# Feasibility of an after-school group-based exercise and lifestyle programme to improve cardiorespiratory fitness and health in less-active Pacific and Māori adolescents

**Yongchie Chansavang** BHScHons;[1] **C Raina Elley** MBChB, FRNZCGP, PhD;[1] **Brighid McCaffrey** BPhEd, PGDipSci;[2] **Chloe Davidson** BSc, PGDipSci;[2] **Ofa Dewes** MBA, PhD;[3] **Lance Dalleck** PhD[4]

## ABSTRACT

**INTRODUCTION:** Obesity and low levels of physical activity are increasing among Pacific and Māori adolescents in New Zealand.

**AIM:** To assess the feasibility of an after-school exercise and lifestyle programme to improve cardiorespiratory fitness, health and usual activity in less-active Pacific and Māori adolescents over six weeks.

**METHODS:** Eighteen less-active secondary school students participated. The six-week programme included 3 x 1.5 hour exercise and healthy lifestyle sessions per week. Outcomes included estimated cardiorespiratory fitness ($VO_2$max), insulin resistance (Homeostasis Model Assessment), physical activity, glycated haemoglobin (HbA1c), fasting plasma glucose, blood pressure, waist circumference and fasting lipids, measured at baseline and six weeks. Programme attendance and qualitative comments were also recorded. Student's *t*-tests were used.

**RESULTS:** Of the 18 students enrolled, 16 (89%) completed six-week follow-up, 14 (78%) were female, 13 (72%) were Pacific ethnicity and 5 (28%) were Māori. At baseline, mean age was 16.3 (standard deviation [SD] 1.0) years, body mass index (BMI) 35.2 (SD 6.7) kg/m$^2$, $VO_2$max 31.5 (SD 4.3) mL/kg/min, systolic blood pressure 125.0 (SD 12.9) mm Hg, HbA1c 39.9 (SD 3.8) mmol/mol, fasting serum insulin 28.3 (SD 27.8) µU/mL. At follow-up, improvements had occurred in $VO_2$max (3.2 mL/kg/min; $p$=0.02), systolic blood pressure (-10.6 mm Hg; $p$=0.003), HbA1c (-1.1 mmol/mol; $p$=0.03) and weekly vigorous (4 hours, $p$=0.002) and moderate (2 hours, $p$=0.006) physical activity, although waist circumference increased ($p$=0.005). Programme attendance was over 50%. Comments were mostly positive.

**DISCUSSION:** The after-school exercise and lifestyle programme and study methods were feasible. Such programmes have the potential to improve health outcomes for Pacific and Māori adolescents.

**KEYWORDS:** Adolescent; diabetes mellitus; ethnic groups; exercise; physical fitness; primary prevention

[1] Department of General Practice and Primary Health Care, The University of Auckland, Auckland, New Zealand

[2] Department of Sport and Exercise Science, The University of Auckland

[3] Department of Pacific Health, The University of Auckland

[4] Department of Recreation, Exercise and Sport Science, Western State Colorado University, USA

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**CORRESPONDENCE TO:**
**C Raina Elley**
Department of General Practice and Primary Health Care, The University of Auckland, PB 92019, Auckland, New Zealand
c.elley@auckland.ac.nz

## Introduction

Pacific peoples and Māori have significantly poorer health outcomes than the rest of the New Zealand population.[1,2] Regular physical activity has been shown to improve physical and psychological health and to reduce the risk of premature death and disability, including for obese adolescents.[3] During adolescence, certain at-risk behaviours can develop, including low levels of exercise, poor eating habits and tobacco and alcohol use—risk factors for diseases such as Type 2 diabetes and cardiovascular disease.[3,4]

The 2012/13 New Zealand Health Survey found that one in three adults (15 years and older) were obese (31%).[5] Obesity is even higher among Māori

(48%) and Pacific people (68%) in New Zealand.[5] Utter et al. found that one in 10 adolescents in New Zealand was obese and an additional 24% were overweight, with the highest levels seen in Māori, Pacific and adolescents in lower socioeconomic areas.[6] Even amongst children aged 2–14 years, much higher rates of obesity have been reported in Pacific (22.3%) and Māori (11.8%), compared with New Zealand European and other New Zealanders (5.5%).[2] New Zealand has one of the highest rates of paediatric Type 2 diabetes in the world, and new cases are estimated to be growing at 10% annually.[7] Insulin resistance is usually associated with obesity and often precedes the development of Type 2 diabetes.

**Research suggests that creating a lifestyle pattern of regular physical activity through exercise may help to promote the long-term health of adolescents, and may also increase the likelihood of these behaviours continuing into adulthood**

The World Health Organization (WHO) recommends that adolescents should accumulate at least 60 minutes of moderate to vigorous physical activity daily to improve cardiorespiratory, bone, muscular and other health.[3] In 2013, Stoner et al. proposed that an exercise programme that includes both resistance and high-intensity aerobic training provides the best health impact for obese adolescents.[8] Levels of participation in physical activity by young people in New Zealand are dropping, especially among Māori and Pacific youth.[9,10]

Exercise programmes developed for adolescents from specific ethnic minority groups are sparse. However, a New Zealand study in younger Pacific adults found that community-based group activities were an effective and culturally sensitive way to promote physical activity levels in Pacific communities.[11] This randomised controlled trial also showed significant improvements in cardiorespiratory fitness and leg strength over four weeks. Other research has confirmed that school-based exercise interventions can be effective in improving physical activity levels;[12] however, after-school programmes may also represent a promising approach for adolescents.[13] Moreover, a recent Cochrane systematic review found that the combination of a school-based intervention with a community component can help to improve the effectiveness of the programme.[12] Research also suggests that creating a lifestyle pattern of regular physical activity through exercise may help to promote the long-term health of adolescents, and may also increase the likelihood of these behaviours continuing into adulthood.[12]

The current study aimed to assess the feasibility of an after-school group-based exercise programme to improve cardiorespiratory fitness, health and usual activity in less-active Pacific and Māori adolescents over six weeks.

## Methods

### Design

The study design was a 'before–after' feasibility study of an adolescent exercise and lifestyle programme. The study aimed to assess the feasibility of the programme for possible future implementation, as well as test the recruitment, retention and research measures in this population, to inform a subsequent larger trial.[14]

### Study population

Students attending a secondary school in a low socioeconomic area in Auckland, New Zealand, who were undertaking less than two sessions of exercise per week were eligible to participate. There were no exclusion criteria specified. Almost all of the 600 students at the school were of Pacific or Māori ethnicity. Volunteers were recruited through posters placed around the school, the school newsletter, invitation from the school nurse, and by word of mouth. Informed consent was obtained, as well as parental consent where participants were under 16 years of age.

### Outcome measures

Primary outcome measures included cardiorespiratory fitness ($VO_2$max) using the Rockport

one-mile test,[15] and insulin resistance estimated using the Homeostatic Model Assessment—Insulin Resistance (HOMA-IR),[16] measured at baseline and at six weeks. Secondary outcomes included usual physical activity levels using the International Physical Activity Questionnaire (IPAQ),[17] waist circumference, blood pressure, glycated haemoglobin (HbA1c), fasting plasma glucose, fasting lipid profile, and attendance at exercise sessions. Demographic data were also collected and participants were invited to provide comments about the programme on the follow-up questionnaire to help inform future improvements. Data were collected at baseline and after the six-week programme at the school health clinic and at the recreation centre where the programme was held.

## Intervention

The participants were encouraged to follow a six-week, group-based exercise and lifestyle intervention programme immediately after school for 1.5 hours three times a week. The exercise programme was held in the recreation centre next to the high school, which is shared by the school and the general public. The intervention goal was to increase students' level of physical activity and cardiorespiratory fitness through supervised exercises, health education, and social support/self-empowerment discussions.

The sessions included a variety of activities, such as basketball, netball, dancing, dodge ball, soccer, jumping rope, kickboxing, and interval training. The exercises could be altered according to the needs of the participant. Most activities were of moderate to high intensity according to the WHO grading of exercise activities.[12] Other non-conventional games, such as 'Stuck in the mud', 'Cops and robbers', 'Human chain tag', 'Spud', and 'Octopus', were also included. An exercise programme was designed initially in consultation with senior students at the secondary school and Sport and Exercise Science staff and postgraduate students at The University of Auckland (see the Appendix in the online version of this paper), although actual sessions were also shaped by preferences and requests from the students on each day. In the gym suite, the weight and cardio machines (elliptical trainers, rowing machines and spin bikes) were used for half an hour at least once per week. All sessions were supervised and administered by a rotation of three Health Science and Sport and Exercise Science postgraduate students from The University of Auckland.

A healthy snack was also provided to the participants after exercise, and sometimes one banana offered prior to the commencement of exercise. This was to help the students 're-fuel' and maintain concentration in the programme after the school day. The snacks chosen consisted of many fruits and vegetables, such as bananas, pineapples, apples, mandarins, oranges, avocados, celery and carrots. Vegetable dips, wholegrain crackers and wholemeal sandwiches prepared by the principal author were also offered. While the participants ate their food, the postgraduate students/instructors were able to deliver education to achieve recommended physical activity levels and maintain healthy eating habits in everyday life. These discussions focused on appropriate portion sizes, increasing water intake, healthier food choices, and the benefits of making these dietary changes. Likewise, instructors set 'challenges' each week that were given to participants and they were able to report back whether they 'failed' or 'passed' the challenge at the following session; examples of challenges included 'no fizzy drinks this week', or '20 squats before bed'. Lastly, ongoing support was provided through text messages and included motivational fitness and nutrition quotes.

## Analyses

Raw data were entered into a Microsoft Access database before being analysed with the SPSS

### WHAT GAP THIS FILLS

**What we already know:** Long-term health outcomes are poor for Pacific and Māori adolescents in New Zealand. Exercise and lifestyle interventions can improve health outcomes and lifestyle patterns amongst adolescents.

**What this study adds:** This study demonstrated it was feasible to run an after-school exercise and lifestyle programme for less active Pacific and Māori adolescents. The study also showed that it was possible to assess health outcome measures and to recruit and retain students into a lifestyle intervention study, which could be used in a subsequent larger and longer trial.

22.0 and SAS 9.3 statistical programs using Student's *t*-tests. The main analyses included only full data with no imputation. Sensitivity analyses were also carried out where no change was assumed for missing data.

### Consultation and ethics

Consultation was carried out with Pacific and Māori community members, school staff, school students and advisors from The University of Auckland prior to the commencement of the study, to ensure the appropriateness of study and intervention processes. The importance of group-based activities was emphasised, and active invitation of students at the health centre was encouraged. The study was granted ethics approval by The University of Auckland Human Participants Ethics Committee (Ref. 9819).

## Results

Twenty sedentary Pacific and Māori adolescents volunteered to participate in the study and 18 completed informed consent and most baseline measures. The other two students left the school prior to study enrolment. Of the 18 participants, 16 (89%) completed six-week follow-up assessment. There were 17 exercise sessions run over the six-week study period, with an average of just over 50% attendance each session.

At baseline, the mean age of study participants was 16.3 years (standard deviation [SD] 1.0), 14 (78%) were female, 13 (72%) were of Pacific ethnicity and 5 (28%) were Māori. Baseline clinical variables are presented in Table 1. Mean weight was 103 [103.4] kg (range 69.8–124.7 kg). All participants had a body mass index (BMI) over 25 kg/m$^2$, and 11 were obese (BMI ≥30 kg/m$^2$). Mean $VO_2$max was 31.3 [31.5] mL/kg/min, which reflects a 'very poor' cardiorespiratory fitness rating among boys, and a 'fair' rating among girls.[18] Mean estimated insulin resistance using the HOMA-IR was 6.3 mmol/L, which is high for an adolescent population. The insulin concentration levels varied from 7 to 119 μU/mL (normal range, 1.7–16.0 μU/mL), with a mean of 28.3 (SD 27.8), largely skewed by one boy who had Type 2 diabetes. Without this participant, the mean was 21.8 μU/ml (SD 12.5).

Baseline mean HbA1c was just under 40 mmol/mol, which is the threshold for 'pre-diabetes'.[19] There were seven (39%) participants who had an HbA1c of at least 40 mmol/mol at baseline, and the remaining participants had HbA1c values above 35 mmol/mol. One participant had an HbA1c of 50 mmol/mol; this participant was known to have Type 2 diabetes and was already taking Metformin as treatment.

Final results are presented in Table 1. There was a significant improvement in cardiorespiratory fitness ($VO_2$max) at six-week follow-up compared with baseline ($p$=0.02). However, the improvement in estimated insulin resistance did not reach statistical significance but was in the direction of improvement ($p$=0.3). A significant improvement was also found in systolic blood pressure (-10.6 mm Hg; $p$=0.003), HbA1c (-1.1 mmol/mol; $p$=0.03) and weekly vigorous and moderate physical activity by four hours ($p$=0.002) and two hours ($p$=0.006) respectively, compared with baseline, although waist circumference increased ($p$=0.005). Sensitivity analysis assuming no change over time for missing values did not alter the significance of the results. Of note, four of the seven participants with an HbA1c of at least 40 mmol/mol reduced their HbA1c to below 40 mmol/mol.

### Qualitative comments

Thirteen (72%) participants wrote comments about the programme on the final questionnaire. Most comments were positive. Seven participants indicated that playing games was an enjoyable part of the intervention. The use of the gym suite was a novel experience for many participants and the majority enjoyed learning about and using the equipment; however, one participant reported that they disliked this.

> The thing that I really liked was playing games such as basketball, dodge ball and touch rugby. (Participant #11)

> I really liked our sessions when we played sports in the recreation centre. I also liked the gym suite. (Participant #3)

> I enjoyed playing games. I didn't enjoy the gym. (Participant #2)

*Table 1. Changes in outcome measures from baseline to six-weeks' follow-up*

| | Baseline Mean (SD) [n] | Follow-up Mean (SD) [n] | Change Mean (SD)* | 95% confidence interval | P-value |
|---|---|---|---|---|---|
| **Primary outcomes** | | | | | |
| **$VO_2$max, mL/kg/min** | 31.5 (4.3) [15] | 34.0 (6.2) [15] | 3.2 (4.4) | (0.5 to 5.8) | 0.02 |
| **Insulin resistance (HOMA-IR), mmol/L** | 6.3 (7.3) [15] | 4.8 (2.5) [15] | -1.9 (6.2) | (-5.8 to 2.1) | 0.3 |
| **Secondary outcomes** | | | | | |
| **Self-report vigorous exercise, min/week** | 12.9 (34.7) [14] | 321.9 (326.3) [16] | 239.3 (216.6) | (108.4 to 370.2) | 0.002 |
| **Self-report moderate exercise, min/week** | 90.0 (16.9) [14] | 277.2 (389.0) [16] | 119.6 (130.4) | (40.8 to 198.4) | 0.006 |
| **HbA1c, mmol/mol** | 39.9 (3.8) [16] | 39.1 (3.7) [15] | -1.1 (1.6) | (-2.0 to -0.1) | 0.03 |
| **Systolic BP, mm Hg** | 125.0 (12.9) [18] | 116.3 (10.2) [16] | -10.6 (12.0) | (-17.0 to -4.2) | 0.003 |
| **Diastolic BP, mm Hg** | 74.6 (6.9) [18] | 73.5 (8.4) [16] | -1.9 (10.5) | (-7.5 to 3.6) | 0.5 |
| **Total cholesterol,† mmol/L** | 4.1 (0.5) [16] | 3.9 (0.4) [15] | -0.1 (0.4) | (-0.3 to 0.2) | 0.5 |
| **HDL,† mmol/L** | 1.1 (0.2) [16] | 1.1 (0.2) [15] | -0.04 (0.09) | (-0.09 to 0.02) | 0.2 |
| **LDL,† mmol/L** | 2.3 (0.5) [16] | 2.2 (0.5) [15] | -0.1 (0.3) | (-0.3 to 0.1) | 0.2 |
| **Triglycerides,† mmol/L** | 1.3 (0.5) [16] | 1.4 (0.6) [15] | 0.1 (0.3) | (-0.1 – 0.3) | 0.2 |
| **Waist circumference, cm** | 93.7 (13.6) [18] | 101.7 (17.0) [16] | 6.5 (7.9) | (2.3 to 10.7) | 0.005 |
| **Other measures** | | | | | |
| **Plasma glucose,† mmol/L** | 4.7 (0.5) [17] | 4.6 (0.4) [15] | -0.02 (0.49) | (-0.31 to 0.26) | 0.9 |
| **Serum insulin,† µU/mL** | 28.3 (27.8) [17] | 23.1 (11.0) [15] | -6.8 (21.3) | (-20.3 to 6.8) | 0.3 |
| **Weight, kg** | 103.4 (20.1) [17] | 103.2 (20.1) [16] | -0.7 (2.8) | (-2.2 to 0.9) | 0.4 |
| **Height, cm** | 171.0 (9.2) [17] | 171.0 (9.4) [16] | -0.1 (1.3) | (-0.8 to 0.6) | 0.8 |
| **BMI, kg/m²** | 35.2 (6.7) [17] | 35.3 (6.6) [16] | -0.2 (1.0) | (-0.8 to 0.3) | 0.4 |

BMI Body mass index
* Mean change calculated only for those with both baseline and follow-up values. No imputation carried out
† Fasting

There were a lot of positive comments on the use of motivational texts, and participants specified that this method was a good way of encouraging them to 'get fit and eat healthy'.

> I had an awesome time. I feel fitter and healthier. I lost weight. Texts are supportive. (Participant #1)

> Great motivation, especially from the texts. (Participant #6)

Many participants were fond of the healthy snacks that were provided at the end of each session.

> It was an awesome experience... enjoyed everything, especially the food. Enjoyed all the laughs and trying to do all the activities. (Participant #7)

> I enjoyed the food, especially the sandwiches. I'm glad I got to participate in this programme. I

enjoyed it all and I hope it happens again next year. (Participant #18)

I like how food is provided and just love it all. The programme has really helped me and I'm now happy, healthy and active. Come back again. (Participant #6)

As obesity in adolescence is predictive of adult obesity, it is important to develop and evaluate exercise and lifestyle interventions that involve young people

## Discussion

### Summary of main findings

The main finding of this study was that it is feasible to recruit and retain less-active Pacific and Māori adolescents into an exercise and lifestyle intervention trial over six weeks. The results also suggest that this cohort can achieve reasonable adherence to a six-week moderate to vigorous exercise training programme after school, three times per week. In addition, the study was able to demonstrate significant improvements in cardiorespiratory fitness, physical activity levels, glycaemia and systolic blood pressure. It is likely that the combination of moderate- to vigorous-intensity exercise, frequent group or game-based activities and some resistance training were able to engage participants, as well as involve sufficient energy expenditure or lifestyle behavioural changes to elicit positive cardiovascular and metabolic improvements. However, the longer-term effectiveness and sustainability of such a programme need to be assessed by future quantitative and qualitative research.

### Comparison with the literature

Our results are similar to those of previous adolescent lifestyle intervention trials.[20,21] Previous studies have shown increases in cardiorespiratory fitness using aerobic training[22] and resistance training[23,24] in obese adolescents, of which our study incorporated both modalities. A previous trial of group-based games, involving predominantly younger, untrained Pacific adults over a four-week period, showed significantly improved cardiorespiratory fitness (absolute $VO_2$peak; $p$=0.003) and quadriceps strength ($p$=0.04) compared with controls.[11] The magnitude of change in $VO_2$peak or $VO_2$max was similar in that study to the current study (4.1 mL/kg/min vs 3.2 mL/kg/min, respectively). Unlike many other studies,[22,24] improvements in estimated insulin resistance were not shown to be statistically significant in our study, probably due to the small sample size, although the trend was in a favourable direction.

### Strengths and limitations

This was the first study to investigate the feasibility of an adolescent exercise and lifestyle intervention programme offered to inactive and sedentary (overweight and obese) Pacific and Māori adolescents. Furthermore, the study was able to show a significant improvement in cardiorespiratory fitness and systolic blood pressure in a short time among this population group. The study retention rate of 89% was high, and the programme adherence of approximately 50% was also reasonably high compared with previous studies with adolescents.[12]

The study had a number of limitations. Firstly, the current study was designed as a feasibility study and a pilot for a larger future trial and was not specifically powered to detect changes in the outcome measures and did not have a control group. There was a risk of measurement bias, particularly when participants reported physical activity levels in the IPAQ. With this said, many of the outcome measures in the study were undertaken by the school nurse using objective measures, such as fasting blood tests. Waist circumference in this study was measured by a different health professional at follow-up compared with baseline, and without a specific protocol. This may explain why there was a change in the opposite direction in this variable to all other variables. The lack of specific instructions about position for waist measurement was a weakness of the study. Lastly, the IPAQ has not been shown to be very reliable or valid when used with adolescents,[25]

although few physical activity questionnaires reviewed had adequate validity or appropriate questions for the adolescents in this study.

## Implications

As obesity in adolescence is predictive of adult obesity, it is important to develop and evaluate exercise and lifestyle interventions that involve young people.[26] The feasibility, demonstrated by this study, of producing changes in usual fitness levels, as well as possible benefits to other health outcomes, is important for improving the health and wellbeing of Pacific and Māori adolescents living in New Zealand. The study also showed that it was feasible to recruit, assess and retain the students in the study over approximately two months of recruitment, assessment, intervention delivery and follow-up assessments. This should inform a future trial. In the meantime, the manager of the gym next to the school has applied for funds to have ongoing staff to run an after-school programme, so that it does not rely on the presence of 'researchers' (personal communication).

The use of a larger sample size in a robust, randomised controlled trial is advised for future research. Components of the intervention that were thought to contribute to the promising retention rates seen in this study include:

1. flexibility to change activities according to capabilities;
2. use of technology, such as motivational texts or social media sites;
3. engaging and supportive instructors; and
4. inclusion of a healthy snack or other incentive.

For the duration of the intervention, participants were able to follow a moderate to vigorous exercise schedule; however, it is important to note that there was a mild progression in intensity that occurred over time. A mixed-modality and group-based exercise programme has proven to be practical in this study, although more studies are warranted. More initiatives could be developed for this at-risk group to help prevent the development of Type 2 diabetes and other comorbidities, and to encourage healthy lifestyle patterns for adult life.

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Dole NZ, and New World and Countdown supermarkets in Auckland provided healthy food snacks for the programme, free of charge.

**COMPETING INTERESTS**
None declared.

# APPENDIX: Exercise-based intervention —initial design

## Six-week exercise programme

### Week 1

*Session 1*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Indoor netball with two balls
10 mins: Partner races up and down the hall (Crab, Bear crawl, Wheelbarrow)
10 mins: Dancing
5 mins: Spud
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 2*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
5 mins: Stuck in the mud (Crawl under legs to unfreeze players)
10 mins: Touch rugby
10 mins: Dumbbell/Bodyweight circuit—Human timer
10 mins: Dodgeball
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 3*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
5 mins: Human chain tag
10 mins: Indoor netball with two balls
10 mins: Plyometrics (Cone hops with change of direction, lateral cone hops, tuck/squat jumps)
10 mins: Dancing
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Week 1 Strategy*

– Avoid all sugary, high fat/salty foods.

## Week 2

*Session 4*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Rope jumping, Jumping Jacks, Prison Squats (AMRAP)
15 mins: Partner races up and down the hall (Crab, Bear crawl, Wheelbarrow)
10 mins: Cops and robbers
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 5*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Dodgeball
15 mins: Dumbbell/Bodyweight circuit—Human timer
15 mins: Dancing
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 6*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Human chain tag
15 mins: Pad work—Kick boxing
5 mins: Jump rope/Box jumps
10 mins: Dancing
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Week 2 Strategy:*

- Add two 30–40-minute cardio sessions per week on your own

## Week 3

*Session 7*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
15 mins: Touch rugby
10 mins: Partner races up and down the hall (Crab, Bear crawl, Wheelbarrow)
10 mins: HIIT bodyweight exercises, Pushups (wall/floor), jump squats, burpees etc.
10 mins: Cops and robbers
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 8*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Stuck in the mud (Crawl under legs to unfreeze players)
15 mins: Mini-Olympics: Relays, Belt run, Box jumps
10 mins: Dancing
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 9*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Human chain tag
10 mins: Activity of choice
15 mins: Dumbbell/Bodyweight circuit—Human timer
10 mins: Partner races up and down the hall (Crab, Bear crawl, Wheelbarrow)
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Week 3 Strategy:*

- Reduce carbs by half for four days
- Eliminate/reduce carbs from your last meal of the day

## Week 4:

*Session 10*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
15 mins: Bootcamp: Rope jumping, Push ups, Jumping jacks, Prison squats (AMRAP)
5 mins: Activity of choice
15 mins: Medicine ball passes, Russian twist, Tricep extension, Crunches
10 mins: Ball tag
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 11*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Ball tag
15 mins: Mini Olympics: Relay races, Jumping jacks, Shoot hoops in goal
10 mins: Activity of choice
10 mins: Dodgeball
15 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 12*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Stuck in the mud (Crawl under legs to unfreeze players)
15 mins: Indoor soccer
10 mins: Plyometrics (Cone hops with change of direction, lateral cone hops, tuck/squat jumps)
15 mins: Dancing
5 mins: Activity of choice
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Week 4 Strategy:*

– Increasing fruit, vegetable and water consumption

## Week 5

*Session 13*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
5 mins: Stuck in the mud (Crawl under legs to unfreeze players)
10 mins: Bootcamp: Jumping jacks, Push ups, Burpees, Mountain climbers, Prison squats (AMRAP)
10 mins: Partner races up and down the hall (Crab, Bear crawl, Wheelbarrow)
5 mins: Human chain tag
5 mins: Activity of choice
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 14*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Cops and robbers
15 mins: Touch rugby
10 mins: Basic gymnastics circuit (Forward rolls, Handstand Wall walk, Beginner handstand)
5 mins: Jump rope
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 15*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Dodgeball
15 mins: Kick-boxing/Pad work
15 mins: Basketball/Netball mixed game
10 mins: Dancing
5 mins: Activity of choice
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Week 5 Strategy:*

– Add 50% more sets to your typical training plan

## Week 6

*Session 16*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
15 mins: Mini-Olympics: Rope jumping, Jumping jacks, Prison squats (AMRAP)
15 mins: HIIT circuits with music timer
15 mins: Activity of choice
15 mins: Crab soccer
10 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 17*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Indoor netball
15 mins: Dumbbell/Bodyweight circuit—Music timer
15 mins: Activity of choice
10 mins: Dancing
15 mins: Cool down/Stretch
15 mins: Health and fitness discussion

*Session 18*

5 mins: Change of clothing and snacks
10 min: Warm up/joint rotations
10 mins: Ball tag and Human chain tag
25 mins: Pad work/HIIT
15 mins: Dancing
15 mins: Activity of choice
15 mins: Cool down/Stretch
15 mins: Health and fitness discussion

## Terms:

**Dancing:** Latin, Zumba, Jump Jamp, Hip Hop, or whatever style they want

**AMRAP:** As many repetitions as possible

**HIIT:** High Intensity Interval Training

**Spud:** Spud is a tag variant that is best played in large, open areas. Players begin each round in a central location. 'It' then throws a ball high into the air. The other players run but must stop as soon as 'It' catches the ball and shouts 'Spud!' 'It' may then take three large steps toward the player of his choosing before throwing the ball at that player. If the ball hits the target, that player becomes 'It', and the game starts over.

**Cops and robbers:** The cops, who are in pursuit of robbers (the team being chased), arrest the robbers by tagging and putting them in jail. Robbers can stage a jailbreak by tagging one of the prisoners without getting tagged themselves. The game ends if all the robbers are in jail. In a variant, the robbers have five minutes to hide before being hunted and only one jailbreak may be allowed per robber.

**Stuck in the mud:** Players who are tagged are 'stuck in the mud' or 'frozen' and must stand in place with their arms stretched out until they are unfrozen. An unstuck player can perform an action to unfreeze them, such as tagging them or crawling between their legs.

**Octopus:** 'It' or 'Octopus' attempts to tag the other players. The playing field is known as the ocean. The players, or 'fish' line up along one side of the ocean. When the Octopus calls out, 'Come fishies come!', they try to run to the other side without getting tagged. In a variation, once the fish run to the other side without getting tagged, the game pauses until the octopus starts it again. Upon getting tagged the fish become 'seaweed' and must freeze or sit where they were tagged, but they can wave their arms around and assist the Octopus in tagging other fish within their reach. The last fish to be tagged becomes the next Octopus.

**Human chain tag:** This is a variant of Build Ups in which each person to be caught joins hands with 'It' and the chain thus formed must chase the others as a pair. As more people are caught they too join hands with the 'It' players, forming a lengthening chain. This variation is also called 'Blob'. Only those at the ends of the chain are able to catch someone, as they are the only ones with a free hand. A variant has chains of four splitting in two.

**NOTE:** Although we were not strict in sticking to this programme, most of the activities were performed at least once and activities repeated if enjoyed by the participants.