THE FUNDAMENTAL UNDERSTANDING OF THE IMPACT USING BRAIN-BREAKS ON SARAWAKIAN INDIGENOUS CHILDREN BASED ON PHYSICAL ACTIVITY, NUTRITION AND HYGIENE: A UNITED NATION SDG PROJECT - #3 GOOD HEALTH AND WELL BEING

LIM TING LEN

UNIVERSITI SAINS MALAYSIA

2023

THE FUNDAMENTAL UNDERSTANDING OF THE IMPACT USING BRAIN-BREAKS ON SARAWAKIAN INDIGENOUS CHILDREN BASED ON PHYSICAL ACTIVITY, NUTRITION AND HYGIENE: A UNITED NATION SDG PROJECT - #3 GOOD HEALTH AND WELL BEING

by

LIM TING LEN

Thesis submitted in fulfilment of the requirements
for the degree of
Master of Science

SEPTEMBER 2023

ACKNOWLEDGEMENT

First and foremost, I would like to express my gratitude to God for providing me with the opportunity and endless help in completing this thesis. Only through His grace have I been able to fulfill my responsibilities as a postgraduate student and bring this thesis to completion. I am sincerely thankful to all the people who have contributed to the successful completion of this thesis.

I would like to extend my heartfelt gratitude to my supervisor, Associate Professor Dr. Garry Kuan Pei Ern, and my co-supervisors, Dr. Chin Ngien Siong, Associate Professor Dr. Kueh Yee Cheng, and Dr. Mohd Rahimi Bin Che Jusoh, for their unwavering support and guidance throughout my master's program. Their expertise and patience have been invaluable, and they have played a crucial role in the success of this thesis.

I am also deeply grateful to all the teachers and students at Sekolah Kebangsaan Ulu Yong and Sekolah Kebangsaan Nanga Embuau, who despite their busy schedules, participated and assisted me in my studies. Their cooperation and understanding throughout this study were greatly appreciated.

Furthermore, I would like to express my gratitude to my friends and family for their love and support during this challenging journey. Without their encouragement and motivation, I would not have been able to accomplish this significant achievement.

TABLE OF CONTENTS

ACKNOWLEDGEMENT ..... **ii**

TABLE OF CONTENTS ..... **iii**

LIST OF TABLES ..... **vi**

LIST OF FIGURES ..... **vii**

LIST OF ABBREVIATIONS ..... **ix**

LIST OF APPENDICES ..... **x**

ABSTRAK ..... **xi**

ABSTRACT ..... **xiii**

CHAPTER 1 INTRODUCTION **1**

1.1 Background of the study 1

1.2 Problem statement 2

1.3 Research questions 3

1.4 Research hypotheses 4

1.5 Research aim and objectives 4

1.5.1 Specific objectives 4

1.6 Conceptual framework 5

CHAPTER 2 LITERATURE REVIEW **6**

2.1 Physical activity in school 6

2.2 Technology supported brain breaks 7

2.3 Health-related fitness 10

2.4 Nutritional status 13

2.5 Personal hygiene 14

CHAPTER 3 METHODOLOGY **17**

3.1 Study design 17

3.2 Study area 17

3.3 Study population 17
3.4 Sampling method and subject recruitment 18
3.5 Sample size estimation 18
3.6 Study procedures 19
3.7 Ethical consideration 22
3.8 Research instruments 23
3.8.1 Sit and reach 23
3.8.2 Standing long jump 23
3.8.3 Vertical jump 24
3.8.4 Sit up 24
3.8.5 Push up 25
3.8.6 Body composition 25
3.8.7 Beep test 26
3.8.8 3 days food record 27
3.8.9 Personal hygiene records 28
3.9 Intervention 28
3.9.1 Technology supported brain-breaks (with Educational Seminar) 28
3.9.2 Operational definition 30
CHAPTER 4 DATA ANALYSIS AND FINDINGS 31
4.1 Introduction 31
4.2 Participant Characteristics 31
4.3 Effect of brain-breaks on health-related fitness 35
4.4 Effect of brain-breaks on 3-day food intake 43
4.5 Effect of brain-breaks on personal hygiene 47
CHAPTER 5 DISCUSSION 58
5.1 Introduction 58
5.2 Research Objetive 1 on Health-related fitness 59

5.3 Research Objective 2 on Nutritional status 60

5.4 Research Objective 3 on Personal hygiene 62

5.5 Conclusion..... 63

CHAPTER 6 CONCLUSION AND FUTURE RECOMMENDATIONS..... 65

6.1 Conclusion..... 65

6.2 Recommendations for Future Research 66

REFERENCES..... 68

APPENDICES A: ETHICAL APPROVAL LETTER

APPENDICES B: APPROVAL LETTER FROM MINISTRY OF EDUCATION

APPENDICES C: APPROVAL LETTER FROM STATE EDUCATION

APPENDICES D: ETHICAL CONSENT FORMS

APPENDICES E: PICTURES

LIST OF PUBLICATION

LIST OF PAPER PRESENTATIONS

LIST OF TABLES

Page

Table 4.1 Demographic Characteristics of the Participants (N=35) – Intervention Group 32

Table 4.2 Demographic Characteristics of the Participants (N = 35) – Control Group 34

Table 4.3 Descriptive Statistics for Health-Related Fitness Test Variables 37

Table 4.4 Mixed Factorial ANOVA and *F*-statistics for Health-Related Fitness Test 39

Table 4.5 Descriptive Statistics for 3 Days Food Record Variables 44

Table 4.6 Mixed Factorial ANOVA and F-statistics for 3 Days Food Record Variables 45

Table 4.7 Descriptive Statistics for Personal Hygiene Record Variables 48

Table 4.8 Mixed Factorial ANOVA and F-statistics for Personal Hygiene Record Variables 51

LIST OF FIGURES

Page

Figure 1.1 Conceptual framework.....5

Figure 3.1Study flowchart.....21

Figure 4.1The marginal means of intervention and control group for sit and reach (flexibility) with pair t-test result.....40

Figure 4.2 The Marginal means of intervention and control group for standing long jump (muscular strength).....40

Figure 4.3 The marginal means of intervention and control group for vertical jump (muscular strength).....41

Figure 4.4 The marginal means for intervention and control group for sit up (muscular endurance).....41

Figure 4.5 The marginal means for intervention and control group for push up (muscular endurance).....42

Figure 4.6 The marginal means for intervention and control group for body fat (body composition percentage).....42

Figure 4.7 The marginal means for intervention and control group for beep test 43

Figure 4.8 The marginal means for intervention and control group for weekday 1 calories intake.....45

Figure 4.9 The marginal means for intervention and control group for weekday 2 calories intake.....46

Figure 4.10 The marginal means for intervention and control group for weekend calories intake.....46

Figure 4.11 The marginal means for intervention and control group for bath/shower or wash face (morning).....52

Figure 4.12 The marginal means for intervention and control group for put on clean clothes (morning).....52

Figure 4.13 The marginal means for intervention and control group for brush hair (morning) 53

Figure 4.14 The marginal means for intervention and control group for eat breakfast (morning) 53

Figure 4.15 The marginal means for intervention and control group for brush teeth (morning) 54

Figure 4.16 The marginal means for intervention and control group for make bed (morning) 54

Figure 4.17 The marginal means for intervention and control group for bath/shower or wash face (evening) 55

Figure 4.18 The marginal means for intervention and control group for put on pajamas (evening) 55

Figure 4.19 The marginal means for intervention and control group for brush teeth (evening) 56

Figure 4.20 The marginal means for intervention and control group for exercise (sometimes each day) 56

Figure 4.21 The marginal means for intervention and control group for cut nails (sometimes each week) 57

LIST OF ABBREVIATIONS

BMI	Body Mass Index
GCH	Global Community Health
MoE	Ministry of Education
PF	Physical fitness
SDG	Sustainable Developmental Goals
TSBB	Technology supported brain breaks
USM	Universiti Sains Malaysia
WHO	World Health Organisation

LIST OF APPENDICES

Appendinces A Ethical Approval Letter

Appendinces B Approval Letter from Ministry of Education

Appendinces C Approval Letter from State Education

Appendinces D Ethical Consent Forms

Appendinces E Pictures

PEMAHAMAN ASAS TERHADAP IMPAK PENGGUNAAN *BRAIN-BREAKS* TERHADAP MURID DI PEDALAMAN SARAWAK BERDASARKAN AKTIVITI FIZIKAL, NUTRISI DAN KEBERSIHAN: PROJEK UNITED NATION SDG - #3 GOOD HEALTH AND WELL-BEING

ABSTRAK

Kajian ini bertujuan untuk menyiasat kesan penggunaan *brain-breaks* ke atas tingkah laku aktiviti fizikal, kecergasan berlandaskan kesihatan, pengambilan makanan, dan kebersihan diri di kalangan kanak-kanak sekolah rendah pribumi di Sarawak, Malaysia. Peserta kajian adalah 70 kanak-kanak sekolah rendah pribumi (38 lelaki dan 32 perempuan) berumur 10 hingga 12 tahun dari dua buah sekolah luar bandar di Sarawak, Malaysia. Ujian kecergasan berlandaskan kesihatan dijalankan untuk menilai kelenturan, kekuatan otot, ketahanan otot, komposisi badan, dan ketahanan kardiovaskular murid-murid. Status nutrisi pemakanan individu dihitung menggunakan rekod makanan selama tiga hari, melibatkan dua hari dalam minggu kerja dan satu hujung minggu. Kebersihan individu direkodkan menggunakan rekod kebersihan diri. Statistik deskriptif dan ANOVA faktorial campuran digunakan untuk menganalisis data. ANOVA faktorial campuran untuk kecergasan berlandaskan kesihatan mendapati perubahan signifikan bagi kesan kumpulan ke atas lompatan menegak, $F(1, 68) = 7.26$, nilai p ($\eta p2$) = .009 (.096), tekan tubi, $F(1, 68) = 89.06$, nilai p ($\eta p2$) < .001 (.567) dan ujian beep, $F(1, 68) = 4.53$, nilai p ($\eta p2$) = .037 (.062). Sementara itu, ANOVA faktorial campuran untuk pengambilan makanan mendapati perubahan signifikan bagi kesan kumpulan ke atas pengambilan kalori hari kedua, $F(1, 68) = 19.94$, nilai p ($\eta p2$) < .001 (.227) dan pengambilan kalori hari ketiga, $F(1, 68) = 89.93$, nilai p ($\eta p2$) < .001 (.569). Akhir sekali, ANOVA faktorial campuran untuk

kebersihan diri mendapati perubahan signifikan bagi kesan kumpulan ke atas pengurusan rambut, $F(1, 68) = 4.43$, nilai p ($\eta p2$) = .039 (.061), mengemas tempat tidur, $F(1, 68) = 21.00$, nilai p ($\eta p2$) < .001 (.236), memakai baju tidur, $F(1, 68) = 12.91$, nilai p ($\eta p2$) = .001 (.160), dan memotong kuku, $F(1, 68) = 78.34$, nilai p ($\eta p2$) < .001 (.535). Kajian ini mengesyorkan aktiviti *brain-break* berdasarkan sekolah perlu berubah, menyesuaikan dan beraneka ragam mengikut budaya, nilai, dan norma untuk meningkatkan kesihatan, pemakanan, dan kesejahteraan kanak-kanak pribumi dalam jangka masa panjang.

Kata kunci: *Brain-breaks*, Kecergasan Berlandaskan Kesihatan, Nutrisi, Kebersihan, Kanak-kanak Sekolah Pedalaman.

THE FUNDAMENTAL UNDERSTANDING OF THE IMPACT USING BRAIN-BREAKS ON SARAWAKIAN INDIGENOUS CHILDREN BASED ON PHYSICAL ACTIVITY, NUTRITION AND HYGIENE: A UNITED NATION SDG PROJECT - #3 GOOD HEALTH AND WELL BEING

ABSTRACT

This study aimed to investigate the effects of using brain-breaks on physical activity behaviour, health-related fitness, food intake, and personal hygiene among the indigenous primary school children in Sarawak, Malaysia. The participants were 70 indigenous primary school children (38 male and 32 female) aged 10 to 12 years old from two rural schools in Sarawak, Malaysia. The health-related fitness test was conducted to evaluate the students' flexibility, muscular strength, muscular endurance, body composition and cardiovascular endurance. The nutritional status of an individual was calculated using three days' food record, involving two-week days and one weekend. The hygiene of an individual was recorded using personal hygiene record. Descriptive statistics and mixed factorial ANOVA were used to analyse the data. The mixed factorial ANOVA for health-related fitness revealed significant changes for group effect on vertical jump, $F(1, 68) = 7.26$, p-value ($\eta p2$) = .009 (.096), push up, $F(1, 68) = 89.06$, p-value ($\eta p2$) < .001 (.567) and beep test, $F(1, 68) = 4.53$, p-value ($\eta p2$) = .037 (.062). Whereas, the mixed factorial ANOVA for food intake revealed significant changes for group effect on weekday 2 calories intake, $F(1, 68) = 19.94$, p-value ($\eta p2$) < .001 (.227) and weekday 3 calories intake, $F(1, 68) = 89.93$, p-value ($\eta p2$) < .001 (.569). Lastly, the mixed factorial ANOVA for personal hygiene revealed significant changes for group effect on brush hair, $F(1, 68) = 4.43$, p-value ($\eta p2$) = .039 (.061), make bed, $F(1, 68) = 21.00$, p-value ($\eta p2$) < .001 (.236), put on

pajamas, F(1, 68) = 12.91, *p*-value (ηp2) = .001 (.160), and cut nails, F(1, 68) = 78.34, *p*-value (ηp2) < .001 (.535). The study recommends school-based brain breaks activity need to be vary, adapt and diversify according to the culture, values and norms in order to improve the health, nutrition and well-being of the indigenous children in the long run.

Keywords: Brain-breaks, Health-related Fitness, Nutritional, Hygiene, Indigenous School Children

CHAPTER 1

INTRODUCTION

This chapter presents an overview of the background of the study, problem statement, research questions, research hypotheses, research aim and objectives, and conceptual framework.

1.1 Background of the study

Physical activity plays a vital role in our daily lives. Regular physical activity is recommended for all people in their reproductive years since it is associated with reduced risk of morbidity, maintaining a healthy weight, and the promotion of preconception health. Despite the importance of physical activity, there is a need to increase physical activity among the Malaysian adolescent communities, especially towards indigenous children, whereby they have limited access to healthy lifestyles, good nutrition, and hygiene. To achieve this objective, this fundamental study, which is collaborating with the United Nation's Sustainable Development Goals, aimed to use Brain-Breaks (BB) to transform the quality of life (QoL) among the Sarawakian indigenous children. BB is an interactive web-based structured physical activity and lifestyle videos that aim to stimulate students' interest in learning and promote better health, nutrition and wellness. It is part of Global Community Health Project, that involves whole school, community and child framework. In Malaysia, BB had reaches over 600 Malay primary school children and has been implemented in three schools in the district of Kota Bharu, Kelantan.

However, there is limited study was implemented for the indigenous communities whereby there are lacking internet facilities, electricity, proper education facilities, and hygiene. Thus, the study will begin with pre-testing two indigenous schools and identify schools which are at risks of having children with low QoL,

followed by the intervention. The fundamental study is practical, as it involves two Sarawakian school teachers, who understand the indigenous culture, supported by Jabatan Pendidikan Negeri Sarawak. The indigenous children will be learning about their food intake, physical activity and personal hygiene via BB. A pre-test, intervention, and post-test design will be employed. Students will undertake BB activities on school days (ten minutes per session) spread out for a period of four months. We are expecting more children will increase in their QoL.

1.2 Problem statement

In 2019, research has been conducted to see the impact of brain-breaks across 600 Malay primary school children and has been implemented in three schools in the district of Kota Bharu, Kelantan. It is the first study conducted in Malaysia and it is important to initiate school-based physical activity policies to promote changes at decision-making levels aimed at providing children with more regular access to physical activity in school settings. However, no study was implemented for the indigenous communities whereby there are lacking of internet facilities, electricity, proper education facilities, and hygiene, such as the Sarawak Indigenous schools.

Besides, the effect of physical activity on a holistic development of mental, proper nutrition, hygiene and physical wellbeing can be extrapolated in school settings. This not only improves health but also can further enhance learning development and cognitive functioning more so than just emphasising on core academic subjects. In addition, physical activity can reduce diseases such as diabetes, cancer, osteoporosis and cardiovascular diseases (Kueh et al., 2017). However, research in policies driven to improve physical activity in Malaysian schools is still lacking.

A growing number of studies show a trend of decreasing physical activity level among children (Popeska et al., 2018). More worryingly, physical activity has also

been found to decline with age (Van Mechelen & Kemper, 1995; Schoenborn, 1986). This scenario is even harder for the rural communities such as the indigenous adolescents in Sarawak whereby they are lacking access to clean hygiene, proper nutrition and physical activities leading to low immune system and some adolescents was dead due to diseases, improper cleanliness, and low immune system.

1.3 Research questions

1. Are there any effects of brain-breaks on health-related fitness among indigenous adolescents' primary school children?

2. Are there any effects of brain-breaks on nutritional status among indigenous adolescents' primary school children?

3. Are there any effects of brain-breaks on personal hygiene among indigenous adolescents' primary school children?

1.4 Research hypotheses

HO1: There is no significant effect of brain-breaks on health-related fitness among indigenous adolescents' primary school children.

HA1: There is a significant effect of brain-breaks on health-related fitness among indigenous adolescents' primary school children.

HO2: There is no significant effect of brain-breaks on nutritional status among indigenous adolescents' primary school children.

HA2: There is a significant effect of brain-breaks on nutritional status among indigenous adolescents' primary school children

HO3: There is no significant effect of brain-breaks on personal hygiene among indigenous adolescents' primary school children.

HA3: There is a significant effect of brain-breaks on personal hygiene among indigenous adolescents' primary school children.

1.5 Research aim and objectives

This study aimed to investigate the effects of using brain-breaks on physical activity behaviour, health-related fitness, food intake, and personal hygiene among the indigenous primary school children.

1.5.1 Specific objectives

1. To investigate the effects of Brain-breaks on health-related fitness among indigenous primary school children.
2. To investigate the effects of Brain-breaks on 3-day food intake among indigenous primary school children.
3. To investigate the effects of Brain-breaks on personal hygiene among indigenous primary school children.

1.6 Conceptual framework

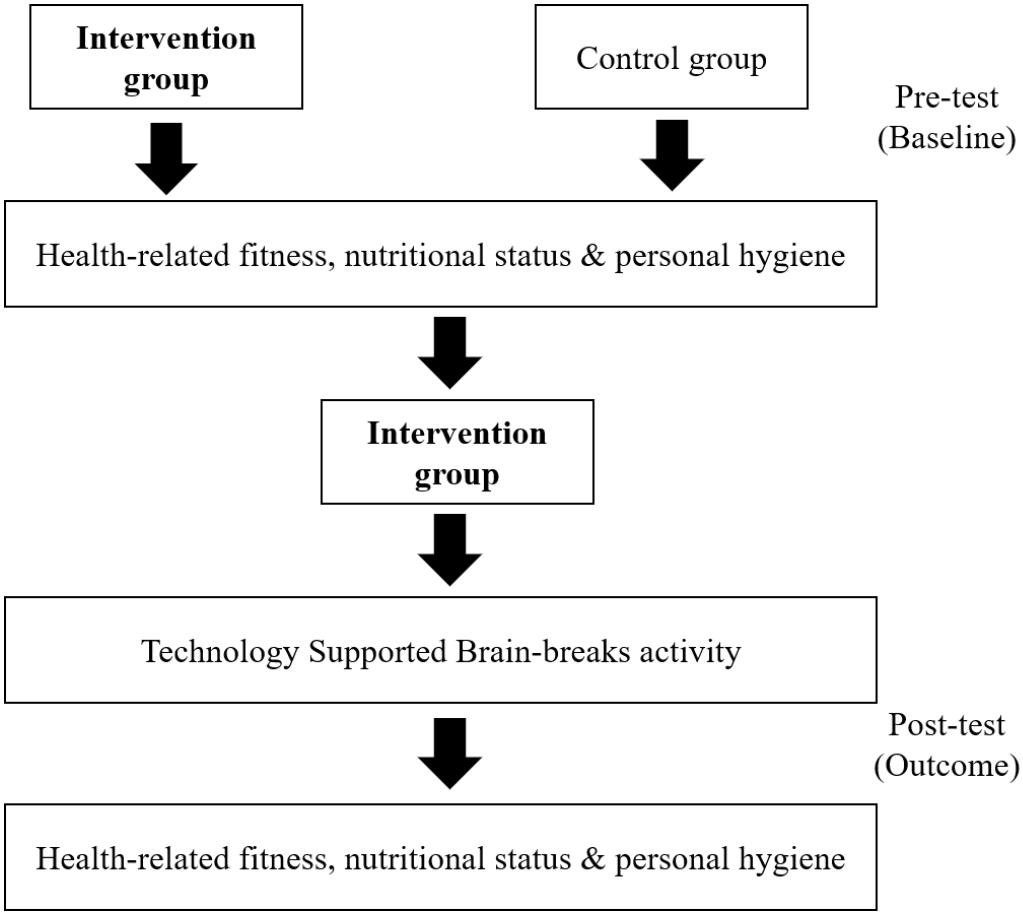

Figure 1.1 Conceptual framework

CHAPTER 2

LITERATURE REVIEW

This chapter presents an overview of studies on physical activity in school, technology supported brain-breaks, health-related fitness, nutritional status, personal hygiene, and literature pertinent to the present study.

2.1 Physical activity in school

Physical activity is characterised as any movements produced by any skeletal muscles that results in the expenditure of energy (Caspersen et al., 1985; Westerterp, 2013). Similarly, exercise is a subset of physical activity that is planned, structured, and repetitive with the intention of improving or maintaining physical fitness. The domains of physical fitness may represent either health- or skill-related. It is increasingly known that the lack of physical activity has been associated with many chronic diseases such as diabetes, obesity, hypertension and cardiovascular diseases. Over the past three decades, the number of people with diabetes mellitus has increased more than doubles globally (Chen et al., 2012); while worldwide prevalence of overweight and obesity has risen to 39% and 13% respectively in almost the same amount of time (World Health Organization, 2018). Physical inactivity is also claimed to be the leading cause of hypertensive illness and is estimated to cause two million deaths per year (World Health Organization, 2018).

Furthermore, physical sedentariness is also associated with increased risk of coronary heart disease (CHD) because it is also increasing the risk for diabetes and high blood pressure (WebMD, 2014). However, active in physical activity has shown promising links to the prevention and treatment of all stated diseases as well as others such as cancer, osteoporosis and even depression (Kueh et al., 2017). Regular exercise or habitual physical activity has been consistently reported to provide significant

benefits to both physically and psychologically ranging from cardiovascular health, body composition, weight management, musculoskeletal fitness and bone health as well as stress management, mood alteration, improve self-efficacy and enhanced self-concept (World Health Organization, 2003). Academically, it has been found that children and adolescents who are more physically active showed higher academic performance (Grierson, 2005; Sigman, 2007). Therefore, physical education in school should not only provide physical activity programs but should also prepare students for a lifetime of habitual physical activity (Kee et al., 2010).

The school environment is ideal for implementing physical activity interventions due to the possibility to reach a wide number of children who are spending most of their time in schools (Hills et al., 2015). Presently, research on the implementation of school-based physical activity programs indicates a positive improvement of cognitive skills and attitudes, academic performance and academic behaviour with only a few studies indicating negative relationship (Mura et al., 2015). In this regard, more research is required to investigate the effect of school-based physical activity to support the effort of initiating policies to promote changes at decision-making levels aimed at providing children with more regular access to physical activity in school settings (Uzunoz et al., 2017). In addition, emphasis must be placed on finding new ways to promote physical activity and encourage behaviour change to perpetuate physical activity participation among children by making it interactive, fun, as well as engaging.

2.2 Technology supported brain breaks

One promising intervention brought forward by Global Community Health (GCH) and HOPSports, is the school-based, video-exercise known as the Brain

Breaks® Physical Activity Solutions or brain breaks for short. It is a web-based structured physical activity videos that aim to stimulate student's overall health and wellness. It also specifically designed for the classroom setting to motivate students to enhance their theoretical lessons and provide opportunity not only to be physically active during breaks, but also learn new motor skills, language, art, music and different cultures (Chin et al., 2013). It is part of a GCH project, developed by the Centres for Disease Control and Prevention, that involves whole school, community and child framework. The programme is supported by the United Nations as part of the 17 Sustainable Development Goals under the goals of good health and wellbeing. Access to the Brain Breaks videos only requires internet access and a projector or a smart TV to display the videos.

The diverse cultural features included in the videos include traditional dance specific to each country, sports and contemporary movement. Brain Breaks provide teachers with a wide selection of physical activity videos to choose from and adds variety. This often results in improvements in students' physical activity attitudes and self-esteem. Students have the opportunity to be physically active using Brain Breaks and to master new motor skills and learning. Each brain breaks video typically ranges from moderate to vigorous intensity physical activity and aims to improve health-related fitness such as cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition (Kuan et al., 2019).

These videos are then shared online and are given accessible to representative of GCH to implement these short exercises during class. Of particular note, Malaysian educators have even uploaded our own exercise video, using 'silat' as a medium for exercise. By contributing these videos, educators from all over the world with access

to an internet connection can implement physical activity and simple exercises to promote cognitive development and health (Global Community Health, 2017).

Physical Education is often misinterpreted as a way of only improving physical fitness such as cardiovascular fitness, flexibility and muscular power. However, it should be noted that Physical Education advocates a holistic approach to human development which emphasises the mind and body as one entity, and that anything that happens to one will affect the other (Sibley & Etnier, 2003). In other words, physical educators believe that a child comes to school to be educated, both mentally and physically. Additionally, there are many educators that believe physical activity and Physical Education may have a positive effect on concentration, learning and academic success. These traits are often traced back to the general term coined as cognitive ability or functioning.

In a research conducted by van Stryp et al. (2021), it was discovered that South African children experienced a boost in their energetic physical activity by 34 minutes, along with a reduction in their inactive behavior by 100.1 minutes when they engaged in the Brain-Breaks program. This study involved 48 children aged 6 to 8, who participated in a 6-week active Brain-Breaks program for 10 minutes each day while wearing Actigraphs accelerometers throughout five consecutive school days.

In a separate investigation, Balasekaran et al. (2021) conducted a study focused on the Brain Breaks Physical Activity Solutions intervention, aimed at assessing the attitudes of primary school students in Singapore towards physical activity. The study included 113 participants, all of whom were primary school students aged between 8 and 11 years. These students were divided into two groups: one received the intervention, while the other served as the control group.The study

involved a 10-week Brain-Breaks video intervention, lasting 3 to 5 minutes per session, which was integrated into regular lessons for the intervention group. The control group, on the other hand, continued with their standard lessons without the intervention. The students' attitudes towards physical activity were measured using the APAS questionnaire both before and after the intervention.

The outcomes demonstrated that the intervention group exhibited positive changes across all APAS variables, including benefits, importance, learning, self-efficacy, enjoyment, fitness, and personal best. As a result, the authors concluded that incorporating interactive and technology-based physical activity into the school curriculum had a positive impact on students' health and education.

2.3 Health-related fitness

Health-related fitness constitutes a multifaceted domain, encompassing various components that exert a profound impact on an individual's overall well-being. One of the fundamental aspects is cardiorespiratory endurance, which assesses the heart and lungs' capacity to supply oxygen during sustained physical activity. Research findings, such as those presented by Myers et al. (2002), have firmly established a strong correlation between higher levels of cardiorespiratory fitness and a reduced risk of cardiovascular diseases, as well as decreased all-cause mortality. It underscores the critical importance of regular aerobic exercise, including activities like jogging, swimming, and cycling, in reaping substantial health benefits.Physical fitness (PF) has numerous health benefits.

Muscular strength and endurance, another integral component of health-related fitness, are vital for performing daily tasks with ease and efficiency. Studies, as exemplified in Westcott's work (2012), underscore the potential of resistance training,

including weightlifting and bodyweight exercises, to increase muscle mass and strength. This effect is especially notable among older adults, suggesting that efforts to enhance muscular fitness contribute significantly to maintaining functional independence and a higher quality of life.

Flexibility and joint mobility represent yet another crucial dimension of health-related fitness. Engaging in activities like yoga and regular stretching routines not only improve joint range of motion but also reduce the risk of injuries. The investigation by Mandy and McBrearty (2019) highlights the potential of flexibility training to alleviate musculoskeletal pain and improve posture, thereby enhancing overall physical comfort and functionality.

In considering health-related fitness, the composition of one's body, particularly the proportion of body fat, emerges as a pivotal determinant of health status. Scientific evidence, as encapsulated in Després and Lemieux's work (2006), underscores the perilous health implications of excessive body fat, especially visceral fat. Such excess fat is consistently linked to an elevated risk of chronic ailments such as type 2 diabetes and heart disease. Thus, the significance of managing body composition through various interventions, including dietary modifications and physical activity, is underscored.

Numerous studies have demonstrated the importance of PF for the well-being of youth (Bedard et al., 2020). Low PF significantly contributes to the prevalence of obesity in adolescents, as well as an increased risk of developing chronic diseases (Galan et al., 2022). Indigenous primary school children are at a higher risk of developing chronic diseases such as obesity, diabetes, and heart disease (Lindberg et al., 2017).

Health-related fitness is important for maintaining good health and preventing these chronic diseases. Health related fitness is a comprehensive approach to physical fitness. It encompasses various components of physical fitness, such as aerobic capacity, muscular strength, muscular endurance, coordination, balance, and flexibility, as well as the body's ability to process and utilise nutrients, and to maintain proper body weight (Gleim, 1998). Health related fitness has been recognised by health and fitness professionals as a crucial component of overall health and well-being. According to Ortega et al., 2008, a high level of PF in adolescence is essential for maintaining good health and well-being and is a preventive factor against noncommunicable diseases. Despite this knowledge, existing research indicates that adolescents have low levels of PF (Lang at al., 2018).

The primary focus of health related fitness is to improve and maintain overall health, as opposed to performance enhancement for competitive athletes. There is a growing body of evidence that suggests that health related fitness can provide numerous health benefits, including improved physical functioning, increased energy levels, improved mood, and a decreased risk of chronic disease (Pate et al., 1995; Myers, 2000; American College of Sports Medicine, 2013).

Regular physical activity is essential for achieving and maintaining health related fitness. Various health and fitness professionals have developed various approaches to health related fitness, including a holistic approach and a physical activity-based approach. The holistic approach focuses on the overall health and well-being of an individual, while the physical activity-based approach focuses on the specific physical activities that an individual can do to improve their health related fitness.

In conclusion, health related fitness is a comprehensive approach to physical fitness that is focused on improving and maintaining overall health. It includes various components of physical fitness, as well as the body's ability to process and utilize nutrients and maintain proper body weight.

Regular physical activity is essential for achieving and maintaining health related fitness, and health and fitness professionals have developed various approaches to health related fitness. Adolescents who are physically inactive are more likely to grow up to be sedentary and or obese adults (Abdelkarim et al., 2020; Galan et al., 2022). Regular physical activity and exercise can have a significant impact on health-related fitness and overall health and well-being. By improving cardiovascular endurance, muscular strength and endurance, flexibility, and body composition, individuals can reduce their risk of chronic diseases and improve their quality of life.

2.4 Nutritional status

A good quality of life requires adequate nutrition and regular physical activity (Fernandez & Sesco, 2023). Humans require food and nutrition on a daily basis. Nutrition is an important component of the healthcare delivery system and plays an important role in maintaining people's health and well-being. Nutrition is an essential component of human health, life, and brain development across the lifespan (Chambers, 1993). A well-balanced diet is essential for endurance, physical growth, cognitive development, and productivity (Opoola et al., 2016). Individuals' nutritional status has an impact on clinical outcomes (Kesari & Noel, 2022).

Nutritional status is a measure of an individual's physical condition in relation to the adequate intake of essential nutrients. It is commonly used to describe the overall health of a person based on their dietary intake, body weight and physical activity. Poor nutrition can lead to a variety of health issues including stunted growth,

developmental delays, and increased risk of disease or death (World Health Organization, 2020).

Good nutrition is essential for physical and cognitive development, and has been linked to improved academic performance (Horton & Rosales, 2017; Ritchie & Roser, 2019). Additionally, studies have found that good nutrition can improve mental health, including reducing the symptoms of depression (Khandaker et al., 2019; Ritchie & Roser, 2019).

Nutritional status is an important indicator of health and wellbeing. Good nutrition can reduce the risk of chronic and infectious diseases, while also improving physical and cognitive development and mental health. Research has shown that nutritional status plays an important role in a variety of health outcomes. Studies have linked poor nutrition to increased risk of chronic diseases such as diabetes, heart disease, and cancer (Tang et al., 2019). Additionally, research has found that poor nutrition can lead to impaired cognitive development in children (Bergeron et al., 2019).

2.5 Personal hygiene

Personal hygiene is a term that is frequently used in medical and public health settings. It entails keeping our bodies and clothes clean. It is personal. It is defined as a condition that promotes sanitary practises in oneself. Personal hygiene is important for health and wellbeing. Personal hygiene is one of the most effective methods of disease prevention in the community (Temitayo, 2016). Poor hygiene can lead to both physical and mental health problems, and can adversely affect social and professional relationships. There is a direct link between poor personal hygiene and illness, and proper hand washing has been shown to reduce the risk of disease transmission (Curtis & Cairncross, 2003).

Personal hygiene refers to the practise of keeping one's own body clean. Good hygienic care, as well as personal hygiene practises, contribute significantly to factors relating to healthy living and disease prevention. Personal hygiene is defined as the practice of keeping oneself clean, groomed, and healthy in order to prevent illness and disease (Gillen & Smith, 2017). It includes activities such as regular bathing, brushing teeth, and washing hands.

Poor personal hygiene can lead to an increased risk of disease, including skin infections and gastrointestinal issues (Mueller et al., 2017). These health risk factors are directly related to some important daily activities associated with worthy operational actions and obligatory responsibilities, such as washing hands with soap before meals and after defecation, brushing teeth at least twice a day, especially after breakfast and after meals, taking regular baths with soap, keeping nails short, and engaging in regular exercise (Ali et al, 2013).

Studies have found that Indigenous children have poorer personal hygiene than their non-Indigenous peers (Lambert et al., 2007). Indigenous children are more likely to have inadequate access to basic hygiene products, such as soap and toothpaste, due to poverty, inadequate housing, and a lack of access to clean water (Mueller et al., 2017). They are also less likely to practice good hygiene due to cultural norms and lack of knowledge about the importance of personal hygiene (Lambert et al., 2007).

Education is required to raise the level of knowledge. Schools are recognised as important settings for developing health promotion and influencing health-related behaviours, including hygiene-related behaviours (Haaple & Probart, 2004; Moon et al, 1999; Sidebottom, 1995). Once habits are formed in adolescence, they are often long-lasting and difficult to change in adulthood (Wills et al, 2005). As a result, children who are effectively educated at school may grow up to be adults who practise

good hygiene. People's health is influenced by their knowledge. The foundations of lifelong responsibility for personal hygiene maintenance are laid down in childhood, which is important for a healthy childhood, a healthy adulthood, and the development of positive values about health and the use of health services (Rahman et al., 2009).

Good hygiene can have numerous health benefits. One study found that regular handwashing was associated with a reduced risk of infectious disease (Garg & Gupta, 2020). Another study found that good hygiene practices, such as taking regular showers, improved mental health and wellbeing (Chen & Zhou, 2016).

CHAPTER 3

METHODOLOGY

This chapter describes the design and methodology which include the sampling procedures and population, ethics, research instrument, intervention and data analysis that were used in conducting the study.

3.1 Study design

This is an interventional study with a randomised controlled trial. The schools were randomised using the computer generated ramdomised algorithm software into two groups. The selected school are from a population of schools in Song and Kapit. Study duration was begun from October 2021 until September 2022 (1 year). The duration of the intervention last twelve weeks (two schools). The study was conducted at two different primary schools in the indigenous school in Sarawak.

3.2 Study area

This study had been conducted at the Sekolah Kebangsaan Ulu Yong, Kapit, and Sekolah Kebangsaan Nanga Embuau, Song.

3.3 Study population

The source population in this study is indigenous primary school children in Sarawak. Sampling frame is those school children who fulfilled the inclusion and exclusion criteria. The inclusion criteria of the participants are male and female students aged between 10 and 12 years old and are physically healthy and free from any form of congenital physical defects such as physical disability and not injured during the study. The students also need to be able to understand Bahasa Malaysia. The exclusion criteria are participants who are not able to participate in the brain-break program at least two to four times per week and refused to provide their informed consent were not participate in the study. Besides, those that are not able to participate

in the brain-breaks activity due to unforeseen circumstances such as an injury and extra-curricular activities were excluded from the study.

3.4 Sampling method and subject recruitment

The schools had been selected through simple random sampling. All indigenous schools in Sarawak had been assigned a number which two schools had been randomly selected (schools A and B). As stated earlier, the selected schools were Sekolah Kebangsaan Ulu Yong (School A) and Sekolah Kebangsaan Nanga Embuau (School B).

The headmaster were then approached to gain approval for conducting this study in their respective schools. They were informed of the objectives and procedures of the study. Letter from the education department of Sarawak also had been given to the respective school as proof of approval for conducting this research. Invitation for student participation had been conducted at class and hall with the aid of the teachers and headmaster. The student had been given an informed consent form to be filled out and an assent form to be given to their parents for approval. If any questions or uncertainty arise, parents are personally contacted to acquire verbal consent.

A total of 70 male and female students had been recruited for the interventional study in which 35 students from school A had been assigned as the intervention group while another 35 students from school B had been assigned as the control group. Students from standard four, five and six are then recruited in each school.

3.5 Sample size estimation

Sample size was calculated using G Power 3.1.7. A power of 0.80 and an error probability of 0.05 were set. Based on the study conducted by Uzunoz et al. (2017), an approximate effect size of 0.102 to 0.306 was derived. The reference used is based on

Cohen's classification of effect size with equivalent values of eta squared ($0.01 \leq r < 0.06$ = small, $0.06 \leq r < 0.14$ = medium, $r > 0.14$ = large (Kinnear & Gray, 2006). The total sample size calculated is 70.

3.6 Study procedures

The procedures of the present study are summarised in the Figure 3.1. Firstly, ethical approval had been sought from USM Human Research Committee. An approval then had been sought from Ministry of Education to collect data from primary schools in Sarawak, which then been given to Jabatan Pendidikan Negeri Sarawak. Subsequently, approval from the selected schools had been acquired before the data collection begins.

Two schools had been selected through simple random sampling (A and B) where both male and female students from standards four, five, and six (aged 10 to 12 years old) had been recruited. During the recruitment process, students and their parents were first complete the informed consent sheet and assent form. To minimize students' vulnerability, the students act as the researches' subordinate in the entity of the management. The date was independent and was not disclose to the management authority to be used for any achievement assessment and decision related to work. Confidentiality of information is protected by using code number for students to remove identifiability. All forms are anonymous and are entered into SPSS software. Only research team members can access the data. Data was presented as grouped data and would not identified the students individually. Besides that, parents are given an assent form to be fill out. However, if any questions or uncertainty arise, they are personally contacted to acquire verbal consent. Student data is also protected using a password.

School A had been assigned as the intervention group while school B as the control group. Students had undergone the pre-test by completing the questionnaires and tests given. Then, the students in the intervention group had undergone brain-breaks video exercise activity and educational seminar once per day, five times a week (Monday to Friday) for twelve weeks. Alternatively, students had undergone the session twice a week with extended duration during physical education (PE) classes. The brain-breaks video had been projected using a smart TV. Each week, a new brain-break exercise video and educational seminar had been used in order to reduce boredom, repetitiveness while increasing student's enjoyment and commitment. The duration of each session is around five to six minutes and had been conducted at a hall or classroom during an allocated time such as during physical education (PE) class, recess or in between classes depending on their availability. Besides, precautions had been taken in the form of giving enough space for students to move during the exercise due to students' movement varies according to exercise video. A first aid kit had been prepared in case of an injury. Teachers were also present during the conduct of the exercise, therefore if further medical assistance is required, the student was sent to the hospital by their respective teachers.

After the twelve weeks of intervention, students filled out the questionnaires and the test as part of their post-test. There is no expected cost for the students such as transportation as the study site had been conducted in the students' respective schools. Honorarium in the form of certificates had been given to the students at the end of this research as a token of appreciation.

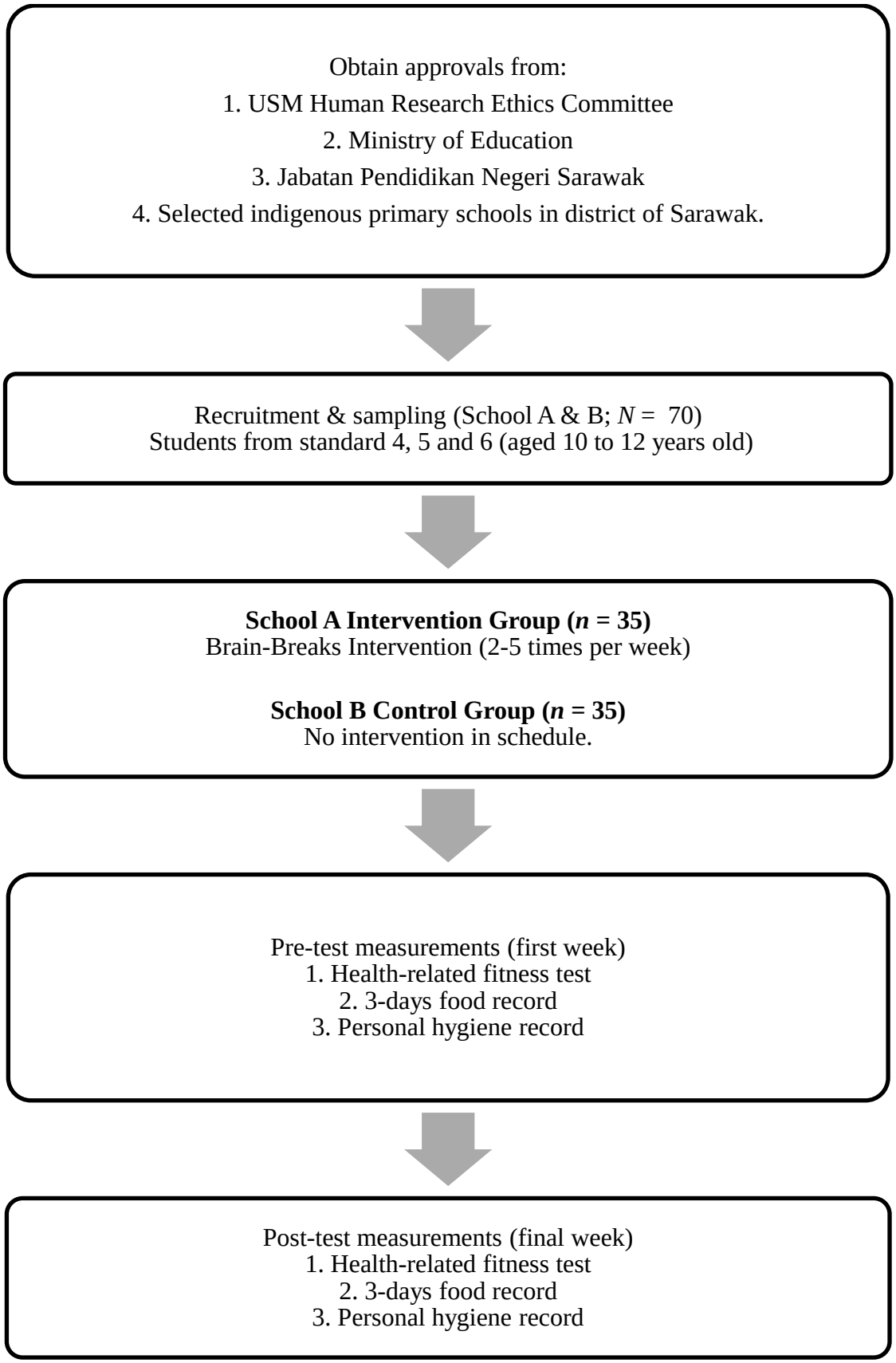

Figure 3.1Study flowchart

3.7 Ethical consideration

The study received approval from the Univerisiti Sains Malaysia (USM) Human Research Ethics Committee (USM/JEPeM/21050370; Appendix 1). Approval from the Ministry of Education (MoE) and the State Education Department of Sarawak were also acquired (Appendix 2 and 3). While collecting data, the students were provided with a research information sheet, parental consent form, and material publication consent form (Appendix 4), which included crucial details about the study procedures as well as the potential risks and benefits. These documents were given to the students to be read and signed by their parents. Furthermore, a message was communicated to the teachers and parents to notify them of this research.

The students were informed that their participation in the study was entirely voluntary, and they could choose to refuse or withdraw from the study at any time without any loss of benefits to which they were entitled. Parents who had further questions or concerns were contacted personally. To minimise the students' vulnerability, they were considered as subordinates to the researchers in the management of the study. The data collection date was independent and was not disclosed to the management authority for any achievement assessment or work-related decisions. The confidentiality of the information was ensured by assigning code numbers to the students to remove any identifiable information. The data collected were stored in a computer and only used for analysis and publications. The researchers were the only ones with access to the data, which was protected by a password. The data was presented in a grouped format and did not identify any individual students. There was no conflict of interest involved in conducting this study.

3.8 Research instruments

Health-related fitness is a combination of fitness test to measure the health-related fitness of an individual. The test includes, flexibility – sit and reach; muscular power – standing long jump and vertical jump; muscular endurance – sit up and push up; body composition – percentage of body fats (Tanita Inner Scan) and somatotype, cardiovascular – beep test.

3.8.1 Sit and reach

The sit and reach test is a common flexibility test used in physical fitness assessments, including in the context of SEGAK in Malaysia. This test measures the flexibility of the lower back and hamstring muscles, which are important for various physical activities and overall health.

To measure the participant performance, the participant should begin in a ready position with both feet straight and the soles of the feet touching the board at all times during the test. An assistant places their hands on the performer's knees to ensure that the knees are not flexed. The dominant palm is overlaid on the back of the non-dominant palm, with both middle fingertips interlocking. Extend the hands slowly as far as possible along the measuring scale. Maintain the maximum reach for 3 seconds. The participant is given three consecutive attempts. The best reach is taken into account as the score. The score will not be counted if the knees are flexed during the reach. Measurements are recorded in centimetres rounded to the nearest whole number.

3.8.2 Standing long jump

The standing long jump test was used to assess leg explosive power. The purpose of the test was to track the development of the children's leg strength power. The standing long jump, also known as the broad jump, is a popular and simple to

administer exercise (Wood, 2008b). The test is easy to perform and requires little equipment. The disadvantage of the test is that it requires a skill component (Wood, 2008b). Falling or stepping backwards after landing results in measurement to the point of contact rather than the first point of contact (Wood, 2008b). Some subjects will attempt to use a step during takeoff, which is not permitted.

3.8.3 Vertical jump

The vertical jump test measures lower-body strength. To measure the participant's performance, they start by standing beside a wall and extending the arm closest to the wall upward. While keeping both feet flat on the ground, the highest point their fingertips reach is marked or noted. This measurement is referred to as the "standing reach height." Next, the participant positions themselves away from the wall and aims to jump vertically as high as possible, utilizing both arms and legs to propel their body upward. The jumping technique can involve or exclude a countermovement (refer to vertical jump technique). The goal is to attempt to touch the wall at the peak of their jump. The score is calculated by determining the difference in distance between the standing reach height and the height reached during the jump. Out of three attempts, the best score is recorded.

3.8.4 Sit up

The 1-minute sit-up test is a common fitness assessment used to evaluate the muscular endurance of a person's abdominal muscles, specifically the rectus abdominis. It is often employed in fitness testing programs. To conduct the test, the participant lies flat on their back with their knees bent at approximately 90 degrees, feet flat on the floor, and arms crossed over their chest or positioned near their ears without pulling on their neck. A timer is set for one minute, during which the participants performs as many sit-ups as possible, aiming to touch or pass their elbows