

Effects of the COVID-19 Lockdown on the Physical Activity and Sedentary Behavior in Elementary School Children

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ABSTRACT

School is an important place for children and youth as they spend a considerable amount of their time staying active. Due to social distancing norms, schools were closed indefinitely. The present study thus intends to find out whether parent-reported changes were appreciated in children's physical activity (PA) and sedentary behavior (SB) during the lockdown from pre-lockdown periods. 310 participants were recruited for this purpose. This online subjective questionnaire assessed the time spent in 6 common types of PA and 10 common types of SB for children. The link to the survey was circulated in the study population via various online social media platforms which was then submitted using Google forms. It was found that around 55% of the students were engaged in the most common types of PA like free play /unstructured activities for 1-5 days during lockdown, however, only 50% were active for all 7 days in the week before the lockdown despite no restrictions. School-based P.E also saw a major decline during the lockdown (only 12% of students had P.E for 2 days/week) in contrast to pre lockdown period (60%). Children increased their screen time for school related coursework (doing homework, attending online classes) and for leisure (watching TV, surfing the internet, playing video games). There could be immediate variations in PA and SB in response to COVID-19, predisposing children and youth to increased risk of gaining non-communicable diseases as well as musculoskeletal injuries in the long run. Thus, educational institutes,

teachers, parents and elders must indulge children into staying active throughout the day and across the entire school year for the next few months of the pandemic.

Keywords: Physical activity, sedentary behavior, elementary school children, lockdown, COVID-19

INTRODUCTION

In March 2020, the respiratory disease caused by the SARS-Cov-2 virus, COVID-19, was declared a pandemic by the World Health Organization. In response to the COVID-19 pandemic, the WHO declared a state of national emergency on a global level which brought about strict restrictions on human movement and physical interactions. To prevent the spread of the coronavirus, a complete lockdown on all non-essential services like schools, offices, public transport, shopping malls, gyms, movie theatres, recreation parks, etc. was imposed across the country. Thus, children had no access to school based physical activities like physical education (P.E), sports, outdoor games, out-of-school activities like karate, dance, yoga, etc.

In adults, it is now well established that high levels of sedentary time are associated with increased mortality rates, and specifically increased risk of some cancers and cardio metabolic disease. This recent evidence on adults has led to an increasing emphasis on policy and research

interventions to modify sedentary behavior during childhood. Studies have shown that due to insufficient physical activity and excessive sedentary behavior among children, there is an increased risk of a number of serious health conditions such as obesity, diabetes, etc. [2] Another study conducted has shown that participation in higher PA and lower SB during early childhood is associated with healthier outcomes. [3]

Physical activity (PA) is bodily movement produced from the contraction of skeletal muscles which results in energy expenditure raised above the resting level. Sedentary behavior (SB) is any behavior performed in a sitting or lying position with energy expenditure ≤ 1.5 times resting levels.

Promoting adequate levels of PA in children is a major public health issue. Recent studies have shown that almost half of children and youth in India do not meet daily recommended guidelines for physical activity and sedentary behavior. [4] As all schools across India were closed temporarily, online classes were conducted to limit the education gap.

Consequently, children have had no physical access to friends, peers, schoolmates and relatives for over two months. Limited or no opportunity for outdoor play and socialization may also impact children adversely, making them resort to other forms of entertainment such as playing video games, watching T.V, surfing the internet and other inactive hobbies for prolonged periods of time. Although many are active on electronic devices and stay virtually connected, there is a higher probability that they will be more engrossed in social media and online entertainment rather than going out to play. [6]

The neighborhood environment where children and youth spend most of their day influences the extent and variety of a set of behaviors. Outdoor spaces such as back/front yards, sidewalks, quiet streets and local parks/trails/playgrounds (where

use is allowed), are seemingly even more important places for children to engage in physical activity throughout the day. Limited access to these built environment features (e.g., when living in an apartment building or in a dense living environment) could lead to a marked decline in children's physical activity levels. [6]

As there is an increased risk of contracting non-communicable diseases in children due to prolonged physical inactivity, information about the impact of the COVID-19 pandemic on children's PA can bring about immediate policy changes during the next few months of the pandemic.

METHODS

In this cross-sectional online survey, 310 participants were recruited. Only the Physical activity and sedentary behavior components of the 'Active where?' survey was utilized. The link to the questionnaire with a brief explanation about the purpose of the study was circulated in the study population via various online platforms (WhatsApp, E-mail, Google Meet, Seesaw app, Facebook, Instagram) which was submitted using Google forms. The survey took about 5-10 minutes to complete.

Subjects:

Total 310 parents of children aged 9-13 yrs. from various schools across the Mumbai Metropolitan Region volunteered to participate in the study. Any children with musculoskeletal, cardiac and psychiatric conditions were excluded. The participants were provided with informed consent at the beginning of the survey and the study was approved by the institutional ethical committee of MGM College of Physiotherapy, Navi Mumbai.

Statistical analysis:

Data was collected on Google Spreadsheet. Data were analyzed using the Statistical Package for the Social Sciences software version 20.0 (IBM Corporation, Armonk, NY, USA). Descriptive statistics

were used to describe the demographic characteristics of the subjects participated in the study.

were females and 49.34% (151) were males. Out of 310 subjects were ranging from 9-10 years of age.

RESULT

A total of 310 subjects participated in the study, out of which 50.66% (n=155)

On comparison, the before and during lockdown values within each domain, were obtained.

Table 1: Shows the results from the physical activity component of the questionnaire before the lockdown.

Sr. No.	Questions	Before Lockdown%(n)					
		0 days	1	2	3	4	5 or more
1.	Over a typical or usual week on how many days is your child physically active for a total of at least 1 hour per day?	0	0.7% (2)	2.6% (8)	2.6% (8)	4.3% (13)	91.1% (278)
2.	Outside of school, how many days per week does your child play(outdoor games) or practice team sports?	3.3% (10)	2% (6)	7.5% (23)	12.1% (37)	19% (58)	56.1% (171)
3.	Outside of school, how many days per week does your child have activity training or instruction not in a team sport?	48% (146)	9% (28)	8.5% (26)	23% (69)	5% (15)	7.2% (22)
4.	How many days per week does your child have gym or Physical Education (P.E) class at school?	2% (6)	14% (43)	60.3% (184)	17% (53)	3% (9)	3.2% (10)

Table 2: Shows the results from the physical activity component of the questionnaire after the lockdown.

Sr. No.	Questions	After Lockdown%(n)					
		0 days	1	2	3	4	5 or more
1.	Over a typical or usual week on how many days is your child physically active for a total of at least 1 hour per day?	7.5% (23)	5.6% (17)	19% (58)	22.3% (68)	16% (49)	31% (93)
2.	Outside of school, how many days per week does your child play(outdoor games) or practice team sports?	36.7% (112)	15% (46)	27.5% (84)	11.5% (35)	4.6% (14)	5.2% (16)
3.	Outside of school, how many days per week does your child have activity training or instruction not in a team sport?	70.5% (215)	16% (49)	4.3% (13)	7.2% (22)	0.3% (1)	2.6% (8)
4.	How many days per week does your child have gym or Physical Education(P.E) class at school?	42.6% (130)	41% (125)	12% (37)	3.6% (11)	0	1.6% (5)

Table 3: shows the number of students active for at least 1 hour/day during the past 1 week.

Question	No. of days					
	0	1	2	3	4	5 or more
For the past 1 week, how many days was your child physically active for a total of at least 1 hour per day?	3.3% (10)	2% (6)	10.5% (32)	18% (55)	20% (60)	46.4% (142)

Table 4: Shows the results of sedentary behavior component of the questionnaire (Before lockdown).

Sr. No.	Questions	Before lockdown%(n)						
		0	15 mins	30 mins	1 hr	2 hrs	3 hrs	4 Hrs or more
1.	Watching T.V / videos/ DVDs in a day.	3.3% (10)	3.3% (10)	27% (82)	42% (127)	19% (59)	3.6% (11)	2% (6)
2.	Playing computer or video games in a day.	58% (178)	6% (18)	18% (56)	11.5% (35)	3% (10)	2% (6)	0.6% (2)
3.	Using the internet, emailing, or other electronic media for leisure in a day.	47% (142)	7% (21)	29% (88)	11% (33)	3.3% (10)	2.6% (8)	0.7% (2)
4.	Doing homework in a day	2.3% (7)	3.3% (10)	18.7% (57)	30% (91)	37% (113)	7% (21)	2% (6)
5.	Sitting listening to music	57.4% (175)	10.5% (32)	23.3% (71)	6.2% (19)	2% (6)	0	0.7% (2)
6.	Sitting talking on the telephone or texting	67% (204)	13% (41)	15% (47)	2% (6)	1% (4)	0.3% (1)	0.7% (2)
7.	Sitting/hanging out/talking with friends or family	7% (21)	4% (12)	24% (74)	30% (91)	23.6% (72)	7% (21)	4.6% (14)
8.	Reading a book or magazine NOT for school	39.3% (120)	9.2% (28)	39% (119)	13% (37)	0	0	0.3% (1)
9.	Doing inactive hobbies (music, art, crafts, going to movies etc)	27% (82)	8.5% (26)	42% (128)	18% (55)	3.3% (10)	1% (3)	0.3% (1)

Table 5 shows the results from the sedentary behavior component of the questionnaire (During lockdown).

Sr. No.	Questions	During lockdown%(n)						
		0	15 mins	30 mins	1 hr	2 hrs	3 hrs	4 Hrs or more
1.	Watching T.V /videos/DVDs in a day.	2.6% (8)	0.7% (2)	6.2% (19)	30.1% (92)	27% (82)	18.3% (56)	15.4% (47)
2.	Playing computer or video games in a day.	50.3% (154)	1.6% (5)	8.2% (25)	17% (52)	9% (28)	7% (21)	7% (21)
3	Using the internet, emailing, or other electronic media for leisure in a day.	20.6% (63)	1.3% (4)	20.3% (62)	17.6% (54)	13.4% (41)	18% (55)	9% (27)
4.	Doing homework in a day	5% (15)	21.4% (65)	34% (104)	23% (70)	8.17% (25)	5.2% (16)	3.6% (11)
5.	Sitting listening to music	46.7% (143)	6.2% (19)	19.3% (59)	17.6% (54)	7.8% (24)	1% (3)	1.3% (4)
6.	Sitting talking on the telephone or texting	49% (150)	13.3% (41)	19% (58)	14% (42)	2.3% (7)	1.6% (5)	1% (3)
7.	Sitting/hanging out/talking with friends or family	13.4% (41)	5% (15)	18.6% (57)	24% (74)	18.6% (57)	11.4% (35)	8.8% (27)
8.	Reading a book or magazine NOT for school	67.6% (207)	4.6% (14)	10% (30)	7.5% (23)	7.2% (22)	2.6% (8)	0.7 (2)
9.	Doing inactive hobbies (music, art, crafts, going to movies etc)	46.1% (141)	5.6% (17)	9.5% (29)	26% (80)	8% (24)	3.3% (10)	1.6% (5)

DISCUSSION

The present study found that more than half the total no. of the school students was not physically active during the week (for all 7 days) before the survey was conducted. Studies have revealed that 1 in 5 school children did not have adequate 'endurance capability' and 1 in 4 did not have 'desired flexibility.' [10]

A Randomized controlled study conducted on children and youth showed that there was significant annual decline in Moderate-to-vigorous-intensity physical activity (MVPA) levels across all age groups. [11] Results have found that children had similar patterns of activity that were seen before COVID-19. In the current study, some students were involved in inactive hobbies like art/craft/music even before the lockdown period, suggesting that their activity levels might have decreased further due to quarantine measures, however there were some children who had habitual activity training so their PA levels did not differ at all. According to WHO, the daily recommended levels of physical activity for children aged 5-17 years should be about 60 minutes of MVPA. In this current study, majority of the students were somewhat active during the lockdown for at least 1 hour during the entire week.

Few students had engaged in some form of activity training like yoga, dance,

karate, etc. via online instructional videos, before and during lockdown for 1-3 days every week. This finding was not surprising given the closure of gyms and fitness clubs. Another study has revealed that increased VPA and MVPA and decreased ST (sedentary time) were associated with reduced overall cardio metabolic risk factors. [12] Apart from non-communicable diseases like CVD, diabetes, obesity, there is a potential increase in the risk of gaining musculoskeletal injuries as a consequence of leading a sedentary lifestyle. [13,14] Prolonged periods of inactivity among children could lead to postural dysfunction, which may place them at a high risk of spine abnormalities. Studies have shown the relation between smartphone addiction and forward head posture due to constant neck flexion resulting in limited cervical ROM. [15]

Some parents have reported that their children were physically inactive during the lockdown due to strict social distancing and online classes. This has contributed to an increase in sedentary time from pre lockdown periods. Children could be less active due to anxiety and depression. There is a heightened fear of the COVID 19 threat among children, which is affecting their overall mental and social wellbeing. [16]

Before lockdown, despite there were no constraints, almost half the total no. of students did not participate in any outdoor games/sports activities. This could be attributed to multiple factors like built environmental structures promoting increase in sedentary pursuits, poor school infrastructure, limited access to playgrounds/parks/trails. However, during the lockdown this percentage was reduced even further as most of the students were restrained within their homes.

Out of the total no. of students surveyed, about only half the number had P.E during the lockdown along with their online classes, indicating that there might have been a potential performance of some physical activity on weekdays. State and national policy makers should implement guidelines for schools to increase the time allotted for Physical Education.

Even though the recommended levels for sedentary pursuit is <2h per day, our current study has revealed that there has been an increase in screen time with a consequent decline in healthy LPA/MVPA since the start of the lockdown. The above-mentioned findings have been supported by other research papers that have found an association between developmental pathways of healthy MVPA and television viewing behaviors. [17,18] Also, data from ISCOLE studies have shown that children aged 9-11 years spend around 9 hours of sedentary time during the day. [19] There was a contrasting reduction in time spent in sitting and reading books as school libraries were closed during the lockdown. However, this was compensated by engaging in other inactive hobbies like art, craft and spending time with friends/family.

Sex differences were determined particularly in sedentary activities like playing computer/video games, surfing the internet which was high among boys and in activities like art, craft which was high among girls. This observation is also supported by another study which was conducted in the U.S during the COVID-19 pandemic. [2]

In this current study, PA and SB were the main components of children's activity during hours awake. As this survey was based on a subjective questionnaire, there were a few limitations observed, which could be rectified in future studies. Free play is an important part of children's physical and social development; however, during social distancing and strict isolation measures, the world is dependent solely on technology to live, learn and work. This has highlighted the urge to focus on children's healthy behaviors and adopt strategies to improve their quality of life.

Abbreviations: -

PA: Physical activity

SB: Sedentary behavior

ST: Sedentary time

P.E: Physical education

MVPA: Moderate-to-vigorous physical activity

VPA: Vigorous physical activity

LPA: Low physical activity

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