationships

We were interested to see if children's closest relationships were stable and if they remained positive during the pandemic. Descriptive data from a few items in the KINDL-R measure showed, more than 93% of mothers ($n = 127/136$) believed their child got on well with them most or all the time, and about the same percentage of mothers believed their child felt fine at home ($n = 125$). In addition, almost 90% of mothers reported that their children "felt strong and full of energy" most or all the time; 93.3% "had fun and laughed a lot" most or all the time; majority of children also enjoyed being in childcare/kindergarten most or all the time ($n=124$) and looked forward to going to childcare/kindergarten most or all the time ($n=117$). According to the respondents, children's play partners ranked in this decreasing order: mothers (82%, $n=112$), sibling ($n=97$), friends from school ($n=82$), grandparents ($n=50$), being alone ($n=47$), to others ($n=28$). This is an indication of positive parent-child relationship and sibling relationship, all of which could have provided strong emotional support for children even under pandemic conditions. Given that these children are 5 years old, it is also a good sign that they are closest to their family and have developed secure relationships with their mothers.

Discussion

Overall, it appears that this group of mothers and their 5-year-olds were not too adversely affected by the pandemic. It appears also that the children in this sample are happy in school, a possible result of the positive and secure relationships they have at home. However, we should continue to encourage parents to pay attention to young children's need for healthy amounts of sleep, physical activity, and reduced SB.

About two-thirds of the children in this sample had less than 10 hours of sleep, a requirement in the Singapore Integrated 24-hour Activity Guideline (CPCHS & AMS, 2022). This result is in line with Chen et al's (2019) results from a group of Singaporean 5.5-year-old-children (N = 547). There seemed to be a positive association between parental confidence ("*I am concerned whether my child is inferior to other children*") and their child's duration of sleep. Whilst we do not have additional data to understand this phenomenon better, we know that children's sleep quality and behaviours can be influenced by a range of factors such as maternal closeness (Bell & Belsky, 2008), parenting styles and cultural practices (Hale et al, 2009); and likewise, mothers' wellbeing and parenting efficacy can also be adversely affected by children's sleep problems (Giallo, Rose, & Vittorino, 2011).

In terms of SB, children spent an average of 140 minutes on digital devices daily, with about half the time spent on watching TV/DVD. This again does not meet the Guideline. And in terms of PA, the children spent an average of about 47 minutes on outdoor free play after school and about 128 minutes on free play indoors. In total, children had an average of less than the Guideline's recommended 180 minutes per day of varying intensity of PA. In comparison, Chen et al (2019) found children averaging 101.9 minutes per day of SB (less than that found in our sample), and 67.3 minutes of moderate to vigorous PA each day. The difference in these findings could be due to conditions created by the pandemic, where general movement was restricted across the population in Singapore due to contact tracing and infections, and there were intermittent closures of preschools and public spaces due to infections.

During the pandemic, it is not surprising more than half the mothers felt that their children spent less time playing freely outdoors and instead, spent more time playing indoors and on digital devices. The children in this sample used the TV/DVD comparatively more frequently than smart phones and tablets, and they used the devices mostly to listen to music and to draw pictures. But most mothers would supervise their children in using digital devices, talking with their child about the content and/or supporting their use during difficult tasks. Chen, Teo & Ngyuen (2019) qualitative study found that parents with young children under five often used digital devices quite intentionally to support their child's learning, for entertainment, and for babysitting, thereby setting out to satisfy their child's and their own cognitive, affective and tension release needs. This seems to be in line with what we found in the study, based on mothers' reported involvement in their child's digital media use.

Family relationships seems positive and healthy in this sample, with most mothers believing that they were their child's favourite play partner, with siblings listed as the next favourite. Children were also generally happy to be in childcare/kindergarten – this is in line with past research that has found positive mother-child relationships to be predictive of child's adjustment in school regardless of home background (e.g., Pianta & Walsh, 1996; Pianta, Nimetz, & Bennett, 1997).

Conclusion and Limitations of Study

The key limitation of this study is that these analyses are based on a small nonprobability sample, and should be treated with some caution due to issues related to self-selection/non-response. However, as an exploratory survey, these findings are a useful snapshot and indication of how a group of mothers and their 5-year-olds fared during a crucial time point during the pandemic in Singapore. We see that the majority of the mothers' lives were not significantly and negatively affected by the pandemic; and likewise, the children in this survey seemed to have positive relationships with their family members, were generally happy at home and in preschool. There was, however, noticeable reduction in their physical activity and increased use of digital devices during the pandemic, which surprised some of the mothers but not all of them. Further analyses would be required to examine the factors associated with children's happiness and resilience.

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