



UNIVERSITI PUTRA MALAYSIA

***FEASIBILITY OF DISTANCE-MONITORING ON SEDENTARY TIME AND
PHYSICAL ACTIVITY AMONG SRI LANKAN ADOLESCENTS***

**WICKRAMARACHCHI W KANKANAMALAGE DONA
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FPP 2022 50



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By

**WICKRAMARACHCHI W KANKANAMALAGE DONA SHASHINI
ANUSHKA**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Master of Science**

January 2022

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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January 2022

Chairman : Associate Professor Tengku Fadilah Tengku Kamalden, PhD
Faculty : Educational Studies

COVID-19 restrictions such as the closure of schools and parks, and the cancellation of youth sports and activity classes around the Sri Lanka may prevent children from achieving recommended levels of physical activity (PA). The study was carried out during the COVID 19 pandemic in Sri Lanka and it took into considerations factors such as physical activity level (PA level), sedentary behaviour (SB), behavioral sleep problems (BSP) and body mass index (BMI). The prime aim of this study was to examined the feasibility of distance-monitoring concept on sedentary time (ST) and PA of Sri Lankan adolescents. Along four minor objectives were to assess the current status of PA and ST, find the effectiveness of distance monitoring program on PA and ST, find the relationship between to PA, ST, BSP, BMI and finally compare the differences of PA, ST BSP and BMI among gender.

Study was conducted by using concurrent triangulation design under the mixed method research approach. Data were obtained from 347 male and female adolescents aged between 13-17 years old in the year 2020 and 2021 from four provinces in Sri Lanka by using multi stage sampling technique. Data were obtained from WHO STEPS instrument for PA and Adolescent Sedentary Activity Questionnaire (ASAQ) for ST. Parents also reported children BSP through Children's Sleep Habits Questionnaire (CSHQ). Additionally, participants were recorded their usual daily activities in a given diary template which include PA, BSP and other activities over a two months' (2) period. Main outcome was to assess the feasibility of the distance monitoring programme defined as recruitment and retention >70% and treatment fidelity of >80% of distance monitoring programme.

A total of 500 participants were invited to participate, 420 adolescents met eligibility criteria, and were recruited. At follow-up, the overall retention of participants was 347

(82.6%) and treatment fidelity rate was 87.5%. The study found that PA level of the respondents increased significantly from 784.7 MET/min per week to 831.7 MET/min per week ($p < 0.05$). The ST also decreased significantly from 3490 min/per week to 3332 min/per week ($p < 0.05$). Educational time and cultural time of adolescents were highly correlated with total sedentary time. There is no positive relationship between PAL, BSP and BMI. However, there is a positive relationship between ST and BMI. Our findings also showed 34% of adolescents were suffering from sleeping problems. The study also showed that 66% of adolescents adhered to the recommended guidelines using distance monitoring. According to the thematic analysis students and teachers' perception on this was an even chance to accept this distance monitoring concept among the adolescents in Sri Lanka. Parents seems to think it's impractical and it's a quite challenge to implement. Hence, distance monitoring has potentials in regulating and decreasing (SB) among adolescents in Sri Lanka and it's feasible. Future research is recommended to help develop better and effective guidelines on distance monitoring to decrease SB especially during the COVID 19 pandemic in Sri Lanka.

Key words: Distance monitoring, Adolescents, PA level, sedentary behavior, Sri Lanka

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

FEASIBILITY OF DISTANCE-MONITORING ON SEDENTARY TIME AND PHYSICAL ACTIVITY AMONG SRI LANKAN ADOLESCENTS

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Sekatan COVID-19 seperti penutupan sekolah dan taman, dan pembatalan kelas sukan dan aktiviti belia di sekitar Sri Lanka mungkin menghalang kanak-kanak daripada mencapai tahap aktiviti fizikal (PA) yang disyorkan.” Kajian ini dijalankan semasa pandemik COVID 19 di Sri Lanka dan ia mengambil kira faktor seperti tahap aktiviti fizikal (tahap PA), tingkah laku sedentari (SB), masalah tidur tingkah laku (BSP) dan indeks jisim badan (BMI). Matlamat utama kajian ini adalah untuk mengkaji kebolehlaksanaan konsep pemantauan jarak pada masa sedentari (ST) dan PA remaja Sri Lanka. Di sepanjang empat objektif kecil adalah untuk menilai status semasa PA dan ST, mencari keberkesanan program pemantauan jarak jauh pada PA dan ST, mencari hubungan antara PA, ST, BSP, BMI dan akhir sekali membandingkan perbezaan PA, ST BSP dan BMI antara jantungina.

Kajian ini telah dijalankan dengan menggunakan reka bentuk triangulasi serentak di bawah pendekatan kajian kaedah campuran. Data diperolehi daripada 347 remaja lelaki dan perempuan berumur antara 13-17 tahun pada tahun 2020 dan 2021 dari empat wilayah di Sri Lanka dengan menggunakan teknik persampelan pelbagai peringkat. Data diperolehi daripada instrumen WHO STEPS untuk PA dan Soal Selidik Aktiviti Sedentari Remaja (ASAQ) untuk ST. Ibu bapa juga melaporkan BSP anak melalui Soal Selidik Tabiat Tidur Kanak-kanak (CSHQ). Selain itu, para peserta telah direkodkan aktiviti harian biasa mereka dalam templat diari yang diberikan termasuk PA, BSP dan aktiviti lain dalam tempoh dua bulan (2). Hasil utama adalah untuk menilai kebolehlaksanaan program pemantauan jarak yang ditakrifkan sebagai pengambilan dan pengekaln >70% dan kesetiaan rawatan > 80% program pemantauan jarak jauh.

Seramai 500 peserta telah dijemput untuk mengambil bahagian, 420 remaja memenuhi kriteria kelayakan, dan telah dipilih. Pada susulan, pengekaln keseluruhan peserta ialah

347 (82.6%) dan kadar kesetiaan rawatan ialah 87.5%. Kajian mendapati tahap PA responden meningkat dengan ketara daripada 784.7 MET/min seminggu kepada 831.7 MET/min seminggu ($p < 0.05$). ST juga menurun dengan ketara daripada 3490 min/seminggu kepada 3332 min/seminggu ($p < 0.05$). Masa pendidikan dan masa budaya remaja sangat berkorelasi dengan jumlah masa yang tidak aktif. Tiada hubungan positif antara PAL, BSP dan BMI. Walau bagaimanapun, terdapat hubungan positif antara ST dan BMI. Penemuan kami juga menunjukkan 34% remaja mengalami masalah tidur. Kajian itu juga menunjukkan bahawa 66% remaja mematuhi garis panduan yang disyorkan menggunakan pemantauan jarak jauh. Menurut analisis tematik, persepsi pelajar dan guru mengenai perkara ini adalah peluang yang nipis untuk menerima konsep pemantauan jarak jauh ini dalam kalangan remaja di Sri Lanka. Ibu bapa nampaknya menganggapnya tidak praktikal dan ia agak mencabar untuk dilaksanakan.

Oleh itu, pemantauan jarak jauh mempunyai potensi dalam mengawal selia dan mengurangkan (SB) dalam kalangan remaja di Sri Lanka dan boleh dilaksanakan. Penyelidikan masa depan disyorkan untuk membantu membangunkan garis panduan yang lebih baik dan berkesan mengenai pemantauan jarak jauh untuk mengurangkan SB terutamanya semasa pandemik COVID 19 di Sri Lanka.

Key words: Pemantau jarak jauh, remaja, paras aktiviti fizikal, tingkah laku sedentari, Sri Lanka

ACKNOWLEDGEMENTS

First I wish to express my deepest sense of gratitude to my main supervisor Associate Professor Dr. Tengku Fadilah Tengku Kamalden, Head, Department of Sport Studies in Faculty of Educational Studies who was always with me and gave me her cheerful, kind corporation and clear guidance throughout my study to success completion. Also my deepest gratitude was extended to my core supervisor Professor Soh Kim Geok, lecturer Department of Sport Studies, Faculty of Educational Studies for her guidance and humbleness blessing to make this research success.

Further I extend my gratitude to Professor Emeritus Dr. Kamariah Abu Bakar, Dr. Nasnoor Juzaily Mohd Nasirddin and Qais Gasibat for their valuable comments and support to make this research success.

I extend my sincere thanks to all professors and lecturers of the Faculty of Educational Studies and Faculty of Graduate Studies, University of Putra Malaysia for their encouragement and moral support in completing this study.

Specially I thankful to all subjective members of this research sample in Sri Lanka. Last but not least my heartex.st thankfulness goes to my husband, son, parents, colleagues and those who have helped me during this study for their encouragement, assistance and valuable support.

This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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- the research conducted and the writing of this thesis was under our supervision;
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LIST OF ABBREVIATIONS

ASAQ	Adolescents Sedentary Activity Questionnaire
ANOVA	Analysis of Variance
BSP	Behavioral Sleep Problems
BP	Blood Pressure
BMI	Body Mass Index
CSHQ	Children's Sleep Habit Questionnaire
CI	Confident Interval
CAD	Coronary Artery Diseases
COVID	Corona Virus Disease
DF	Degree of Freedom
DVD	Digital Versatile Disk
FHB	Family Health Bureau
LKR	Lanka Rupee
MET	Metabolic Equivalent
MIN	Minutes
NCD	Non Communicable Diseases
OW	Over Weight
PA	Physical Activity
PA Level	P Activity Level
SB	Sedentary Behavior
SD	Sleeping Disturbance
SD	Standard Deviation
SE	Standard Error

SL	Sri Lanka
SSB	Sugar Sweet Beverages
TV	Television
WHO	World Health Organization



CHAPTER 1

INTRODUCTION

Moderate-to-vigorous physical activity (PA) and restricting sedentary behaviour (SB) are both recognized independent risk factors for poor health outcomes in children and adolescents around the world (Carson et al., 2016; Veronica et al., 2015; Tremblay et al., 2011; Janssen & Leblanc, 2010).

Children and adolescents are unable to engage in PA outside of the home due to severe limitations. As the confinement of individuals in a small, enclosed space, severely restricts movement and has a negative impact on spontaneous PA that is generally associated with the demands of everyday living outside the home. A high level of physical inactivity and/or SB, are well known due to lack of moderate to high intensity PA (Margaritis et al., 2020). According to the current situation, which has been impaired by the COVID-19 pandemic, where general population PA levels have fallen significantly below of commonly observed, it is critical to maintain or improve physical fitness in order to avoid an increase in the risk of hypokinetic diseases and all-cause mortality. The current study found that exercising at home is a safe and effective way to maintain a healthy lifestyle (Schwendinger et al., 2020)

Physical exerciser can be considered as one of the main determinant of lifestyle-related health. However, during the adolescence period, it can be noticed that this health protecting behaviour is continuously decreasing. The reduced number of people getting required exercises has affected changes in lifestyles developments in economies. When compared with the other emerging countries, Sri Lanka's decrease in getting required physical exercises levels was found to be minimal. When compared with the other emerging countries, Sri Lanka has decreased in getting required physical exercise levels were found to be minimal. As a result, increased levels of physical exercises, also at a moderate pace, are linked to a significant reduction in risk. There can be seen an increasing trend of non-communicable diseases (NCD) in Sri Lanka. Most of the NCD caused due to overweight, unhealthy eating patterns, obesity and due to less exercises. Within Sri Lanka, around 75% of the death were caused by NCD. Cardiovascular can be known as the main reason for deaths and cancers whereas the second factor. NCD's are thought to be responsible for approximately 20% of all premature death in Sri Lanka (i.e. deaths that occur between the ages of 30 and 70 years). NCD can be considered as one of the main health problem in Sri Lanka and more than that it has become such a huge economic burden. NCD are increasing due to combined factors of ageing population, increase of unhealthy and sedentary lifestyles and consumption of less nutrient foods (WHO, 2017).

Therefore, Sri Lanka faces similar circumstances where physically inactive citizens increased by the numbers during this COVID 19 pandemic. In an effort to slow down the rate of infection, major social distancing and isolation policies have been

implemented worldwide for groups susceptible to high risk of morbidity and mortality. In this situation significant concern is drawn towards people who are living with NCDs as they are at higher risk of severe COVID 19 related illness and death. Not only that but also most of the children and adolescents also being inactive and there is a possibility to increase lifestyle associated risk factors due to sedentary life patterns (Woods et al., 2020).

According to a study conducted among 8-12-year-old school children in an urban area of SL, Sri Lankan children and adolescents have become more physically inactive as a result of globalization and fast urbanization. Children are more physically inactive, and the prevalence of overweight and obesity among older children is on the rise (Wickramasinghe et al., 2010). Therefore, rise of NCD among Sri Lankans can be considered as a highlighted factor and adolescence is a crucial period in the growth of obesity and overweight. Further due to increased consumption of calorie-dense foods and high sugar contained sweetened beverages, children become overweight. National Nutrition Data of 2016, family health bureau indicates that 5-6% of the school children are overweight. Obesity in children is a serious problem. Childhood obesity may have significant long term effects in adulthood, ranging from low self-esteem and depression to diabetes and heart disease (NCD risk factor survey, Sri Lanka, 2015).

This research focuses on the feasibility of distance-monitoring on PA and sedentary time of Sri Lankan adolescents during this COVID 19 pandemic. This is especially important during this COVID 19 pandemic period when distance monitoring concept is more feasible to reach to adolescents to assess their PA level and sedentary time.

1.1 Background of the study

The recent technological advancements adults, children, and adolescents have more spare time and opportunity to engage in sedentary activities. Therefore, the global population has become more sedentary (Hardy et al., 2010). SB can be considered as a global public health concern (Park et al., 2020). It is characterized as an activity to time that has spent on sleeping (Sampasa-Kanyinga et al., 2020; Tremblay et al., 2017; Bames et al., 2012). Sedentary habits have been linked to unfavourable health issues such as overweight/ obesity, higher blood pressure and total cholesterol, reduced levels of self-esteem, body fitness, and academic success, regardless of PA (De Rezende et al., 2014). Sedentary activities have several sub domains such as watching television (TV), playing video games, surfing internet, reading books, and engagement with passive transportation (Le-Blanc et al., 2017; Ainsworth et al., 2011). Higher levels of PA and less time spent sitting are linked to improved health-related quality of life in children and adolescents, (Wu et al., 2017) and there is a relationship between PA, SB and health-related quality of life in children and adolescents as a whole. In most countries, adolescents/ young adults under the age of 19, begin university life, start new life, moving away from their parents, result in increased psychological anxiety, heavy use of social devices and disrupted sleep (Sampasa-Kanyinga et al., 2020; Leger et al., 2012). As a result, young people are at a high risk of engaging in various forms of sedentary activity and develop irregular sleeping patterns.

In children and adolescents, PA is well-known for providing a lot of health benefits (WHO, 2010). However, 81% of 11–17-year-olds students around the world were not getting enough PA (Guthold et al., 2020). Physical inactivity is a significant danger to the population's health and well-being, and proven successful policies and programs which introduced to boost physical activity levels (PA level) in the population, especially children and adolescents, need to be increased up immediately (Guthold et al., 2018; WHO, 2013; Ekelund et al., 2012; Lee et al., 2012). Today computer devices and social media platforms have reduced the interest of children's need for and ability to run and play (Biddle et al., 2009). PA participation would decline with age, and it is more pronounced in girls compared to boys (Cooper et al., 2015). There should be a great influence from family over pushing children to be physically active every day and parents should introduce children the exercises that match to their age and proactive leadership should be comes from family and friends towards this. Owing to sedentary lifestyle trends, the lack of recognition of predictors of childhood behaviour is trouble when considering all of these factors. The claim that childhood exercise habits carry over into adulthood and as a consequence of that it will have a significant impact on illness, later in life (Zecevic et al., 2010). Early disease symptoms such as obesity, cardiorespiratory health, and blood pressure have been linked to physical exercise since childhood. Having regular exercises would help teenagers to enhance the cardiorespiratory fitness, it will help in building healthy bones and muscles will help sustain weight, relieve anxiety and depressive symptoms, and lower their risk of getting health problems such as heart diseases, severe cancers, type 2 diabetes, high blood pressure, osteoporosis, and obesity. For children and teenagers, having daily exercises and daily playing activities have historically been an integral part of their lives (WHO, 2013).

Poor sleep or not enough sleep affects concentration, memory and behaviour of children and adolescents. As a result, children get more fatigued and engage in less physical exercise. Sleep is something that is most important for the mental and physical health of a child. Unfortunately, recent research data indicates that there is a trend of getting reduced sleep in childhood due to constant waking times and late to bed habits of the children (Iglowstein et al., 2003; Matricciani et al., 2012). School-aged children should get a longer hours compared to the adolescents and adults and requiring 10-11 hours of sleep a night on average (Meltzer and Mindell, 2006). At present, an average child who is not getting the recommended amount of sleep, will lead to a variety of problems during the daytime. If a young person does not get the adequate sleep, it can lead to various of negative issues during the day. Sleep related problems, in terms of quantity and consistency, may have a significant effect on daytime activities of children (Vriend et al., 2012). Further they expressed that inadequate sleep was linked to elevated negative affect such as higher level of depression, anger and impaired focus in normally developing children. Further, study stated that the influence of children's sleep on daytime functioning was investigated by making it shorter and expansion children's normal sleeping period by one hour for four days (Vriend et al., 2013). Sleep deprivation caused significant problems with anger control, less positive affect, poor concentration and decreased productivity.

When people can't get in touch with their subordinates, such as in a pandemic or a lockdown, use emails, smartphone applications, or other technology to send instructions or direction. Accordingly, distance monitoring of PA may have potentials to prevent SB. PA monitoring at distance interventions has been shown to increase self-responsibility and self-efficacy may help people improve their health practices. Self-monitoring activities, such as keeping diaries or journals, provide cues to engage in desired behaviour while being simple to deliver, low in cost, and time consuming for the health care provider (Gleeson-Kreig, 2006). Home-based projects were reported to have greater compliance to practice treatments and reduced costs than programs that required participants to attend a class (Oman et al., 2000). In two ways, a distance-monitoring intervention can be beneficial. First, activity tracking gives information about an individual's actual behaviour. A visual record of performance is provided and it shows progress and areas for improvement. Secondly activity tracking allows social influence by allowing the health care provider to acknowledge the client's efforts and describe how activity fits into daily life. The document or the activity recorder could potentially be used for self-persuasion (Gleeson-Kreig, 2006).

Across the world PA level decreased during the COVID-19 lockdown. SB levels had increased in the majority of investigations. Promotion of PA and effective counselling on how to reduce SB during a lockdown should be part of public health measures (Stockwell et al., 2021).

1.2 Problem statement

Promoting adequate levels of PA in children is a major public health issue. Recent estimates suggest approximately three-quarters of Sri Lankan children and youth between the ages of 6 and 15 years fail to meet the 2018 Physical Activity Guidelines for Sri Lankans recommendation of at least 60 min of moderate-to-vigorous physical activity (MVPA) per day (SLSEM Conference, 2018). Additionally, nearly half of Sri Lankan children and youth between the ages of 6 and 11 years engage in two or more hours of screen time per day a level of behavior greater than recommended levels (SLSEM Conference, 2018). Insufficient PA and excessive SB among children represents a significant problem because health behavior patterns in childhood are likely to persist into adulthood and can lead to increased risk for a number of serious health conditions (e.g., overweight/obesity, type II diabetes, and metabolic syndrome) in later childhood and adulthood (Sooriyaarachchi et al., 2021). It has been argued COVID-19 school closures will lead to increased rates of obesity in children (Rundle et al., 2020 and Workman., 2020) in part because schools provide opportunities and facilities for physical activity through physical education and recess (Fairclough and Stratton, 2006; Ridgers et al., 2012).”

Therefore, this pandemic is preventing adolescents from attending school. The majority of PA and extracurricular activities take place at school. However, due to pandemic, they are currently resting at home. As a result, they don't move much and don't engage in physical activities. Teachers were monitoring them in school before the outbreak. However, they are no longer able to monitor them at school. Consequently, there is no

proper monitoring mechanism. Reijonsaari et al., (2009) revealed that no trials were yet available that have evaluated the effectiveness of daily physical activity monitoring and distance counselling. Therefore, this study attempt to apply distance monitoring to determine whether distance monitoring is feasible for increasing PA and decreasing SB.

The following are the most common reasons for SB as a result of technological disruption. Adolescents were use mobile apps to play games on their phones, and anxious parents in Sri Lanka and their high expectations of good grades prompted after school private classes and leads to SB. Therefore, they do not have enough time to do any physical activities (Karunanayake et al., 2020).

Currently, there were no evidence of studies done in the South Asia to examine the feasibility of distance monitoring on PA and SB among adolescents through questionnaires. This study hopes to contribute to the knowledge and understanding on the effectiveness of this novel method of lifestyle intervention, PA and ST monitoring using distance monitoring.

1.3 General Objective of the Study

- 1.3.1 To examined the feasibility of distance-monitoring concept on ST and PA level of Sri Lankan adolescents

1.4 Research Questions

- 1.4.1 What is the current status of sedentary time and level of physical activity of Sri Lankan adolescents?
- 1.4.2 How effective is the distance monitoring in reducing ST and increasing PA level among Sri Lankan male and female adolescents?
- 1.4.3 What is the relationship between physical activity, sedentary time and BMI among Sri Lankan male and female adolescents?
- 1.4.4 Is there any difference between PA level, sedentary time, BSP and BMI among gender?

1.5 Hypothesis

- H1** - Distance monitoring program will be feasible among Sri Lankan adolescents
- H2** - The status of ST and the level of physical activity of Sri Lankan adolescents will be high
- H3a** - There will be a decrease in sedentary time among Sri Lankan male and female adolescents
- H3b** - There will be an increase in physical activity level among Sri Lankan male and female adolescents
- H4a** - There will be a negative relationship between PA level and ST
- H4b** - There will be a positive relationship between ST and BMI
- H4c** - There will be a positive relationship between ST and BSP
- H4d** - There will be a negative relationship between PA level and BMI
- H4e** - There will be negative relationship between PA level and BSP

Independent variable: Distance Monitoring

Dependent Variable: PA Level, ST, BMI, BSP

1.6 Conceptual Framework

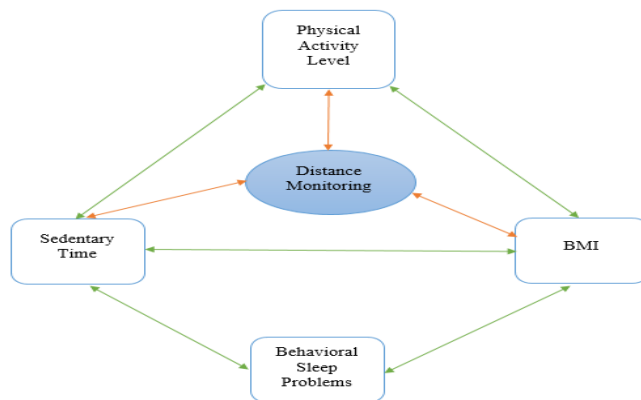


Figure 1.1 : Conceptual Framework of this Study

Figure 1.1 illustrated the four variables that used in this study. They were PA level, ST, BMI and BSP. It showed how these four variables were interrelated with distance monitoring concept. Green colour arrows represented the relationship between each variable. Effectiveness of the distance monitoring on PA level and sedentary time and BMI represented in orange arrows respectively.

1.7 Significance of the study

Regular PA benefits both the body and mind. It can reduce high blood pressure, help manage weight and reduce the risk of heart disease, stroke, type 2 diabetes, and various cancers. It also improves bone and muscle strength and increases balance, flexibility and fitness. For children, regular PA helps support healthy growth and development and reduce the risk of disease in later life, and through regular activity, children can develop fundamental movement skills and build social relationships. Regular PA also improves mental health and can reduce the risk of depression, cognitive decline and delay the onset of dementia - and improve overall feelings of wellbeing.”

Especially in pandemic period distance monitoring physical activity program identical for children to make them active. For children and adolescents, moderate-to-vigorous physical activity and exercise during the day are associated with elevations in self-esteem, improved concentration, reductions in depressive symptoms, and improvements in sleep. Further this program is important for family members to take a supportive role in the promotion of PA and exercise. Allowing individuals to maintain their autonomy and choice in their activities will be important for ongoing engagement.”

This type of research can contribute new knowledge to the field such as increasing the level of PA is associated with a wide spectrum of benefits, from improvements in lipid and glucose homeostasis to improved endothelial function (Wyszyńska et al., 2020). Such health outcomes have usually occurred independent of changes in BMI. A higher level of PA in childhood is correlated with lower risks of cardiovascular diseases, type 2 diabetes, and increased life expectancy in adulthood (cesa et al., 2014).”

Further, distance monitoring of PA should be encouraged as a tool to increase self-efficacy and potentially long-term changes in behavior.”

1.8 Scope and limitations of the study

1.8.1 Scope of the study

This study was carried out at the selected schools in four provinces of Sri Lanka to assess the feasibility of distance monitoring on sedentary time among 13-17 age adolescents during COVID 19 pandemic. Over a 2-months period, daily activities were reported

through activity monitor diary. A questionnaire was used to collect data on PA level, ST, and BSP at three different points during the study. The analysis of the distance monitoring was based on the effectiveness of this program.

1.8.2 Limitations of the study

As the first limitation, it can mention that the questionnaire has to be self-completed. According to this study participant have to completed questionnaire initially of this study and after one month of period. Therefore, at that time there could be memory effect in their responses.

Second limitation is, this study includes adolescents who are in selected schools in Sri Lanka, which may not reflect the population of all adolescents in a country.

Third limitation is, PA and SB assessments in this study was based on adolescents' self-report and parent-report, and thus may have affected the measurement error.

1.9 Definitions

1.9.1 Operational Definitions

1.9.1.1 Physical Activity

“Any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2020).”

Table 1.1 : Standards of Physical activity level

PA level	MET Min. per week
Low	<600
Moderate	600 – 1500
High	>1500

(Source: Global PA analysis guide, 2018)

1.9.1.2 Sedentary Behavior

Sedentary behaviour (SB) can be known as sitting or lying down, (including the exception of sleep). SB can be conducted at work, at school, at home, during travelling or during the leisure time of a person. SB necessitates a low level of energy consumption.

Any waking activity accompanied by energy expenditure of 1.5 metabolic equivalents when in a sitting, reclining or lying position referred to as SB (Tremblay et al., 2017).”

1.9.1.3 Behavioral Sleep Problems

Sleep is a reversible behavioural state of perceptual disengagement from and unresponsiveness to the environment. It is also true that sleep is a complex amalgam of physiologic and behavioural processes (Carskadon & Dement 2011). Behavioural sleep problem is problems with the quality, timing, and amount of sleep, which result in daytime distress and impairment in functioning. Behavioural sleep problems in children include bedtime refusal or resistance, delayed sleep onset, and prolonged night awakenings (Owens et al., 2017).”

1.9.1.4 Body Mass Index

An estimate of an individual’s relative body fat calculated from his or her height and weight. It is calculated using the formula $BMI = \text{weight (kg)} / \text{height (m)}^2$. Obesity is medically defined as a BMI over 30 (Glossory: Harvard Medical School, 2020)

Table 1.2 : BMI Classification

BMI	BMI Category
<18.5kg/m ²	Under weight
18.5–22.9kg/m ²	Normal weight
23.0–24.9kg/m ²	Over weight
>25.0kg/m ²	Obesity

1.9.1.5 Adolescents

Adolescence, transitional phase of growth and development between childhood and adulthood. The World Health Organization (WHO) defines an adolescent as any person between ages 10 and 19 (Csikszentmihalyi and Mihalyi, 2021).”

1.10 Summary

The aim of this chapter is to introduce and provide a brief overview of the context and reasoning for this research study. The chapter helps to get a brief idea about how distance monitoring concept impacts to PA level and SB during COVID 19 pandemic. This chapter gives an idea about the background, scope and limitations of this study.

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