HONG KONG RECREATION REVIEW
康樂動向

Volume 34
2022
二〇二二年
第三十四期

Hong Kong Recreation Management Association
香港康樂管理協會

Hong Kong Recreation Management Association
香 港 康 樂 管 理 協 會

2021 - 22 Organisation and Office Bearers
二〇二一至二二年度組織及職員表

Patron 贊助人	霍震霆 GBS, 太平紳士 *The Honourable Timothy Fok Tsun Ting, GBS, JP*
Founding President 創會會長	容德根博士 *Dr. Dicken Yung*
President 會長	胡偉民先生 BBS *Mr. Johnny Woo Wai Man, BBS*
Hon. President 名譽會長	湯偉綸先生 BBS, MH, 太平紳士 *Mr. William Tong Wai Lun, BBS, MH, JP*
Hon. Legal Adviser 名譽法律顧問	王寶榮大律師 *Mr. Wong Po Wing, Barrister*

Executive Committee 執行委員會

Chairman 主席	黃達明先生 *Mr. Richard Wong Tat Ming*
Vice Chairman 副主席	劉永松教授 *Prof. Patrick Lau Wing Chung*
Secretary 秘書	陸智剛先生 *Mr. Luk Chi Kwong*
Vice Secretary 副秘書	饒奕明先生 *Mr. Edmond Yiu Yik Ming*
Treasurer 司庫	黃令陶先生 *Mr. Lester Huang Ling To*
Member 委員	陳敏璇女士 *Ms Joyce Chan*
	關仲偉先生 *Mr. David Kwan Chung Wai*
	林絢琛博士 *Dr. Michael Lam Huen Sum*
	梁景法先生 *Mr. Kelvin Leung King Fat*
	李世琛博士 *Dr. Sam Li Sai Sum*
	屈旨盈小姐 *Miss Crystal Vut Tsz Ying*
	黃嘉儀博士 *Dr. Allison Wong Ka Yee*

Sub-committees 小組委員會

Academic 學術小組	陳敏璇女士 *Ms Joyce Chan*
	林絢琛博士 *Dr. Michael Lam Huen Sum*
Finance 財務小組	黃令陶先生 *Mr. Lester Huang Ling To*
	林思源先生 *Mr. Lam Sze Yuen*
Marketing 市場推廣小組	關仲偉先生 *Mr. David Kwan Chung Wai*
	屈旨盈小姐 *Miss Crystal Vut Tsz Ying*
	饒奕明先生 *Mr. Edmond Yiu Yik Ming*
Membership 會員小組	黃嘉儀博士 *Dr. Allison Wong Ka Yee*
	游家騰先生 *Mr. Yau Ka Tang*
Newsletter 會訊編輯小組	李世琛博士 *Dr. Sam Li Sai Sum*
	何詠嘉小姐 *Miss Ho Wing Ka*
	余顯穎小姐 *Miss Yue Hin Wing*
	王靖欣小姐 *Miss Kris Wong*
	魏銘治先生 *Mr. Jimmy Ngai*
Social and Recreation 社交及康樂小組	梁景法先生 *Mr. Kelvin Leung King Fat*
	屈旨盈小姐 *Miss Crystal Vut Tsz Ying*
	黃曉盈小姐 *Miss Angel Wong Hiu Ying*
	陳愷晴小姐 *Miss Chan Hoi Ching*

Contents 目錄

康樂動向
二〇二二年
第三十四期

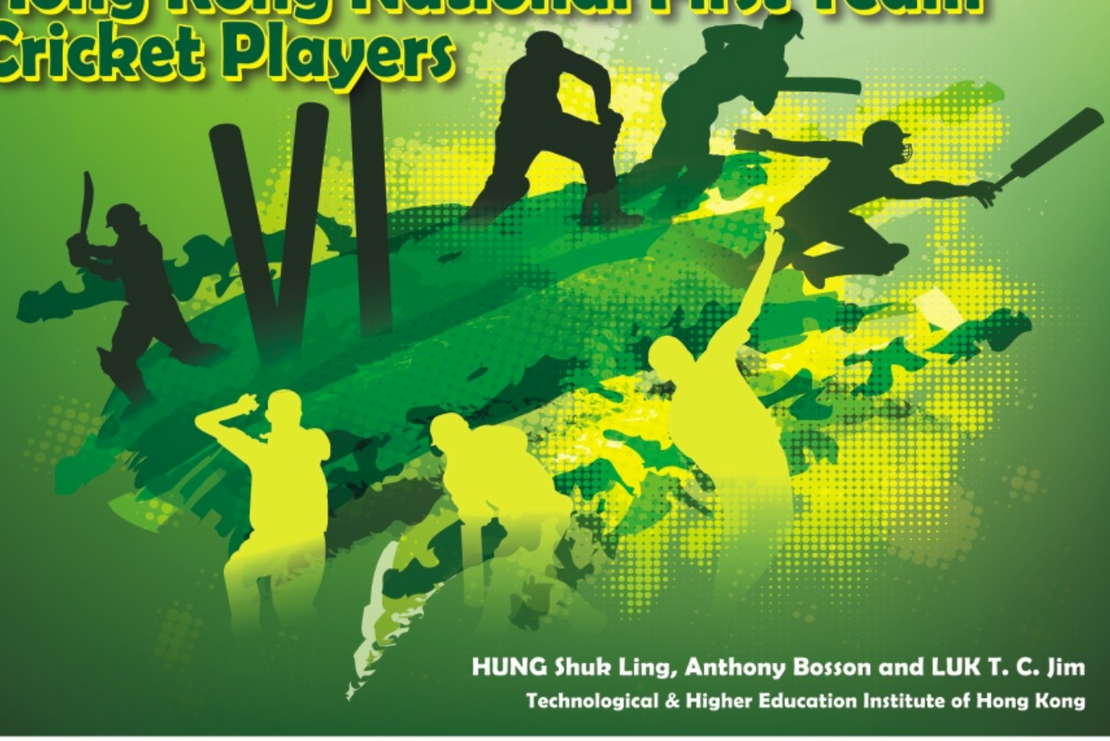
Hong Kong Recreation Review
Volume 34
2022

康樂動向是香港康樂管理協會出版的刊物。本刊登載的文章，所表達的意見，並不一定代表康樂管理協會的意見。

有關本刊物的任何查詢，可致函香港郵政總局郵政信箱9044號香港康樂管理協會。本會網址：http://www.hkrma.com.hk

Hong Kong Recreation Review is a publication of the Hong Kong Recreation Management Association. The opinions expressed in the articles are the contributors' own and do not necessarily reflect the views of the Hong Kong Recreation Management Association. Correspondence address: Hong Kong Recreation Management Association, P.O. Box 9044, General Post Office, Hong Kong. Website: http://www.hkrma.com.hk

The Effectiveness of a 6-week Core Stability Training Programme on Running Speed and Agility in Hong Kong National First Team Cricket Players



HUNG Shuk Ling, Anthony Bosson and LUK T. C. Jim
Technological & Higher Education Institute of Hong Kong

Introduction

Cricket originated in England in the 16th century. In 1611, the first cricket match, an English Village game, was documented. It was then introduced to different British colonies and started global development in the 18th century (ICC, 2020). Now a day, cricket is the second most popular sport and the oldest noncontact ball and bat sport, consist of 11 players in each team (Stuelcken, Pyne & Sinclair, 2007). As a field-based sport, running, throwing and catching during fielding, bowling, wicket keeping, and batting are the essential roles on the field. Cricket develop from village cricket to professional sports.

Cricket starts in Hong Kong in the 1840s. The official governing body, Hong Kong Cricket Association, was established in 1968; it was named Cricket Hong Kong in the International Cricket Council and Asia Cricket Council (CHK, 2020). The Hong Kong Cricket Association was granted associate membership of the ICC in 1969. Hong Kong is currently ranked 23rd in ICC Twenty20 International (T20I) and was ranked 11th in T20I in 2015 (ICC, 2020). Hong Kong Cricket Club is founded in 1851 as one of the first cricket clubs outside the United Kingdom (HKCC, 2020).

With the increase in the number of studies related to the efficacy of intervention strategies of reducing the risk of cricket injury, more studies focused on injury prevention specific for cricket. Core stability, an essential component of muscle capacity and neuromuscular control, the ability to control the position and movement of the trunk for optimal production, transfer and control of forces during functional activities (Silfies, Ebaugh, Pontillo & Butowicz, 2015). However, a rare number of studies provide support for the link between core stability and sports performance.

The purpose of this study is to investigate the effectiveness of core stability training on Cricket Hong Kong elite cricket players' running speed and agility. A 6-week core stability training programme was designed for the players with the pre and post-test comparison.

Methods

Study Design

This study is a repeated measure longitudinal research design with recruitment of the subjects in purposive sampling technique.

The study was taken place in Technological and Higher Institute of Hong Kong (THEi). The consent form, information sheet about the study, medical history check form and PAR-Q, would be given to subjects. All the forms and testing procedure was approved by a Human Subjects Ethics Sub-committee (HSESC) of THEi.

For those who passed the screening, there will only one experimental group to start the intervention exercises. Once completion of the intervention exercises programme, the post-tests will be conducted.

Participants

Seven subjects were recruited in this study. They are currently Hong Kong National cricket male team players. The recruitment of subjects this study would be the players who currently involved in Hong Kong National Cricket Men's team (first team) and without injuries in the past 6 months. If the red flags were presented and suffered from injuries in the past 6 months, the players would be excluded to this study.

Procedures

It would be a 6-week programme with session twice a week, 12 sessions in total. With the pre-test and post-test, the whole procedures would be an 8-week period.

Subjects would be informed all details of the experimental with the demonstration and explanation of all the procedures from the research team.

Pre-test and Post-test would be separately tested on core endurance, running speed and agility to compare the different result before and after the intervention exercises program. Same set-up for procedures and equipment would be the same to minimise the error of the result. There will be 4 tests and 10 intervention exercises in total. Progression of the intervention exercises would be made every 2 weeks. Details of tests (Table 1) and intervention exercises program (Table 2) would be shown as follow.

Table 1. Testing items in both Pre-test and Pro-test

Components	Tests
Running Speed	17.68 Metre Sprint Test
Agility	Run - A - Three Test
Core Endurance	Biering - Sorenson Test Side - Bridge Test

Table 2. Selected exercise items in the intervention exercises programme

Exercises	Duration / Repetition	Rest Time	Progression (Phase 2)	Progression (Phase 3)
Warm up (RAMP)	115 mins	30	N/A	N/A
Hip Bridge w/ legs on balance pad	3 sets; 10 reps	15s	Double legs on balance disc	Double leg on Swiss ball
Plank w/ legs on balance pad	3 sets; 45s	15s	Elbow on balance disc	Swiss ball roll (10 reps)
Side Bridge w/ elbow on balance pad	3 sets; 45s	15s	Elbow on balance disc	Elbow on balance pad w/ rotation
V-Sit w/ trunk rotation	3 sets; 30s	15s	W/ leg movement	Swiss ball pass 5 reps
Deadbug (Bracing w/ heel taps)	3 sets; 10 reps (Each side)	15s	Supine position alternating	Supine position alternating w/ Swiss ball
Bird Dog	3 sets; 10 reps (Each Side)	15s	W/ elbow to knee	W/ drawing circle (20s each side)
Medicine Ball Side Throw	3sets of 5reps	15s	6kg/3m	8kg/3m
Farmer Walk	3 sets of 10m	15s	Single side weight	Overhead weight
Prone Jackknife	3 sets; 10 reps	15s	Hands on balance pad, shin on Swiss ball	Hand on the balance pad, feet on Swiss ball
Kneeling Woodchop	3 sets; 10 reps (Each side)	15s	Standing position	Lunge position
Cool Down (Static Stretching)	10 mins	N/A	N/A	N/A

Apart from the intervention exercises, RAMP warm-up exercises (Table 3) and cool-down exercises (Table 4) would be included in the core stability training programme as shown in the following. Warm-up and cool-down would take 10 mins each before and after the intervention exercises respectively. The intervention exercises programme would take around 60 minutes. The whole session would take around 90 minutes.

Subjects need to maintain normal breathing during all the tests. No clues to the scores will be provided until all tests are finished.

Table 3. RAMP Warm-up exercises (Jeffreys, 2007)

Exercises	Duration
Cobra stretch	30 seconds 2 reps
Cat cow stretch	30 seconds 2 reps
Lumbar lock	10 reps for each side
Quadriceps stretch	30 seconds for each leg 2 reps
Hamstring stretch	30 seconds for each leg 2 reps
Gluteus stretch	30 seconds for each leg 2 reps

Table 4. Arrangement of cool-down exercise session

Order	Exercises	Duration / Repetition	Rest Time
Raise	Jogging	5 minutes	90s
Activate	Walking Lunge	1 set; 10 meter	30s
	Narrow Push-up	1 set; 10 reps	30s
	Banded internal rotation	1 set; 10 reps	20s
	Banded external rotation	1 set; 10 reps	20s
Mobilize	TMobilise's Greatest stretch	1 set; 10 reps	20s
	Upward - Downward Dog	1 set; 10 reps	20s
	Banded Around the World	1 set; 10 reps	20s
Potentiate	High heel	1 set	30s
	Squat Jump	1 set; 10 reps	35s
	Forward Crawl	1 set; 10 reps	30s

Testing Procedure

Pre-test and post-test would be required for all the subjects before and after the 6-week programme. All core endurance tests, Biering-Sorenson Test and Side-Bridge Test would be measured by stopwatches and result would be recorded to two decimal places. For the speed test and agility test, measuring tapes and speed gate would be used to measure the running distance and recording time. All equipment with their models would be used in this study are shown in Table 4.

Core Stability tests

Biering-Sorenson Test

The Biering-Sorensen test, an isometric endurance test for assessing trunk extensor muscles. The Intraclass Correlation Coefficient (ICC) value of the Biering-Sorensen test is 0.98 (McGill et al., 1999, Demoulin et al., 2012). In this test, subjects are required to lie on the plinth in the prone lying position with the pelvis lie on the edge of the table with the arms across the chest (Demoulin et al., 2012). There will be three staps, to stabilise stabilise body of the subject, would be places on the hip, knee and below calves to the plinth. Subjects are required to maintain the upper body to be extent and maintain the horizontal level. This is a "means of maximum effort tests", subjects would require performing the test as long as possible. Researchers would stop the timer once the subject fail to maintain the horizontal position (Demoulin et al., 2012).

Side Bridge Endurance Test

Side Bridge test, an isometric endurance test of the oblique muscles (Demoulin et al., 2012). The ICC value of the test is 0.99 and 0.99 on both right and left side (McGill

et al., 1999). Subjects would perform this test on an exercise mat in a side lying position with legs extended. To support the side laying position, the top foot will be placed in front of the lower foot and the elbow should be in a line with the shoulder. During the test, subjects would require lifting their hips off the mat and maintain a straight line of the whole-body length. The test would finish when the hips touch the mat. Subjects would be reminded to maintain the position as long as possible (McGill et al., 1999). This test will be performed on both sides.

Running Speed Test (17.68 Metre Sprint Test

The 17.68 Metre Sprint Test is used to measure the running speed of the cricket player that running with or without the cricket bat in the distance of 17.68m. This is the stimulation of competition situation of running "Quick Single", scoring 1 run in batting (Callaghan et al., 2014; Lockie et.al., 2013). The ICC value of this test of with bat and without bat are 0.94 and 0.96 respectively (Lockie et.al., 2013). In this study, a standardisstandardised2lb8oz (1,134g) is used for all subjects. During the test, subjects have to sprint 17.68m with and without bat. Four pairs of speed gate would be separately placed at starting point(0m), 5m, 12.78m and the finishing point (17.68m). There will be three trails to record for both with bat and without bat, and 3 minutes break would be provided between each trial. Standard deviation and mean of all the three successful trails would be recorded and processed.

Agility Test (Run-A-Three Test)

Run-A-Three test is used to measure the speed of change of direction of the players with the bat in 17.68m. This would include acceleration, deceleration, reacceleration and change of direction (Dos'Santos et al., 2018, Lockie et.al., 2013). ICC value of this test is 0.97 (Lockie et.al., 2013). During the test, subjects must sprint 17.68m with bat. Four pairs of speed gate would be separately placed at starting point(0m), 5m, 12.78m and the finishing point (17.68m). A standardised 2lb 8oz (1,134g) is used for all subjects in this study. There will be three trails to record for both with bat and without bat, and 3 minutes break would be provided between each trial. Standard deviation and mean of all the three successful trails would be recorded and processed.

Core Training Programme Procedure

Hip Bridge

Hip Bridge, an exercise focuses on the muscle activation of the transverse abdominis, rectus abdominis, and erector spinae. This can increase the muscle activities of the transverse abdominis and erector spinae muscles and improve stabilisation of the joint (Lee, Park & Lee, 2015). Also, by performing the hip bridge, it brings more attention on the use of gluteal muscles and eliminating hamstrings. This would help to establish gluteal muscles dominances during hip extension and prevent chronic back pain (McGill, 2010).

There will be three phases in this intervention, Phase 1 will be hip bridge with both legs on balance pads, Phase 2 will be hip bridge with both legs on balance disc and Phase 3 will be hip bridge with double legs on Swiss ball. Subjects would start the exercise with a supine lying position with 90 degree knee flexion and feet on the floor. Lifting up the ship in a hip extension movement and keeping a straight line between shoulders and knees (Oliva-Lozano & Muyor, 2020).

Plank

Plank, an exercise targets the transversus abdominis and lumbar multifidus, the lumbopelvic region and diaphragm, a functional core stability maintenance exercise. The strengthen of transversus abdominis would improve sports performance (Clark, Holt & Sinyard, 2003).

There will be three phases in this intervention, Phase 1 will be plank with elbow on balance pad, Phase 2 will be plank with elbow on balance disc and Phase 3 will be swiss ball roll out.

Subject would start in a prone position with posterior pelvic tilt. Forearm and feet would be the supporting point. The feet should be shoulder-width apart and the spine should be in the neutral position. Progressions would be made from front planks with hands and legs and unstable surfaces (Oliva-Lozano & Muyor, 2020).

Side Bridge

Side Bridge, an exercise of the obliques, rectus abdominis, latissimus dorsi, and both upper and lower spine extensors, a challenge to the lowest torso muscles. This exercise requires all muscles activation as support and bring more challenge on this exercise (McGill & Karpowicz, 2009).

There will be three phases in this intervention, Phase 1 will be side bridge with elbow on balance pad, Phase 2 will be side bridge with elbow on balance disc and Phase 3 will be side bridge with elbow on balance pad with roation. Subjects would be in side-lying position with the elbow placed directly under the shoulder. There will be a 90 degree angle with the forearm is placed on the floor. The hip would be lifted while the spine in the neutral position and extension of the knee would keep the body in a straight line from the head to the feet (Oliva-Lozano & Muyor, 2020).

V-Sit

V-sit, an effective abdominal muscle exercise, a simultaneous upper and lower bodies movement. This exercise has a relatively higher muscle activity in lower rectus abdominis and external oblique muscles. With the simultaneous upper and lower bodies movement, this can increase the body perturbation and enhance body stability with the activation of abdominal muscles (Seo & Chung, 2020)

There will be three phases in this intervention, Phase 1 will be V-Sit with trunk rotation, Phase 2 will be V-Sit with leg movement and Phase 3 will be V-Sit and Swiss ball passing.

Subjects would be in a supinated lying position on the yoga mat that placed on the floor. Full hip and knee extension would be the starting position. Legs would lift up through a 45 degree hip flexion movement and the arms will then move towards the ankles (Oliva-Lozano & Muyor, 2020)

Dead bug

Dead bug, an isometric exercise that brings challenge to the anterior abdominal muscles of the athletes. From the supination position of dead bug, it is specifically targeting the rectus abdominals and external obliques. This exercise can improve muscle strength and core muscle endurance so as to provide adequate stiffness and stability. This can ensure the stabilisation of lumbopelvic region during movements and daily living activities. Progression of exercises would include the use of resistance band that held by the partner or fix with a fixed object (Mullane, Turner & Bishop, 2019).

There will be three phases in this intervention, Phase 1 will be dead bug with heel taps, Phase 2 will be supine dead bug and Phase 3 will be double-leg dead bug with Swiss ball. To start the exercise, subjects will be in a supine position with full elbow extension and be directly above the shoulders, legs off the floor 90 degree flexion and 90 degree knee flexion directly above the hips and ankle in a dorsiflexion position (Mullane, Turner & Bishop, 2019).

Bird Dog

This exercise is the exercise that requires the use of erector spinae, latissimus dorsi, rectus abdominis, transverse abdominus, gluteus maximus, trapezius, supraspinatus, infraspinatus, subscapularis, teres minor, anterior and medial deltoids, posterior deltoids, serratus anterior, gluteus medius and gluteus minimus (Graham, 2009). By making a fist and contracting to the arm and shoulder, there will be a progression on upper erector spinae contraction enhancement (McGill, 2010).

There will be three phases in this intervention, Phase 1 will be full bird dog, Phase 2 will be bird dog with elbow to knee and Phase 3 will be bird dog with drawing circle. Subjects would be in prone lying position. Knees would be placed directly under the hips and hands placed directly under the shoulders. Subjects would raise the left arm with 180 degree shoulder flexion and right leg with 180 degree hip extension. It is a contralateral side movement (McGill, 2010, Oliva-Lozano & Muyor, 2020).

Medicine Ball Side Throw

Medicine ball training, an effective way of performance enhancement for athletes in rotational powering sports, allows complex sport-specific skills that perform explosive movement with more resistance training than regular competition. This medicine ball side throw exercises would be able to enhance the performance for both bowler and batsman with the rotational movement (Earp & Kraeman, 2010).

There will be three phases in this intervention, Phase 1 will use a 4 kg medicine ball, Phase 2 will use a 6 kg medicine ball and Phase 3 will use a 8 kg medicine ball. During all phases, they are all 3m distance side throws. Subjects will in a lunge position with one knee on the ground. Knees would be around hip-width distance and shoulders remain in the same direction that perpendicular to their partner (Oliva-Lozano & Muyor, 2020). Weight will then increase during different phase.

Farmer's Walk

The asymmetric dumbbell carry brings the unique challenge to the lateral muscle group, quadratus lumborum and the oblique muscles. This would rarely be found in other exercises (McGill, 2010).

There will be three phases in this intervention, Phase 1 will be same weight on both sides, Phase 2 will be different weight on both sides and Phase 3 will be overhead weight.

Subjects would carry a set of equal weight dumbbells. Holding the dumbbells with a tight and firm grip. Starting with a Shoulder-width stand and arms resting at the sides with dumbbells. Before the movement, engaging the core muscles and pulling the shoulder blades downward and backward, and form an upright posture. Head, shoulder, and core muscles should be braced the entire time (McGill, 2010).

Prone Jack-knife

Prone Jack-knife, an exercise targets the transversus abdominis and lumbar multifidus, the lumbopelvic region and diaphragm, a functional core stability maintenance exercise. The strengthen of transversus abdominis would improve sports performance (Clark, Holt & Sinyard, 2003).

There will be three phases in this intervention, Phase 1 will be hands on floor and feet on swiss ball, Phase 2 will be hands on balance pad and shin on Swiss ball and Phase 3 will be hands on balance pad and feet on swiss ball. The unstable surface of the Swiss ball would require the core to work hard and to maintain the boy position. Subjects start in press- up position with the feet place on the Swiss ball. Embrace the core and draw the knees in towards as close as possible to the chest, hold the position for a second and return to the starting position (Clark, Holt & Sinyard, 2003).

Kneeling Woodchop

Kneeling woodchop is a bilateral upper extremity proprioceptive neuromuscular facilitation (PNF) exercise. Unilateral PNF diagonal patterns are common in sports physical therapy and athletic training with additional manual resistance, weights, and elastic resistance in different position. It is an exercise that focus on the principles of proximal to distal and distal to proximal overflow (Voight et al., 2008).

There will be three phases in this intervention, Phase 1 will be kneeling wood chop, Phase 2 will be do in a standing position and Phase 3 will be wood chop in lunge position.

For kneeling woodchop, subjects would start with the overhead position with both knees places in a shoulder width position and hands on the handle. During the exercise, the core is required to pull the handle down in a diagonal direction to the opposite hip. Holding in the end point briefly, maintain the body posture and steady back to the starting position.

Warm Up and Cool Down Exercise

There will be a 10 minutes "RAMP" warm-up programme before the intervention exercises programme. The "RAMP" warm-up aimed to increase heart rate, activation, mobilisation, and potentiation to maximise their performance (Jeffreys, 2007). For the cool down exercises, it is aimed to improve performance in the following day and increase the removal of lactate acid. In the long term, cool-down would prevent injuries, and enhance long-term adaptive response (Van Hooren & Peake, 2018).

Table 5. Equipment list used in all the testing

Equipment	Model	Quantity
Measuring Tape	Seca 206, Germany	1
Measuring Tape	KOMELON Unigrip Neo	1
Speed Gate	Fusion Sport SMARTSPEED PT 1 Gate Sports – Timing System	4 pairs
Dumbbell	LifeFitness	7 pairs
Balance Pad	AIREX	7
Medicine Ball	JoinFit	4
Swiss Ball	ChrisPower	7
Resistance Band	Rogue Fitness	7
Balance disc	Joinfit	7
In-body Machine	In-body 720	1
Yoga Mat	Goma	8

Statistical Analysis

IBM Statistical Package for the Social Sciences (SPSS) - Version 26 will be used for data analysing study. All the test data from Pre-test and Pro-test will be stated as mean ± standard deviation (SD). To determine the condition of parametric, the skewness value need to ± 1.96 and within twice the value of "standard error of skewness", then the data would be determined as parametric. For this study, paired sample t-test would be used to analyse the result between pre-test and post-test if the data was normally distributed ($p < 0.05$). The confidence level would be set at 95% (alpha = 0.05, $p < 0.05$). The significant difference will be shown when $p < 0.05$. Vice versa, the Wilcoxon Signed- Ranked test would be used if the significant difference is $p > 0.05$.

Results

Personal information of subjects was presented in Table 6. The data of age, height, weight and body mass index were shown accordingly.

Table 6. Anthropometric and body composition measurers for elite cricketers.

Subjects (males n=6)	Pre-test (Mean ± SD)	Post-test (Mean ± SD)
Age (year)	26 ± 5.07	26 ± 5.07
Height (cm)	183.33 ± 5.32	183.33 ± 5.32
Weight (kg)	75.52 ± 6.18	75.81 ± 5.13
Skeletal Muscle Mass (kg)	37.12 ± 3.67	37.87 ± 3.56
Body Fat Mass (kg)	10.01 ± 1.94	9.79 ± 2.06
Body mass index	22.47 ± 1.31	22.81 ± 1.07

Core Endurance Test

Side Bridge Test

Table 7. Paired Sample t-test result of Side Bridge Test on left side (SBL)and Side Bridge Test on right side (SBR).

	Pre-Test (s) (Mean ± SD)	Post-Test(s) (Mean ± SD)	Mean difference (Mean ± SD)	t value	Sig. (2-tailed)	Effect Size
			95% Confidence Interval			
SBL	95.929 ± 24.060	104.357 ± 29.333	8.428 ± 5.273	-2.351	0.057	9.484
SBR	92.929 ± 21.269	103.714 ± 27.354	11.785 ± 6.085	-2.140	0.076	13.332

**Significant difference at p < 0.05*

As the skewness value is ± 1.96 and within twice the value of "standard error of skewness", the Paired Sample t-test has been used to compare the result of pre-test and post-test of Side Bridge Test for both left side and right side as shown in Table 8. The result of SBL in pre-test and post-test are showed (M = 95.929, SD = 24.060) and post-test (M = 104.357, SD = 29.333; t(6) = -2.351, p > 0.05) respectively. The result of SBR in pre-test and post-test are showed (M = 92.929, SD = 21.269) and post-test (M = 103.714, SD = 27.354; t(6) = 2.14, p > 0.05) respectively. There was no significant mean difference for both SBL and SBR. The effect size for SBL and SBR are 9.484 and 13.332 respectively.

Biering-Sorenson Test

Table 8. Paired Sample t-test result of Biering-Sorenson Test (BST).

	Pre-Test (s) (Mean ± SD)	Post-Test(s) (Mean ± SD)	Mean difference (Mean ± SD)	t value	Sig. (2-tailed)	Effect Size
			95% Confidence Interval			
BST	134.214 ± 32.545	168.357 ± 33.265	34.143 ± 0.72	-3.806	*0.009	23.732

**Significant difference at p < 0.05*

As the skewness value is ± 1.96 and within twice the value of "standard error of skewness", the Paired Sample t-test has been used to compare the result of pre-test and post-test of Biering-Sorenson Test as shown in Table 9. There was a significant mean difference between pre-test and post-test of the BST in pre-test (M = 134.214, SD = 32.545) and post-test (M = 168.357, SD = 33.265; t(6) = -3.806, p < 0.05; The effect size of BSTis (d)=23.732.

Running Speed Test (17.68 Metre Sprint Test)

Table 9. Paired Sample t-test result of 17.68 Metre Sprint Test with a bat (WB)and 17.68 Metre Sprint Test without a bat (WOB).

	Pre-Test (s) (Mean ± SD)	Post-Test(s) (Mean ± SD)	Mean difference (Mean ± SD)	t value	Sig. (2-tailed)	Effect Size
			95% Confidence Interval			
WB	2.885 ± 0.105	2.75 ± 0.093	0.135 ± 0.012	4.868	*0.003	0.732
WOB	2.895 ± 0.091	2.843 ± 0.080	0.052 ± 0.01	2.194	0.071	0.063

**Significant difference at p < 0.05*

As the skewness value is ± 1.96 and within twice the value of "standard error of skewness", the Paired Sample t-test has been used to compare the result of the pre-test and post-test of 17.68 Metre Sprint Test with a bat (WB) and 17.68 Metre Sprint Test without a bat (WOB) in shown in Table 10. There was a significant mean difference between pre-test and post-test of the 17.68 Metre Sprint Test WB in pre-test (M = 288.5, SD = 0.105) and post-test (M = 2.75, SD = 0.093; t(6) = 4.848, p < 0.05). The effect size of 17.68mWB (d) = 0.732.

However, there was no significant mean difference between pre-test and post-test of the 17.68 Metre Sprint Test without a bat in pre-test (M = 2.895, SD = 0.091) and post-test (M = 2.843, SD = 0.080; t(6) = 0.071, p > 0.05). The effect size of 17.68m WOB (d) = 0.063.

Agility Test (Run-A-Three Test)

Table 10. Wilcoxon signed rank test of Run-A-Three Test).

	Pre-Test (s) (Mean ± SD)	Post-Test(s) (Mean ± SD)	Mean difference (Mean ± SD)	Z score	SAsymp. Sig. (2-tailed)
			95% Confidence Interval		
First turn of Run-A-Three Test	2.268 ± 0.875	2.232 ± 0.098	0.036 ± 0.777	-0.845	0.398
Second turn of Run-A-Three Test	2.328 ± 0.119	2.249 ± 0.866	0.079 ± 0.747	-2.028	0.043

**Significant difference at p < 0.01*

As the skewness value is not ± 1.96 and within twice the value of "standard error of skewness", the Wilcoxon Signed-Ranks Test has been used to compare the result of the pre-test and post-test of the Run-A-Three Test shown in Table 11. Wilcoxon Signed-Ranks Test indicated that the First turn of Run-A-Three Test of post-test mean rank was not significantly lower than the pre-test mean ranks (Z = -0.845, p > 0.05). For the Second turn of Run-A-Three Test of post-test mean rank was not significantly lower than the pre-test mean ranks (Z = -2.028, p < 0.05).

Discussion

Introduction and Major Findings

The study participants comprised seven male cricket athletes from the Hong Kong national team were included in the intervention and the respective outcomes measures. Subjects would require completing three core endurance tests, two-speed tests and one agility before and after the 6-week core stability intervention. This study hypothesised the 6-week core stability intervention training could improve Hong Kong team cricket players' speed and agility with an increase in running ability and an increase in change direction speed. The present result indicated a significant improvement in all tests. Results from the present study found significant differences (p<0.05) in the three core stability tests, two running speed tests and the agility test in pre-test and post-test. This showed a positive correlation between core stability and speed and core stability and agility.

Core Endurance Test Performance

Side Bridge Test on left side (SBL), Side Bridge Test on right side (SBR) and the Biering -Sorensen test (BST), the three core endurance tests were used to assess the core muscles stability of the subjects. With the results from the present study, Hong Kong cricket men's first players indicated a significant improvement in core endurance and core stability after experiencing the 6-week core stability intervention training. The present results indicated the effectiveness of core stability training can further confirm the correlation between core stability and core endurance.

Core stability, an essential component of muscle capacity and neuromuscular control, is the ability to control the position and movement of the trunk for optimal production, transfer, and management of forces during functional activities (Silfies, Ebaugh, Pontillo & Butowicz, 2015). The core stability training programme included the use of Swiss ball, balance pad and balance disc exercises. With the isometric muscle actions, small loads, and long tension times, these factors are suggested for the improvement of core endurace, proprioception and may reduce the risk of lower extremity injuries (Willardson, 2007). Individuals with better core strength, stability and neuromuscular control have the advantage of being able to avoid injuries, especially when playing on unstable surfaces (Riva et al., 2016; Hibbs, Thompson, French, Wrigley, & Spears, 2008). By targeting core endurance and proprioception, players' core endurance should be strong enough to maintain their athletic performance during cricket matches. This was indication enough of an impact on the core strength, core stability and of the participants. This also pointed to a marked improvement in the side bridge endurance and trunk extension endurance. Thus, the endurance of the core of the body has a significant effect on the probability of injuries as well as the performance in athletic activities.

Running Speed Test Performance

The 17.68 Metre Sprint Test is used to measure the running speed of the cricket player that running with or without the cricket bat in the distance of 17.68m. This is the stimulation of competition situation of running "Quick Single", scoring 1 run in batting (Callaghan et al., 2014; Lockie et.al., 2013). After the 6-week core stability programme, both 17.68m with a bat (WB) and 17.68m without a bat (WOB) test result were improved significantly. According to the paired sample t-test of the running speed, the 17.98-meter sprint WB had a significant improvement

from 2.885 seconds to 2.75 seconds. There was the significant different from this test. The speed WOB however exhibited little change, from 2.895 to 2.843. Despite the small difference in speed of WOB, the result could conclude that the interventions applied played a significant role in improving the athletic ability of the cricket players.

Core stability training programme improvement the core endurance and the control of movement. Lumbopelvic complex control and functional movement allow the production of force and the control of motion along the kinetic chain (Kibler et al., 2006). Core stabilisations facilitate acute and persistent force transmission and production during sports (Santos, Behm, Barbado, DeSantana & Da Silva-Grigoletto, 2019). With the better production of force and the control of motion, cricketers were able to run faster and more stable. For the running speed test, there were two main considerations that were made, sprinting WB and sprinting WOB. Sprinting WB is considered more intensive and thus more indicative of the ability of an athlete to ensure the challenges that come with the sport. Sprinting WOB, on the other hand, just tests the overall ability of the athlete to run (Houghton, 2010). During this study, sprinting with a bat was given greater weight as an indicator of improved resilience, speed and ability to withstand the aspects of the sport that might cause injury and reduce the performance of the athlete.

Agility Test Performance

Agility, the ability to move fast and flexibly, the ability of complex motor control and coordination of muscle groups (Little & Williams, 2005). The agility of the participants was tested to investigate the improvement of this aspect of their fitness and how it could improve their ability to avoid injuries and perform better. The first turn of the agility test only showed minimal improvement from 2.268 to 2.232 which was not statistically significant. The second turn at the test however showed a much greater improvement with the results being statistically significant. The fact that one of the tests was statistically significant was enough to warrant the argument that the intervention undertaken over a period of 6 weeks had been effective in improving the agility of the participants.

Hibbs, Thompson, French, Wrigley & Spears (2008) suggested core stability is the basis of stabilisation and mobilisation, this can improve the coordination of dynamic stabilisation. Through these exercises, the athlete can achieve a greater neuromuscular ability which immensely improves their movement and competency during sporting activities. Balance and coordination reduce the probability of awkward movements which put athletes at a greater risk of injury within the playing field. Agility also improves recovery time of athletes which means that they do not spend more time from injury rehabilitation. This would be able to improve their performance both in the short term and the long term.

Conclusion

The positive results of the 6-week core stability training programme on running speed and agility of the Hong Kong elite male cricketer shows the importance of core stability in sports performance. The importance of core stability should be continuously studied and promoted to coaches, athletes and supporting staff. RMA

References

Abbas, S. H., Karvannan, H., & Prem, V. (2019). Effect of neuromuscular training on functional throwing performance and speed in asymptomatic cricket players. Journal of Bodywork and Movement Therapies, 23(3), 502-507. https://doi.org/10.1016/j.jbmt.2018.02.014

Akuthota, V., Ferreiro, A., Moore, T., & Fredericson, M. (2008). Core Stability Exercise Principles. Current Sports Medicine Reports, 7(1), 39-44. doi: 10.1097/01.csmr.0000308663.13278.69

Brumitt, J., Matheson, J. W., & Meira, E. P. (2013). Core stabilisation prescription, part I: current concepts in assessment and intervention. Sports Health, 5(6), 504-509. https://-doi.org/10.1177%2F1941738113502451

Callaghan, S. J., Lockie, R. G., & Jeffriess, M. D. (2014). The acceleration kinematics of cricket-specific starts when completing a quick single. Sports Technology, 7(1-2), 39-51. https://-doi.org/10.1080/19346182.2014.893353

Chaalali, A., Rouissi, M., Chtara, M., Owen, A., Bragazzi, N. L., Moalla, W. & Chamari, K. (2016). Agility training in young elite soccer players: promising results compared to change of direction drills. Biology of sport, 33(4), 345. https://dx.-doi.org/10.5604%2F20831862.1217924

Cissik, J., 2011. The Role of Core Training in Athletic Performance, Injury Prevention, and Injury Treatment. Strength and Conditioning Journal, 33(1), pp.10-15.

CLARK, K., HOLT, L., & SINYARD, J. (2003). Electromyographic Comparison of the Upper and Lower Rectus Abdominis During Abdominal Exercises. Journal Of Strength And Conditioning Research, 17(3), 475-483. doi: 10.1519/00124278-200308000-00008

Demoulin, C., Grosdent, S., Smeets, R., Verbunt, J., Jidovtseff, B., & Mahieu, G. et al. (2012). Muscular Performance Assessment of Trunk Extensors: A Critical Appraisal of the Literature. Low Back Pain. doi: 10.5772/34188

Dennis, R., Finch, C., Elliott, B., & Farhart, P. (2008). The reliability of musculoskeletal screening tests used in cricket. Physical Therapy In Sport, 9(1), 25-33. https://doi.org/10.1016/j.ptsp.2007.09.004

Dos'Santos, T., Thomas, C., Comfort, P., & Jones, P. A. (2018). Comparison of change of direction speed performance and asymmetries between team-sport athletes: Application of change of direction deficit. Sports, 6(4), 174. https://doi.org/10.3390/sports6040174

Duffield, R., Portus, M. and Edge, J., 2007. Comparison of three types of full-body compression garments on throwing and repeat-sprint performance in cricket players * COMMENTARY. British Journal of Sports Medicine, 41(7), pp.409-414.

Earp, J. & Kraemer, W. J. (2010) Medicine Ball Training Implications for Rotational Power Sports, Strength and Conditioning Journal, 32(4), 20-25 doi:10.1519/SSC.0b013e3181e92911

Emami, F., Yoosefinejad, A. K., & Razeghi, M. (2018). Correlations between core muscle geometry, pain intensity, functional disability and postural balance in patients with nonspecific mechanical low back pain. Medical engineering & physics, 60, 39-46. https://-doi.org/10.1016/j.medengphy.2018.07.006

Escriche-Escuder, A., Calatayud, J., Aiguadé, R., Andersen, L., Ezzatvar, Y., & Casaña, J. (2019). Core Muscle Activity Assessed by Electromyography During Exercises for Chronic Low Back Pain. Strength & Conditioning Journal, 41(4), 55-69. https://-doi.org/10.1519/ssc.0000000000000456

Forrest, M., Scott, B., Hebert, J., & Dempsey, A. (2018). Injury Prevention Strategies for Adolescent Cricket Pace Bowlers. Sports Medicine, 48(11), 2449-2461. https://doi.org/10.1007/s40279-018-0981-6

Garcia-Byrne, F., Wycherley, T., Bishop, C., & Schwerdt, S. (2020). Accelerometer detected lateral sway during a submaximal running test correlates with endurance exercise performance in elite Australian male cricket players. Journal of Science and Medicine in Sport /, 23(5), 519–523. https://doi.org/10.1016/j.jsams.2019.12.003

García-Vaquero, M. P., Moreside, J. M., Brontons-Gil, E., Peco-González, N., & Vera-Garcia, F. J. (2012). Trunk muscle activation during stabilizatstabilisation with single and double leg support. Journal of Electromyography and Kinesiology, 22(3), 398–406. https://doi.org/10.1016/j.jelekin.2012.02.017

Graham, J. F. (2009). Exercise: Bird Dog. Strength and Conditioning Journal, 31(6), 93–94. https://doi.org/10.1519/ssc.0b013e3181c2228a

Hammami, R., Behm, D. G., Chtara, M., Othman, A. B., & Chaouachi, A. (2014). Comparison of static balance and the role of vision in elite athletes. Journal of human kinetics, 41(1), 33-41. https://-doi.org/10.2478/hukin-2014-0030

Hibbs, A., Thompson, K., French, D., Wrigley, A., & Spears, I. (2008). OptimizingOptimisingce by Improving Core Stability and Core Strength. Sports Medicine, 38(12), 995-1008. https://-doi.org/10.2165/00007256-200838120-00004

Hides, J. A., Brown, C. T., Penfold, L., & Stanton, W. R. (2011). Screening the lumbopelvic muscles for a relationship to injury of the quadriceps, hamstrings, and adductor muscles among elite Australian Football League players. journal of orthopaedic & sports physical therapy, 41(10), 767-775. https://www.jospt.org/doi/10.2519/-jospt.2011.3755

Horička, P., Hianik, J., & Šimonek, J. (2014). The relationship between speed factors and agility in sport games. Journal Of Human Sport And Exercise, 9(1), 49-58. doi: 10.4100/jhse.2014.91.06

Hulin, B. T., Gabbett, T. J., Blanch, P., Chapman, P., Bailey, D., & Orchard, J. W. (2014). Spikes in acute workload are associated with increased injury risk in elite cricket fast bowlers. British journal of sports medicine, 48(8), 708-712. http://dx.doi.org/10.1136/b-jsports-2013-092524

Huxel Bliven, K., & Anderson, B. (2013). Core Stability Training for Injury Prevention. Sports Health: A Multidisciplinary Approach, 5(6), 514-522. doi: 10.1177/1941738113481200

Johnstone, J., & Ford, P. (2010). Physiologic Profile of Professional Cricketers. Journal Of Strength And Conditioning Research, 24(11), 2900-2907. https://doi.org/10.1519/jsc.0b013e3181bac3a7

Kibler, W., Press, J., & Sciascia, A. (2006). The Role of Core Stability in Athletic Function. Sports Medicine, 36(3), 189-198. doi: 10.2165/00007256-200636030-00001

Lee, D., Park, J., & Lee, S. (2015). Effects of bridge exercise on trunk core muscle activity with respect to sling height and hip joint abduction and adduction. Journal Of Physical Therapy Science, 27(6), 1997-1999. doi: 10.1589/jpts.27.1997

Leyva, D. W., Wong, A. M., & Lee, E. B. (2017). Resisted and Assisted Training for Sprint Speed: A Brief Review. Retrieved 9th November 2020, from https://juniperpublishers.com/jpfmts/pdf/JPF-MTS.MS.ID.555554.pdf

Little, T., & Williams, A. (2005). Specificity of Acceleration, Maximum Speed, and Agility in Professional Soccer Players. The Journal Of Strength And Conditioning Research, 19(1), 76. doi: 10.1519/14253.1

Little, T., & Williams, A. (2005). Specificity of Acceleration, Maximum Speed, and Agility in Professional occer Players. The Journal Of Strength And Conditioning Research, 19(1), 76. doi: 10.1519/14253.1

Lockie, R., Callaghan, S., & Jeffriess, M. (2013). Analysis of Specific Speed Testing for Cricketers. Journal Of Strength And Conditioning Research, 27(11), 2981-2988. doi: 10.1519/jsc.0b013e31828a2c56

Loock, N., Du Toit, D., Ventner, D., & Stretch, R. (2006). Effect of different types of cricket batting pads on the running and turning speed in cricket batting. Sports Biomechanics /, 5(1), 15–22. https://-doi.org/10.1080/14763141.2006.9628222

Majewski-Schrage, T., Evans, T. and Ragan, B., 2014. Development of a Core-Stability Model: A Delphi Approach. Journal of Sport Rehabilitation, 23(2), pp.95-106.

Martin, C., Olivier, B., & Benjamin, N. (2017). Asymmetrical abdominal

muscle morphometry is present in injury free adolescent cricket pace bowlers: A prospective observational study. Physical Therapy in Sport, 28, 34-42. http://dx.doi.org.eproxy.vtclib9.vtc.edu.hk/10.1016/j.ptsp.2017.08.078

McGill, S. (2010). Core Training: Evidence Translating to Better Performance and Injury Prevention. Strength And Conditioning Journal, 32(3)

McGill, S., & Karpowicz, A. (2009). Exercises for Spine Stabilization: Motion/Motor Patterns, Stability Progressions, and Clinical Technique. Archives Of Physical Medicine And Rehabilitation, 90(1), 118-126. doi: 10.1016/j.apmr.2008.06.026

McGill, S., Childs, A., & Liebenson, C. (1999). Endurance Times for Low Back Stabilization Exercises: Clinical Targets for Testing and Training From A Normal Database. Archives Of Physical Medicine And Rehabilitation, 80(8), 941-944. https://-doi.org/10.1016/s0003-9993(99)90087-4

McNamara, D., Gabbett, T., & Naughton, G. (2016). Assessment of Workload and its Effects on Performance and Injury in Elite Cricket Fast Bowlers. Sports Medicine, 47(3), 503-515. https://-doi.org/10.1007/s40279-016-0588-8

Morley, B., & Thomas, D. (2007). Attendance demand and core support: evidence from limited-overs cricket. Applied Economics, 39(16),2085–2097. https://doi-org.eproxy.vtclib9.vtc.edu.hk/10.1080/00036840600707225

Mullane, M., Turner, A. and Bishop, C., 2019. Exercise Technique. Strength and Conditioning Journal, 41(5), pp.114-120.

Nelson, G., Bent-Forsythe, D. and Roopchand-Martin, S., 2012. Electromyographic Activity of the Rectus Abdominis During a Traditional Crunch and the Basic Jackknife Exercise with the Ab Lounge™. Journal of Strength and Conditioning Research, 26(6), pp.1584-1588.

Oliva-Lozano, J., & Muyor, J. (2020). Core Muscle Activity during Physical Fitness Exercises: A Systematic Review. *International Journal Of Environmental Research And Public Health, 17*(12), 4306. doi: 10.3390/ijerph17124306

Orchard, J. W., Kountouris, A., & Sims, K. (2016). Incidence and prevalence of elite male cricket injuries using updated consensus definitions. Open access journal of sports medicine, 7, 187. https://dx-.doi.org/10.2147%2FOAJSM.S117497

Pardiwala, D., Rao, N., & Varshney, A. (2018). Injuries in Cricket. Sports Health: A Multidisciplinary Approach, 10(3), 217-222

Petersen, C., Pyne, D., Dawson, B., Portus, M., & Kellett, A. (2010). Movement patterns in cricket vary by both position and game format. Journal Of Sports Sciences, 28(1), 45-52. doi: 10.1080/02640410903348665

Prieske, O., Muehlbauer, T. and Granacher, U., 2015. The Role of Trunk Muscle Strength for Physical Fitness and Athletic Performance in Trained Individuals: A Systematic Review and Meta-Analysis. Sports Medicine, 46(3), pp.401-419.

Ranson, C., Burnett, A., King, M., Patel, N., & O'Sullivan, P. (2008). The relationship between bowling action classification and three-dimensional lower trunk motion in fast bowlers in cricket. Journal Of Sports Sciences, 26(3), 267-276. https://-doi.org/10.1080/02640410701501671

Riva, D., Bianchi, R., Rocca, F., & Mamo, C. (2016). Proprioceptive Training and Injury Prevention in a Professional Men⊠s Basketball Team. Journal Of Strength And Conditioning Research, 30(2), 461-475. doi: 10.1519/jsc.0000000000001097

Saeterbakken, A. and Fimland, M., 2011. Muscle activity of the core during bilateral, unilateral, seated and standing resistance exercise. European Journal of Applied Physiology, 112(5), pp.1671-1678.

Santos, M., Behm, D., Barbado, D., DeSantana, J., & Da Silva-Grigoletto, M. (2019). Core Endurance Relationships With Athletic and Functional Performance in Inactive People. Frontiers In Physiology, 10. doi: 10.3389/fphys.2019.01490

Seo, J., & Chung, Y. (2020). The effects of different V-sit positions on abdominal muscle activation. Physical Therapy Rehabilitation Science, 9(3), 201-208. doi: 10.14474/ptrs.2020.9.3.201

Shamsi, M. B., Rezaei, M., Zamanlou, M., Sadeghi, M., & Pourahmadi, M. R. (2016). Does core stability exercise improve lumbopelvic stability (through endurance tests) more than general exercise in chronic low back pain? A quasi-randquasi-randomisedd trial. Physiotherapy Theory & Practice, 32(3), 171–178. https://-doi-org.eproxy.vtclib9.vtc.edu.hk/10.3109/09593985.2015.1117550

Silfies, S., Ebaugh, D., Pontillo, M., & Butowicz, C. (2015). Critical review of the impact of core stability on upper extremity athletic injury and performance. Brazilian Journal Of Physical Therapy, 19(5), 360-368. doi: 10.1590/bjpt-rbf.2014.0108

Stanton, R., Reaburn, P., & Humphries, B. (2004). The Effect of Short-Term Swiss Ball Training on Core Stability and Running Economy. Journal Of Strength And Conditioning Research, 18(3), 522-528. https://doi.org/10.1519/00124278-200408000-00023

Stretch, R. (2007). A review of cricket injuries and the effectiveness of strategies to prevent cricket injuries at all levels. *South African Journal Of Sports Medicine, 19*(5), 129. doi: 10.17159/2078-516x/2007/v19i5a256

Stretch, R. (2003). Cricket injuries: a longitudinal study of the nature of injuries to South African cricketers. British Journal of Sports Medicine, 37(3), 250. http://dx.doi.org.eproxy.vtclib9.vtc.edu.hk/10.1136/bjsm.37.3.250

Stuelcken, M., Ginn, K. and Sinclair, P., 2008. Musculoskeletal profile of the lumbar spine and hip regions in cricket fast bowlers. Physical Therapy in Sport, 9(2), pp.82-88.

Tan, S., Cao, L., Schoenfisch, W., & Wang, J. (2013). Investigation of Core Muscle Function through Electromyography Activities in Healthy Young Men. *Journal of Exercise Physiology,* Volume 16, Number 1

Tayashiki, K., Takai, Y., Maeo, S. and Kanehisa, H., 2015. Intra-abdominal Pressure and Trunk Muscular Activities during Abdominal Bracing and Hollowing. International Journal of Sports Medicine, 37(02), pp.134-143.

Thavasilingam, K., & Palanisamy, D. (2012). Effect of Aerobic Training Programme on Selected Physical Fitness Components Among School Cricket Players. International Journal Of Scientific Research, 2(12), 491-492. https://doi.org/10.15373/22778179/dec2013/154

Thomas, D., & Khan, F. (2020). Effect of core stability training on selected fitness components among cricket players. International Journal Of Physiology, Nutrition And Physical Education, 5(1), 139-142.

Tong, T., Wu, S., & Nie, J. (2014). Sport-specific endurance plank test for evaluation of global core muscle function. *Physical Therapy In Sport, 15*(1), 58-63. doi: 10.1016/j.ptsp.2013.03.003

Van Hooren, B., Peake, J.M. Do We Need a Cool-Down After Exercise? A Narrative Review of the Psychophysiological Effects and the Effects on Performance, Injuries and the Long-Term Adaptive Response. *Sports Med 48,* 1575–1595 (2018). https://-doi.org/10.1007/s40279-018-0916-2

Voight, M. L., Hoogenboom, B. J., & Cook, G. (2008). The chop and lift reconsidered: integrating neuromuscular principles into orthopedic and sports rehabilitation. North American journal of sports physical therapy : *NAJSPT, 3(3), 151–159.*

Willardson, J. M. (2007). CORE STABILITY TRAINING: APPLICATIONS TO SPORTS CONDITIONING PROGRAMS: [1]. *Journal of Strength and Conditioning Research, 21*(3), 979-85. Retrieved from https://www-proquest-com.eproxy.vtclib9.vtc.edu.hk/scholarly-journals/core-stability-training-applications-sports/docview/21310 7864/se-2?accountid=29075

Wirth, K., Hartmann, H., Mickel, C., Szilvas, E., Keiner, M. and Sander, A., 2016. Core Stability in Athletes: A Critical Analysis of Current Guidelines. Sports Medicine, 47(3), pp.401-414.

Effects on Thermoregulation when Performing High-Intensity Interval Training with Different Facemasks under Heat Condition: Study Protocol for a Randomized Crossover Study

Jingyuan WANG
The Chinese University of Hong Kong

Abstract

Background: In this COVID-19 pandemic period, wearing facemask is considered as an effective non-pharmacological approach to protect people from the coronavirus. Since high intensity interval training becomes popular widely and the weather in Hong Kong is hot and humid, people's thermoregulation may be negatively affected by these conditions. This study aims to investigate the effects on thermoregulation when people performing high intensity interval training with different facemasks under heat condition.

Methods: The study is a randomized crossover study with four parallel groups: (1) high intensity interval training with no mask (control group); (2) high intensity interval training with surgical/medical facemask; (3) high intensity interval training with filtering facepiece respirator; (4) high intensity interval training with cloth face covering. 14 healthy participants who will involve in this study. Heart rate, core temperature, and perioral region's facial temperature will be measured before and after the trail. End blood lactate concentration and the rating of perceived exertion will also be tested immediately after the test.

Discussion: This will most probably be the first study to take into account all three important factors: HIIT, facemasks, and the hot environment. The findings of this study will help the general public have a better knowledge of the impact of practicing HIIT with varied masks in high-temperature, high-humidity environments on thermoregulation, other physiological parameters, and perceptual responses.

Background

Wearing of facemasks during the period of COVID-19 is an effective non-pharmacological approach to preventing the spread and infect the virus, particularly when visiting public facilities and spaces (Rojo-Tirado et al., 2021; World Health Organization (WHO), 2022a). Since virus particles in respiratory droplets may be more easily spread during several forms of physical effort, including numerous amateur and professional sports (Leung et al., 2020), the mask strategy aims to contain the transmission of potentially virus-carrying aerosol particles at source (Chu et al., 2020). Therefore, many health organizations and governments (for example the HK government) have also announced many strategies to require people to wear masks in the public, even when exercising. However, several studies have been conducted that facemask may led to some health concerns on people's body and their sport performance (Fikenzer et al., 2020). Theoretically, the risk of thermoregulation-related illness may be increased because of prolonged facemask wearing.

The thermoregulation is critical for human beings to maintain physiological homeostasis during rest and activity (Lim et al., 2008). According to the previous study, the normal and optimal core internal temperature for human is at 98.6℉ (37℃), which changes over time and with the environment (Osilla et al., 2021). The core temperature may always maintain in a narrow and tightly regulated range, which is 97-99℉ (36.1-37.2℃) (Osilla et al., 2021). Once the thermoregulation fails, many health concerns will occur, for example, hyperthermia (core temperature over 42℃), lung inflammation, hypercapnia, even fainting (Lim et al., 2008; Cherrie et al., 2018; Barbosa, 2020; Janse van Rensburg et al., 2020). Pervious study shows that protective facemasks (PFMs) may lead thermoregulation changes and cause skin temperature increase (Shi et al., 2021). This high temperature (34-35 ℃) and high humidity (80-95%) microenvironment under PFMs may increase the risk of high core temperature (Shi et al., 2021). According to the Hong Kong Observatory website, the average temperature is around 30℃ in this summer (June to August), and the related humidity is around 75% (Hong Kong Observatory, 2022). Under this hot and humid condition, the microenvironment under PFMs might even worse than the other time of the year.

Usually, PFMs are divided into four categories: surgical/medical facemask (FM), filtering facepiece respirator (FFR), air-purifying respirator (APR), and cloth face covering (Roberge et al., 2012; FDA, 2021). Previous researchers have found health risks associated with extensive wearing of masks and during exercises. Face masks made exercising too strenuous and as a result could pose serious health risks by taxing the various physiological systems, particularly circulatory, pulmonary, as well as immune systems (Chandrasekaran & Fernandes, 2020). Other researchers also similarly found that FMs reduced comfort, ventilation, and cardiopulmonary exercise capacity while FFRs highly impaired these parameters in healthy individuals (Fikenzer et al., 2020; Driver et al., 2021).

Some studies on the effects of wearing FMs during exercises noticed that although people doing low to moderate intensity exercise with facemasks may only feel more breathlessness, exercising with facemasks wearing will not negatively affect the performance of low to moderate exercise in the hot environment (Morris et al., 2021; Yoshihara et al., 2021). However, high intensity exercise has not be tested before, which is the limitation of these studies. Thus, the public is unaware of core body temperature and the necessity of masks during high-intensity exercise in hot weather. High-intensity interval training (HIIT) is a type of exercise that has repeated bouts of high-intensity (over 80% maximum heart rate) exercise, with recovery period interspersed in the middle (MacInnis & Gibala, 2017). In recent years, HIIT becomes more and more popular among fitness people and professional athletes (ACSM, 2021). Many studies have demonstrated that HIIT can bring positive effects in many areas, for example, improve cardiorespiratory fitness (CRF), body composition improvement, and help patients with chronic diseases (Ito, 2019; Chin et al., 2020; Ross et al., 2016). However, this high intensity exercise can increase body temperature until over 40℃ in a very short period after exercise (Lim et al., 2008). Because there are few studies in this criteria, this study aimed to investigate the effects on thermoregulation when people performing HIIT with different PFMs under heat condition. It has been hypothesized that HIIT while wearing mask in heat would negatively affect the thermoregulation of people's body. Meanwhile, since different PFMs have different levels of filtering capacity, they may bring different degrees of impact to people.

Methods and Materials

Participants

All participants for this study will be recruited from The Chinese University of Hong Kong (CUHK) in HKSAR. The inclusion criteria for both men and women will be 18 to 35 years old having normal health screening 6 months prior to the study and without any chronic ailment (ACSM, 2017a). In the same period, their body mass index (BMI) need less than 25 and they must pass the PAR-Q test (WHO, 2021a). The exclusion criteria are following: (1) have mental or physical diseases over past 6 months; (2) cannot pass the PAR-Q test; (3) over-weight or obesity people (WHO, 2021a); (4) hypertension: systolic blood pressure over 140mmHg/ diastolic blood pressure over 90mmHg (ACSM, 2017b).

Sample size

We calculated the sample size for this study based on a previous study that involved facemask while exercising under a heat environment. The number of participants is calculated by G*Power (version 3.1.9.7) with large effect size (d=0.8), statistical power of 0.8 at an alpha level of 0.05 (Moholdt, Silva, Lydersen & Hawley, 2021). But given COVID-19 constraints and other factors, allowing 15% of participants to drop out would require at least 14 participants at the beginning (Yoshihara et al., 2021).

Study Design

The study will utilize a randomized crossover design. It will be effective since each participant will have one

pre-test health screening and be tested four times concurrently under different conditions, one mask-off condition and three mask-on conditions. Each washout interval between all trials should be at least 72 hours. The result of mask-off trial will be worked as the control group result. FM (3M 1820), FFR (3M 9005, N95) and cloth face covering (CM010 Maevn reusable cloth face mask with agion anti-microbial treatment) will be used as three exposure groups respectively. APR is excluded from this study due to some safety concerns (heavy and need to link with power). All experimental tests will be randomly assigned in order by software and participants will follow the same HIIT exercise protocol on treadmill (Pulsar 3p, h/p/cosmos sports and medical, Germany). Before each test start, every participant needs to avoid caffeine and alcohol staffs for at least 12 hours. They will be provided standard pre-test meals on every test day, then the exercise testing will start 2 hours after the pre-test meal. The research will also be reported to the CUHK Research Ethics Committee for clearance. After reading the study's ethical framework and proposed procedures, the participants will be required to sign a consent form to avoid litigation in future.

Pre-test Health Screening

When subjects visit the laboratory for the first time, they need to familiarize themselves with the experimental procedures and sign a consent form. They will then be asked to measure some physical data. Participants' height is measured using a stadiometer (Seca, Leicester, United Kingdom). Body composition analyzer (MC-780MA, Tanita Corp., Tokyo, Japan) is used to measure participants' body weight, body mass index (BMI), body muscle percentage and body fat percentage.

Environment & HIIT Exercise Protocol

The study will be conducted in a physiology laboratory. The exercise testing will be hold in a heat chamber which the room temperature is 30℃ and related humidity is 75%.

Before the test, participant needs to get on the sensors for data collection. Wireless heart rate (HR) monitor (H10 Sensor, Polar Electro, Kempele, Finland) will be used to record the heartbeat in real time to ensure that the target intensity is maintained during subsequent HIIT sessions. Real-time core temperature data will be collected in real-time by ingestible temperature sensor, called VitalSense ingestible telemetric temperature sensor (weight=1.75 g, length=21.9 mm, diameter=8.5 mm) and external ambulatory data receiver (VitalSense, Mini Mitter Co., Inc., Bend, Oregon, USA) (Byrne & Lim, 2007). The perioral region's facial temperature will be measured using infrared thermal evaluation (Scarano, Inchingolo & Lorusso, 2020).

The main HIIT program is designed based on the exercise protocol from previous studies and ACSM exercise recommendation. The main HIIT exercise session consists of four 4-minute intervals aimed at 90%-95% of maximum heart rate (HRmax) on treadmill and get a 3-minute moderate-intensity (50%-70% HRmax) active recovery in between each interval (Ellingsen et al., 2017; Ito, 2019). HRmax is calculated by subtracting your age from 220, and the value of HRmax will be used as the standard to determine the intensity of the exercise. Before and after the main HIIT session, participants need to do dynamic stretching warm-up and cool-down at moderate intensity as well. The purpose of dynamic stretching warmup and cool down is to prevent muscle strain injury for participant. The entire exercise session may last 38 minutes and the whole program will be guided by professional coaches and investigators.

Outcome and Measurement

HR monitor, ingestible temperature sensor and infrared thermal evaluation will be used for tracking the real-time HR and core temperature, and perioral region's facial temperature changes, respectively. Blood lactate concentration will be measured by the fingertips with

portable analyzer (Lactate Plus, Nova Biomedical, Waltham, Massachusetts) (Poon et al., 2020). All data from these biomarkers will be recorded at the baseline and the end of the exercise. The rating of perceived exertion (RPE) is evaluated by Borg RPE 6-20 Scale for measuring participants' breathlessness and fatigue level during the testing process.

Statistical analysis

The study will utilize SPSS (Version 26, IBM Corp., Armonk, NY) for analyses. Data will be presented as mean with standard deviation (SD). Repeated analysis of variance (ANOVA) will be calculated and evaluated for differences of pre and post measurements of the parameters for one mask-off condition and 3 mask-on condition. For statistical significance, the value will be set as $P<0.05$.

Discussion

Currently, there is no specific drug or treatment can directly against the coronavirus and the new variants (e.g., Omicron) pop up (WHO, 2021b), the pandemic period cannot end in short term. Since HIIT is very popular training program now, wearing facemasks for a prolong time may huge impact people to do exercise. Exercises are challenging physically and mentally, therefore, the high humidity and high temperature microenvironment under the facemask during workouts is a pertinent factor. Once the masks get wet when participants performing exercise, the ability to filter viruses will be reduced (WHO, 2022b). That may lead the air resistance in front of the face and increase the breathing load (Roberge et al., 2012), which sequentially affect body thermoregulation. Thus, since the study concentrates on HIIT, the conclusions of the study will be particularly beneficial to HIIT lovers and some sports, especially for people who live in a hot, humid city, like Hong Kong. That is the reason that our study will be hold in a particular hot and humid environment and involve different types of masks.

Most these investigations mentioned the effects of wearing FMs during exercises noticed that although people doing low to moderate intensity exercise with facemasks may only feel more breathlessness, exercising with facemasks wearing will not negatively affect body core temperature and performance of low to moderate exercise in the hot environment (Morris et al., 2021; Yoshihara et al., 2021). In addition, there is pervious study shows that wearing FM during exercise will not significantly affect physiological outcomes even in the vigorous level (≥75%VO2max) (Poon et al., 2021). Those findings from previous studies all contradict our hypothesis in some way.

This study will probably be the first to include all three critical factors which are HIIT, facemasks, and heat environment. However, only healthy people will be recruit as the participants in this study, which means the result of this study does not apply to other special populations. At the same time, the dropout rate of participants and motor performance in experimental trial will be unpredictable due to the COVID-19 outbreak. Participants may change their daily habit during the intervention period, thus affect their sport performance during the intervention.

To summarize, this research will significantly contribute to the public a better understanding of the effect of performing HIIT with different masks under high temperature and high humid condition on thermoregulation, other physiological factors, and perceptual responses. If the result is significant, this experiment will be a strong evidence to prove to the public that wearing a mask to do HIIT in a hot setting will affect the body's thermoregulation and increase the risk of developing thermo-related disease. RMA

References

ACSM (2017a). ACSM's guidelines for exercise testing and prescription, 10th Edn.

ACSM (2017b). AHA updates blood pressure guidelines. Retrieved 7 March 2022, from https://www.acsm.org/blog-detail/acsm-certified-blog/2017/12/03/aha-updates-blood-pressure-guidelines

ACSM (2021). ACSM fitness trends. Retrieved 7 March 2022, from https://www.acsm.org/education-resources/trending-topics-resources/acsm-fitness-trends

Barbosa, T. M. (2020). Wearing face mask during physical exercise, 16(X), 1–3.

Braga, F., Espinosa, G., Monteiro, A., Marinho, B., & Drummond, E. (2020). Physiological effects of exercising at different intensities wearing TNT or Double-layer cotton facemasks compared to not wearing a mask. doi: 10.1101/2020.12.11.20203224

Byrne, C., & Lim, C. (2007). The ingestible telemetric body core temperature sensor: a review of validity and exercise applications. British Journal of Sports Medicine, 41(3), 126-133. doi: 10.1136/bjsm.2006.026344

Chandrasekaran, B., & Fernandes, S. (2020). "Exercise with facemask; are we handling a devil's sword?" - a physiological hypothesis. Medical Hypotheses, 144, 110002. doi:10.1016/j.mehy.2020.110002

Cherrie, J. W., Wang, S., Mueller, W., Wendelboe-Nelson, C., & Loh, M. (2019). In-mask temperature and humidity can validate respirator wear-time and indicate lung health status. Journal of Exposure Science & Environmental Epidemiology, 29(4), 578–583. doi: 10.1038/s41370-018-0089-y

Chin, E. C., Yu, A. P., Lai, C. W., Fong, D. Y., Chan, D. K., Wong, S. H., Sun, F., Ngai, H. H., Yung, P., & Siu, P. M. (2020). Low-frequency HIIT improves body composition and aerobic capacity in overweight men. Medicine and Science in Sports and Exercise, 52(1), 56–66. doi: 10.1249/MSS.0000000000002097

Chu, D., Akl, E., Duda, S., Solo, K., Yaacoub, S., & Schünemann, H. et al. (2020). Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. The Lancet, 395(10242), 1973-1987. doi: 10.1016/s0140-6736(20)31142-9

Driver, S., Reynolds, M., Brown, K., Vingren, J. L., Hill, D. W., Bennett, M., Gilliland, T., McShan, E., Callender, L., Reynolds, E., Borunda, N., Mosolf, J., Cates, C., & Jones, A. (2021). Effects of wearing a cloth face mask on performance, physiological and perceptual responses during a graded treadmill running exercise test. British Journal of Sports Medicine, bjsports-2020-103758. Advance online publication. doi: 10.1136/bjsports-2020-103758

Ellingsen, Ø., Halle, M., Conraads, V., Støylen, A., Dalen, H., & Delagardelle, C. et al. (2017). High-intensity interval training in patients with heart failure with reduced ejection fraction. Circulation, 135(9), 839-849. doi: 10.1161/circulationaha.116.022924

Fikenzer, S., Uhe, T., Lavall, D., Rudolph, U., Falz, R., Busse, M., Hepp, P., & Laufs, U. (2020). Effects of surgical and FFP2/N95 face masks on cardiopulmonary exercise capacity. Clinical Research in Cardiology : Official Journal of the German Cardiac Society, 109(12), 1522–1530. doi: 10.1007/s00392-020-01704-y

Hong Kong Observatory. (2022). Automatic Weather Observations Daily Data for Single Element. Retrieved 7 March 2022, from https://www.hko.gov.hk/en/cis/awsDailyElement.htm?stn=R23&ele=RF

Ito S. (2019). High-intensity interval training for health benefits and care of cardiac diseases - The key to an efficient exercise protocol. World Journal of Cardiology, 11(7), 171–188. doi: 10.4330/wjc.v11.i7.171

Janse van Rensburg, D., Pillay, L., Hendricks, S., & Hamuy Blanco, J. (2020). Year of the face mask : Do`s and don'ts during exercise. South African Journal of Sports Medicine, 32(1), 1-2.

Leung, N., Chu, D., Shiu, E., Chan, K., McDevitt, J., & Hau, B. et al. (2020). Respiratory virus shedding in exhaled breath and efficacy of face masks. Nature Medicine, 26(5), 676-680. doi: 10.1038/s41591-020-0843-2

Lim, C. L., Byrne, C., & Lee, J. K. (2008). Human thermoregulation and measurement of body temperature in exercise and clinical settings. Annals of the Academy of Medicine, Singapore, 37(4), 347–353.

MacInnis, M. J., & Gibala, M. J. (2017). Physiological adaptations to interval training and the role of exercise intensity. The Journal of Physiology, 595(9), 2915–2930. doi: 10.1113/JP273196

Moholdt, T., Silva, C., Lydersen, S., & Hawley, J. (2021). Isolated and combined effects of high-intensity interval training and time-restricted eating on glycemic control in reproductive-aged women with overweight or obesity: study protocol for a four-armed randomized controlled trial. BMJ Open, 11(2), e040020. doi: 10.1136/bmjopen-2020-040020

Morris, N. B., Piil, J. F., Christiansen, L., Flouris, A. D., & Nybo, L. (2021). Prolonged facemask use in the heat worsens dyspnea without compromising motor-cognitive performance. Temperature (Austin, Tex.), 8(2), 160–165. doi: 10.1080/23328940.2020.1826840

Osilla, E. V., Marsidi, J. L., & Sharma, S. (2021). Physiology, Temperature Regulation. In StatPearls. StatPearls Publishing.

Poon, E., Little, J., Sit, C., & Wong, S. (2020). The effect of low-volume high-intensity interval training on cardiometabolic health and psychological responses in overweight/obese middle-aged men. Journal of Sports Sciences, 38(17), 1997-2004. doi: 10.1080/02640414.2020.1766178
Poon, E., Zheng, C., & Wong, S. (2021). Effect of Wearing Surgical Face Masks During Exercise: Does Intensity Matter?. Frontiers in Physiology, 12. doi: 10.3389/fphys.2021.775750

Roberge, R. J., Kim, J. H., & Coca, A. (2012). Protective facemask impact on human thermoregulation: an overview. The Annals of Occupational Hygiene, 56(1), 102–112. doi:10.1093/annhyg/mer069

Rojo-Tirado, M., Benítez-Muñoz, J., Alcocer-Ayuga, M., Alfaro-Magallanes, V., Romero-Parra, N., & Peinado, A. et al. (2021). Effect of different types of face masks on the ventilatory and cardiovascular response to maximal-intensity exercise. Biology, 10(10), 969.

Ross, L. M., Porter, R. R., & Durstine, J. L. (2016). High-intensity interval training (HIIT) for patients with chronic diseases. Journal of Sport and Health Science, 5(2), 139–144. doi: 10.1016/j.jshs.2016.04.005

Scarano, A., Inchingolo, F., & Lorusso, F. (2020). Facial skin temperature and discomfort when wearing protective face masks: thermal infrared imaging evaluation and hands moving the mask. International Journal of Environmental Research and Public Health, 17(13), 4624. doi: 10.3390/ijerph17134624

Shi, D., Song, J., Du, R., & Chan, P. W. (2021). Dual challenges of heat wave and protective facemask-induced thermal stress in Hong Kong. Building and Environment, VOL.206(May), 108317. doi:10.1016/j.buildenv.2021.108317

U. S. Food and Drug Administration [FDA]. (2020). Use of Face Coverings in the Food Sector During COVID-19. Retrieved 7 March 2022, from https://www.fda.gov/food/food-safety-during-emergencies/use-respirators-facemasks-and-cloth-face-coverings-food-and-agriculture-sector-during-coronavirus

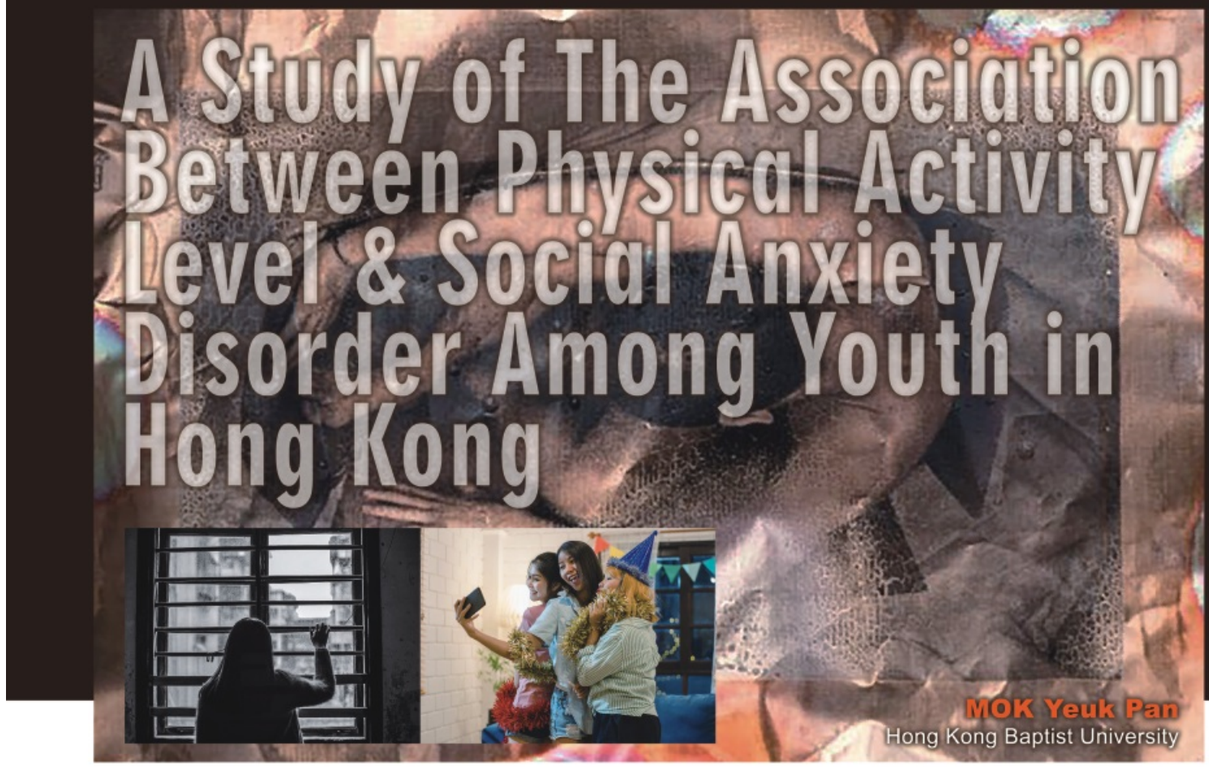
World Health Organization [WHO]. (2021a). Obesity and overweight. Obesity and overweight. Retrieved 7 March 2022, from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

World Health Organization [WHO]. (2021b). Update on Omicron. Retrieved 14 December 2021, from https://www.who.int/news/item/28-11-2021-update-on-omicron

World Health Organization [WHO]. (2022a). Coronavirus disease (COVID-19) advice for the public: Mythbusters. Retrieved 7 March 2022, from https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters

World Health Organization [WHO]. (2022b). Coronavirus disease (COVID-19): Masks. Coronavirus disease (COVID-19): Masks. Retrieved 7 March 2022, from https://www.who.int/news-room/questions-and-answers/item/coronavirus-disease-covid-19-masks

Yoshihara, A., Dierickx, E. E., Brewer, G. J., Sekiguchi, Y., Stearns, R. L., & Casa, D. J. (2021). Effects of face mask use on objective and subjective measures of thermoregulation during exercise in the heat. Sports Health, 13(5), 463–470. doi: 10.1177/19417381211028212



Introduction

People are more likely to neglect the importance of mental and social well-being in comparison to physical health. According to the World Health Organization (WHO, 2020), health is defined not only as a state of complete physical, but also mental and social well-being. In the last two decades, plenty of cases of adolescents with social withdrawn or also known as hikikomori were exposed to society by media. One of the syndromes among these youths with social withdrawal is social anxiety disorder (SAD). SAD is also known as social phobia, which is one of the most prevalent anxiety disorders among children and adolescents. Lee, et al. (2005) conducted a telephone survey and interviewed 3,006 individuals and found that 3.2% respondents had SAD. The prevalence of SAD among children is currently 7.5% (Child Assessment Service, 2020). It indicates the phenomenon shows an uptrend tendency in the future. According to Kleberg et al. (2016), people with SAD would have an intense self-consciousness, intense avoidance of social interaction, being afraid of embarrassment that exceeds common shyness and fear of being scrutinized and negatively evaluated by others. It is found that an individual's quality of life who has SAD can be greatly impaired since it might lead to social isolation, or more severe psychological disorders such as depression (Merikangas et al., 2002).

Many studies revealed that sport participation is beneficial to mental and social well-being. Schmitz et al. (2004) pointed out that physically active people would have less affective and anxiety issues in comparison with physically inactive people. Some research also mentioned that sport participation is beneficial to children's social development by respecting the rules and cooperating with others. Therefore, it is important to discover if physical activity (PA) could be a key of lowering the risk of social phobia among adolescents.

Social anxiety disorder (SAD)

The term SAD was first used back in 1903 by Janet for describing an individual who feared of being observed while speaking, writing, and playing the piano (Atarbay, 2017). In general, SAD is characterized as general type and specific type. Fehm et al. (2005) stated that the general type of SAD tends to onset at an earlier age and typically lasts for 10 or more years. SAD can occur from the age of 3, with earlier onset of SAD, the syndromes would become more severe, persistent and lead a to a greater likelihood of non-recovery in adults (Davidson et al., 1993). For specific SAD, it refers to an individual fear of a specific situation such as speaking in public (Furmark el al., 1999).

In 1980s, social phobia was barely reported and studied, most people still regarded it as shyness until the

term of social phobia was first introduced by Psychology Today magazine in 1993 (Lane, 2006). Up to date, the causes and etiology of SAD are still not elucidated yet. It is believed that family background, personality, and unpleasant social experience seems to be potential factors that affect an individual's social intention. A study (Caplan, 2007) also pointed out that internet addiction is associated with social anxiety.

The Importance of Physical Activities (PA)

PA could be beneficial to one's health both physically, mentally, and socially. Jonsdottir et al. (2010) suggested that PA may protect an individual from the development of poor mental health. Apart from that, Liu et al. (2015) also stated that PA can improve mental health such as anxiety, self-esteem, and self-concept. The view was supported by Wipfli et al. (2008), who mentioned that having regular exercises could provide an individual with the effect of anxiolytic. It has also been mentioned that to promote mental health and prevent mental disorders, PA is a powerful way to do so (Saxena, et al. 2009).

Even though PA offers different benefits to participants, there is a relatively low level of participation in PA among youth in Hong Kong. In 2016, the score of overall PA levels was 'D', which indicated that less than half of children and youth in Hong Kong fulfilled the recommended PA standard (Huang et al., 2016). Although the score of overall PA levels moved to C- in 2018 (Huang et al., 2018), it implied that Hong Kong's children and youth still had very low PA levels. Physical inactive could bring health risks to an individual physically and mentally. According to Warburton et al. (2006), physical inactive was the risk factor for chronic diseases and depression. They found that most physically active people were having lowest risk of mentioned diseases. Hence, youth in Hong Kong may have a higher possibility of struggling from anxiety disorder and mental health issues in comparison with other countries.

Previous Studies on The Relationship Between PA and SAD

PA is defined as "any bodily movement produced by skeletal muscles that require energy expenditure" (WHO, 2020). Dimech and Seiler (2010) found that there were no significant differences in social anxiety symptoms between children who participated in PA and those not engaged in PA. One year later, Dimech and Seiler (2011) conducted a similar study which confirmed that there were no differences between children involved in extra-curricular sport and those not participating in sports. Yet, they spot that there were gender differences where girls were found to report higher social anxiety symptoms. Gren-Landell et al. (2009) also supported the view that social anxiety symptoms were more common among adolescent girls than boys. According to Blumenthal et al. (2011), social anxiety was related to youth's pubertal timing. Early maturing would lead to higher risk of having social anxiety level, especially for youth female. It might probably explain why adolescent girls have higher level in social anxiety. However, there was another study conducted by Üstün and Yapici (2019) countered that male individual sports participants had a higher level in fear of negative evaluation than female.

Yet, Dimech and Seiler (2011) found out that the type of sport was more related to social anxiety symptoms than the intensity of the sport. They found out only team sport had a protective effect against social anxiety symptoms in children. Pluhar et al. (2019) also support the view of anxiety and depression were less common in participants of team sports than individual sports. Furthermore, Üstün and Yapici (2019) also stated that professional individual sports participants had higher level of social avoidance and felt more uncomfortable in general and new situation. It was also said by Mahin and Mohammad (2010) that team sports athletes had higher score on agreeableness and sociotropy than individual sports athletes. All these results reflected that team sports might be a better avenue to protect an individual from social anxiety. Üstün and Yapici (2019) also pointed out that there was not any significant difference between social anxiety level and the duration of doing sports among those participants.

Method

The purpose of the study is to investigate the association between PA level and SAD among youth in Hong Kong. In this paper, youth is defined as the 15-24 years old (WHO, 2020). Apart from that, the endurance and frequency of moderate or vigorous activity at work, and the endurance and frequency of sports activity were used to represent an individual's PA level. Apart from that, an individual's gender, preference of sports, experience of sports would be considered as other factors for analysis.

Data was collected through a questionnaire which were divided into two parts: (a) Global Physical Activity Questionnaire (GPAQ); and (b) Anxiety Disorder Questionnaire for Adults (SAQ-A30). The GPAQ was modified by adding several demographic questions for better understanding of respondents' sports participation. The SAQ-A30 includes 30 items which are rated on 5-point Likert scale, which ranging from 1 (Not at all or very slight) to 5 (Very high or extremely high). The total add-up score indicates the level of participants' SAD level. Correlation test, independent t-test, correlation test, Pearson Product-Movement (PPM), and One-way Anova were carried out to analyze all data. All test for statistical significance was standardized on an alpha level of $P < 0.05$.

Results

In total 287 participants were recruited in this study. The details of the participants were shown in Table 1. After running the independent t-test, the significant difference in SAD level (p=0.04) was found between males and females. The results of the independent t-test of the gender difference in SAD level were listed in Table 2.

Table 1

Distribution of participants and the total anxiety test result

	n	%	Mean
Gender			
Male	152	53.0	
Female	133	46.3	
Other	2	0.7	
Age			
15-18	84	29.3	
19-21	116	40.4	
22-24	87	30.3	
Total Anxiety Score	287	100	86.5

Table 2

Distribution of participants and independent t-test result of the gender difference in SAD level

	n	%	P
Gender			0.04
Male	152	53.0	
Female	133	46.3	
Other	2	0.7	
Age			
15-18	84	29.3	
19-21	116	40.4	
22-24	87	30.3	

There were only 25 (8.7%) involved vigorous-intensity activity at their work in total 287 participants, while 262 (91.3%) had not involved any vigorous-intensity activity at work. In addition, there were 102 (35.5%) who reported that they had moderate-intensity activity at work and 185 (64.5%) did not involve moderate-intensity activity at work. The details of PA participation at work were shown in Table 3.

Table 3

Distribution of PA participation at work

	n	%
Vigorous-intensity Activity at Work		
Yes	25	8.7
No	262	91.3
Moderate-intensity Activity at Work		
Yes	102	35.5
No	185	64.5

Within those 25 participants involved vigorous-intensity activity at work, their frequency was 2 days to 5 days (Mean=4.02) per week. The endurance of involving vigorous-intensity activity at work was 45 minutes to 480 minutes (Mean=237). There was no significant correlation between the SAD level and frequency (p>0.05). Besides, there was statical significant difference between the SAD level and endurance (p<0.05) of having vigorous-intensity activity at work. The results were shown in Table 1.4.

Furthermore, within those 102 participants who involved moderate-intensity activity at work, the frequency was 1 day to 7 days per week (Mean=3.5) and the endurance of was 20 minutes to 600 minutes per day (Mean=233). There was no significant correlation between the SAD level and frequency (p>0.05) and was no significant correlation the SAD level and endurance (p>0.05) of moderate-intensity activity at work after running the Pearson Product-Movement (PPM). The results were listed in Table 4.

Table 4

Distribution of PA participation at work and the results of correlation test between SAD level and PA level

	M	r	P
Vigorous-intensity Activity at Work (n=25)			
Days per week (frequency)	4.02	0.12	0.58
Mins per day (endurance)	237	0.42*	0.04
Moderate-intensity Activity at Work (n=102)			
Days per week (frequency)	3.52	0.17	0.09
Mins per day (endurance)	233	0.01	0.94

*. Correlation is significant at the 0.05 level (2-tailed).

There were 140 participants (48.8%) who participated in vigorous-intensity sports or recreational activities, while 147 (51.2%) did not participate in vigorous-intensity sports or recreation activities. Apart from participating in vigorous-intensity sports or recreational activities, there were 217 (76%) participants who participated in moderate-intensity sports activities and 70 (24%) did not participate in moderate intensity sports activities. The details were listed in Table 5.

Table 5

Distribution of participants' participation in PA

	n	%
Vigorous-intensity Sports Activity		
Yes	140	48.8
No	147	51.2
Moderate-intensity Sports Activity		
Yes	217	76
No	70	24

Within 140 participants who would involve vigorous-intensity sports activity regularly, their frequency was 1 to 7 day(s) per week (Mean=2.60) and endurance was 10 to 210 minutes per day (Mean=72.6). There was no significant correlation between the SAD level and

frequency (p>0.05). Yet, there was significant difference but low correlation between the SAD level and endurance (p<0.05, t=0.19) of having vigorous-intensity sports activity.

In addition, those 217 who had regular moderate-intensity sports activity, their frequency was 1 to 7day(s) per week (Mean=2.49) and endurance was 15 to 240 minutes per day (Mean=62.3). There was statical significant difference but low correlation between SAD level and frequency (p<0.05, t=0.25) and endurance (p<0.05, t=0.26) of having moderate-intensity sports activity. All the results were shown in Table 6.

Table 6

Distribution of participation in PA and the results of correlation test between SAD level and PA level

	M	r	P
Vigorous-intensity Sports Activity (n=141)			
Days per week (frequency)	2.60	0.04	0.61
Mins per day (endurance)	72.6	0.19*	0.03
Moderate-intensity Sports Activity (n=217)			
Days per week (frequency)	2.49	0.25**	0.00
Mins per day (endurance)	62.3	0.26**	0.00

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

In those 140 participants who would participate in vigorous-intensity sports activities, 61 (44%) of them participate into individual sports and 79 (56%) of them participate into team sports. There were 24 (17%) had less than one year sports experience, 56 (40%) had 1 to 3 years sports experience, 21 (15%) had 3 to 5 years sports experience, and 39 (28%) had more than 5 years sports experience. There was statical significant difference but low correlation between the SAD level and types of sports (p<0.05, t=0.29). The result also indicated that there was no significant correlation between the SAD level and year(s) of sports participation (p>0.05). There were 67 (48%) participants were sports team members and 73 (52%) were not sports team members. Yet, there was no significant difference (p>0.05) in SAD level between sports team members and non-sports team members. All the results were listed in Table 7.

Table 7

Distribution of participants' participation (n=140) in PA and the results of correlation between SAD level and various variables

	n	%	t	P
Type of Sports			0.29**	0.00
Individual	61	43.6		
Team	79	56.4		
Year(s) of Sports Participation			0.10	0.23
Less than 1 year	24	17.1		
1 to 3 year(s)	56	40.0		
3 to 5 years	21	15.0		
Above 5 years	39	27.9		
Sports Team Members				0.16
Yes	67	47.9		
No	73	52.1		

*. Correlation is significant at the 0.05 level (2-tailed).

Discussion

SAD Level and Gender Difference

There was a significant difference in SAD level between male and female since the significant level of two variables was p=0.04. The result indicated that female participants had higher SAD level than male participants. The result also supported the findings from previous studies. Dimech and Saeiler (2011) spotted that there were gender differences where girls were found to had higher social anxiety symptoms than boys. In addition, Gren-Landell et al. (2009) also stated that adolescent girls were more common in having social anxiety symptoms than adolescent boys. Moreover, according to Blumenthal et al. (2011), social anxiety was related to pubertal timing. Their study found that early maturing girls had higher level of social anxiety, while on-time and late maturing girls and boys were reported lower level of social anxiety. Furthermore, Storch et al. (2003) highlighted the importance of social comparison and peer approval among adolescent girls, early maturing girls may be more vulnerable to social anxiety due to their disparate maturation are evident to their peer group. Besides, Graber (2003) pointed out that the relationship between peer groups, especially with older adolescents, probably a vital factor for psychological maladjustment among early matures. These factors are considered as potential mechanisms that may lead to enhance vulnerability to social anxiety among early maturing girls.

SAD Level and PA Level

The result of the current study indicated that there was no significant association between SAD level and PA level. The distribution of participants involving vigorous-intensity activity at work were extremely small (n=25). The reason of such a phenomenon probably due to most participants in the study were students, it was rare for them to involve in any vigorous-intensity activity at work. There were 102 participants involved in moderate-intensity activity at work, which was more than vigorous-intensity level. After analyzing the frequency and duration of PA at work from each intensity level, there was no significant correlation were found. The current result might be influenced by the small number of participants in vigorous-intensity activity.

Apart from having PA at work, 140 participants had regular vigorous-intensity sports activity and 217

LIFEFITNESS
FAMILY OF BRANDS

網上訓練教學全面提供，
只需掃描 QR Code。

AXIOM 系列

優雅 · 高效 · 可靠

現正熱售

LIFE FITNESS 產品查詢：
電話 : 852.2159.9503 / Whatsapp: 852.9830.7027
電郵 : james.leung@lifefitness.com

LIFE FITNESS 售後服務查詢：
電話 :852.2159.9530 / Whatsapp: 852.5595.6262
電郵 : service.hk@lifefitness.com
地址 : 香港黃竹坑道 21 號環匯廣場 26 樓
網址 : www.lifefitness.com.hk

James Leung 梁衍邦
高級項目顧問 - 香港及澳門地區

健身室管理與物業管理服務的關係

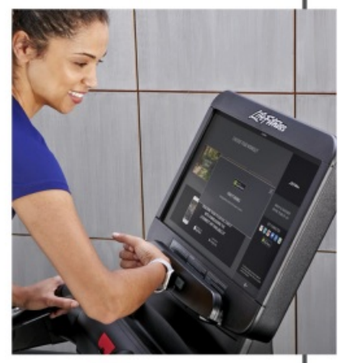
物業管理服務與住戶生活質素惜惜相關，這是一門以「人」為本的服務性行業。有了完善的服務管理，物業管理公司才能建立更專業的形象，為住戶提供優質的服務。隨著運動習慣的改變和在這熱潮的盛行下，市民比以前更著重健康和運動。另外，生活指數不斷提升，新落成屋苑亦加入多元化高增值的康體設施。住戶對屋苑健身室的要求亦大大提升，健身室也成為了他們經常「打卡」的地方。

健身室管理雖然只佔物業管理服務範疇的一小部分，但卻有舉足輕重的地位。管理服務當中的每一部分，都會直接影響住戶的生活質素和物業管理公司的形象和評價。故此，管理健身室的員工必須擁有相關的知識，從健身室設計、器材使用、軟件系統操作到後期保養等，加以配合才能達到有效的管理。

提升健身室服務管理

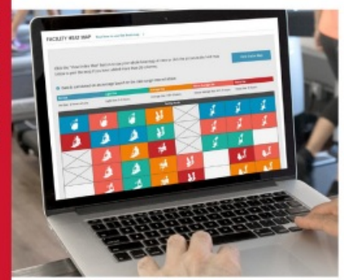
01 智能健身室器材與科技應用

物業管理智能化是現今趨勢，而智能健身室器材的科技應用亦是健身行業的大趨勢。相較於傳統的健身室，現在更常見的是將運動與科技結合，務求提供嶄新和另類的體驗給大眾。現今的健身人士更重視個人的運動數據追蹤、體能表現和動作的準確性等。在健身過程中，可以得到更有效的成果和減低受傷風險。透過融入不同的健身科技及應用，打造出智能化的健身室，提升器材的表現及管理的有效性。



運動與科技的結合

健身器材上的控制台可以與電話或電子手錶連線，將個人運動數據準確地實時記錄作分析，還可以隨時隨地分享和評估自己的身體質素和狀態，繼而作出針對性的訓練，令鍛鍊效果更顯著。

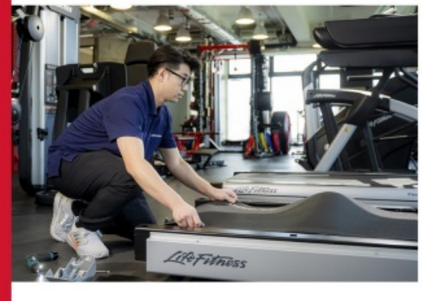


數據化健身室管理

透過已連線的雲端系統管理和監察健身器材的使用率和系統更新等，從而可以有效地管理各器材和作出保養安排。

02 原廠零件和保養

運動科技固然重要，但硬件亦不可忽略，從購買有信譽的品牌健身器材，到採用原廠零件和保養服務，這些都是十分值得關注的。從風險管理角度來說，管理公司有責任提供一個安全和舒適的健身環境給住戶。作為健身室管理者，在提供服務的同時亦要控制成本及質素，尤其是器材的售後服務。



原廠保養及年度檢查計劃

- 享有高質、專業、可靠的服務保證
- 優質的正品零件和服務可以減少器材的停機時間
- 確保更換零件的優先次序
- 購買零件尊享折扣
- 年度檢查計劃可提前預算年度管理服務費用
- 定期檢查可監察設備的外觀和性能，軟件更新

03 定期培訓

定期對員工進行健身室使用服務等的培訓及了解運動潮流趨勢，這是保持員工服務水準的重要元素。當員工能夠為住戶提供個人化、貼心的專業級服務時，必然能為管理公司帶來更專業的形象和信譽。

Life Fitness
維修保養服務數據

93%
*** 首次維修器材修復率**

Life Fitness Hong Kong
服務團隊

*** 首次維修器材修復率衡量標準：**
最好 : 85% 以上，一般 : 80% 至 84.9%，較差 :65% 至 79.9%，差 :63% 或以下
資料來源 : Life Fitness 客戶服務（香港及澳門）2019-2020

participants had moderate-intensity sports activity. The result of the current study revealed the p-value of moderate-intensity sports activity ($p<0.05$). It indicated that there was significant difference in SAD level among frequency and duration of sports participation in moderate level. The result supported past study which pointed out that having sports participation could bring positive effects to social anxiety (Çaglayan Tunç, 2015). Taylor et al. (1985) also supported the view that PA and exercise are beneficial to one's mental disorders. It seems like higher frequency of participation in PA leads to better social skills and self-image which might lower one's SAD level.

The result of the current study was a contrary to previous mentioned studies which showed that there was no significant difference in SAD level among frequency and duration of sports participation. For instance, Üstün and Yapici (2019) stated that there was not any significant difference between SAD level and the duration of PA. A study conducted by Russell (2002) found out that the frequency of aerobic exercise and weight training has nothing to do with social physique anxiety. In other words, the frequency of exercise is not associated with SAD. Apart from that, Brewer et al. (2004) even pointed out that individual with higher SAD level would tend to behave protective in their exercise such as lower the intention and duration of exercise. In other words, individual with higher SAD level would tend to do less exercise. Individual with higher SAD level fear of performing in front of others since they do not want to be observed or evaluated by others.

Although there was significant difference in SAD level among frequency and duration of moderate-intensity sports participation in current study, but no significant correlation was found due to low t-score ($tf=0.25$, $td=0.26$). In addition, the result supported the view from Dimech and Seiler (2011) that the intensity and duration of sports were less related to social anxiety symptoms.

There was significant difference ($p<0.05$) in SAD level between individual and team sports in the current study. The result was similar with previous studies. Past research has shown that different types of sports are related to social anxiety symptoms (Dimech and Seiler, 2011). Pluhar et al. (2019) also confirmed that anxiety level was lower in participants of team sports than individual sports. The reason of team sports participants had lower SAD level than individual sports participants probably due to team sports requires more communication and interaction with teammates. Mahin and Mohammad (2010) found out that team sports athletes scored higher on agreeableness and sociotropy significantly than individual sports athletes. It seems like team sports could offer a buffer to against social anxiety. However, the correlation in SAD level between team and individual sports was not significant due to relatively low t-score ($t=0.029$).

According to Rottensteiner et al. (2013), there were different reasons explaining why youth athletes would withdraw from team sports and one of the reasons was social problems. Therefore, there is a drawback of participation in team sports which might lead to social problems, which could probably become a barrier for adolescent to keep maintaining sports and exercise participation.

For year(s) of sport participation, no significant difference ($p>0.05$) were found. The data was collected from 140 participants who participated in vigorous-intensity sports activity only. Participants who participate in moderate-intensity sports activity were not included. The result was not statistically significant, but it pointed out that exercise has the effect of anxiolytic (Wipfli, et al. 2008). The study conducted by Dimech and Seiler (2011) stated that doing exercise could provide primary school children with a buffer that help with against social anxiety. As Wankel & Berger (1990) stated that sport participation could lead to various potential benefits for an individual such as personal enjoyment, social harmony and social change. Therefore, it seems like having a habit of doing exercise, regardless the years of sport participation could be beneficial to personal's SAD level.

There was no significant difference ($p>0.05$) in SAD level between sport or university team members and non-sport or non-university team members. There was no significant correlation between SAD level and habits of sport participation except for type of sports. However, a study was conducted by Özyol (2020) and discovered that participation in competitive swimming was effective in controlling social anxiety disorder among student-athletes. This is a contrary result to the current study. Although the target of the study was lower secondary education student, it could be a reference. Therefore, more information about the topic requires further study.

Conclusion

The purpose of this study was to examine the association between PA level and SAD level among youth in Hong Kong. PA level was not significantly associated with SAD level. Yet, the study spotted the difference in SAD level of gender and type of sports. Further study is needed for situation on other population or more information between PA and SAD. RMA

References

Atarbay, S. (2017). *The effect of social anxiety levels of university students from different departments on their psychological resilience.* [Unpublished master's dissertation]. Istanbul University.

Blumenthal, H., Leen-Feldner, E., Babson, K. A., Gahr, J. L., Trainor, C. D., & Frala, J. L. (2011). Elevated social anxiety among early maturing girls. *Developmental Psychology, 47(4),* 1133-1140. http://dx.doi.org.lib-ezproxy.hkbu.edu.hk/10.1037/a0024008

Caplan, S. E. (2007). Relation among loneliness, social anxiety, and problematic Internet use. *Cyberpsychol & Behav, 10(2)*, 234-242. https://doi.org/10.1089/cpb.2006.9963

Çağlayan Tunç, A. (2015). *Sporun üniversite öğrencilerinin sosyal kaygı ve öznel iyi oluş düzeylerine etkisi.* [Unpublished master's dissertation]. Konya: Selçuk Üniversitesi, Sağlık Bilimleri Enstitüsü Beden Eğitimi ve Spor Anabilim Dalı.

Central Health Partners Child Development Team. *Social anxiety disorder.* https://www.cdt.com.hk/social-anxiety-disorder/

Davidson, J. R., Hughes, D. L., George, L. K., & Blazer, D. G. (1993). The epidemiology of social phobia: findings from the Duke epidemiological catchment area study. *Psychol Med 23(3),* 709–718. https://doi.org/10.1017/s0033291700025484

Dimech, A. S., & Seiler, R. (2011). Extra-curricular sport participation: A potential buffer against social anxiety symptoms in primary school children. *Psychology of Sport and Exercise, 12*(4), 347-354. https://doi.org/10.1016/j.psychsport.2011.03.007

Dimech, A. S., & Seiler, R. (2010). The association between extra-curricular sport participation and social anxiety symptoms in children. *Journal of Clinical Sport Psychology, 4*(3), 191-203. https://doi.org/10.1123/jcsp.4.3.191

Fehm, L., Pelissolo, A., Furmark, T., & Wittchen, H-U. (2005). Size and burden of social phobia in Europe. European *Neuropsychopharmacology, 15*(4), 453–462. https://doi.org/10.1016/j.euroneuro.2005.04.002

Graber, J. S., & Hayward, C. (2003). Puberty in body context. *Gender Differences at Puberty,* 307-325. https://psycnet.apa.org/doi/10.1017/CBO9780511489716.015

Gren-landell, M., Tillfors, M., Furmark, T., Bohlin, G., Andersson, G., & Svedin, C. G. (2009). Social phobia in swedish adolescents: Prevalence and gender differences. *Social Psychiatry and Psychiatric Epidemiology, 44*(1), 1-7. http://dx.doi.org.lib-ezproxy.hkbu.edu.hk/10.1007/s00127-008-0400-7

Huang, W. Y., Wong, S. H. S., Sit, C. H. P., Wong, M. C. S., Sum, R. K. W., Wong, S. W. S., & Yu, J. J. (2019). Results from the Hong Kong's 2018 report card on physical activity for children and youth. *Journal of Exercise Science & Fitness, 17*(1), 14-19. https://doi.org/10.1016/j.jesf.2018.10.003

Huang, W. Y., Wong, S. H. S., Wong, M. C. S., Sit, C. H. P., Sum, R. K. W., & He, G. (2016). Results from Hong Kong's 2016 report card on physical activity for children and youth. *Journal of Physical Activity and Health, 13*(2), 169-175. https://doi.org/10.1123/jpah.2016-0302

Kleberg, J. L., Högström, J., Nord, M., Bölte, S., Serlachius, E., & Falck-Ytter, T. (2017). Autistic traits and symptoms of social anxiety are differentially related to attention to others' eyes in social anxiety disorder. *Journal of Autism and Developmental Disorders, 47*(12), 3814-3821. http://dx.doi.org.lib-ezproxy.hkbu.edu.hk/10.1007/s10803-016-2978-z

Jonsdottir, I. H., Rodjer, L., Hadzibajramovic, E., Borjesson, M., & Ahlborg, Jr. G. (2010). A prospective study of leisure-time physical activity and mental health in Swedish health care workers and social insurance officers. *Prev Med, 51(5), 373–377. https://doi.org*/10.1016/j.ypmed.2010.07.019

Lane, C. (2006). How shyness became an illness: A brief history of social phobia. *Common Knowledge, 12*(3), 388-409. https://doi-org.lib-ezproxy.hkbu.edu.hk/10.1215/0961754X-2006-004

Lee, S., Lee, M. Y. T., & Kwok, K. (2005). A community-based telephone survey of social anxiety disorder in Hong Kong. Journal of *Affective Disorders, 88*(2), 183-186. https://doi.org/10.1016/j.jad.2005.05.018

Liu, M., Lang, W., & Ming, Q. (2015). How does physical activity intervention improve self-esteem and self-concept in children and adolescents? Evidence from a meta-analysis. *PLoS One, 10*(8). http//dx.doi.org.lib-ezproxy.hkbu.edu.hk/10.1371/journal.pone.0134804

Mahin, E. N., & Mohammad, A. B. (2010). Comparison of athletes' personality characteristics in individual and team sports. *Procedia – Social and Behavioral Sciences,* 5, 808-812. https://doi.org/10.1016/j.sbspro.2010.07.189

Özyol, F. C. (2020). The determinants of social anxiety in lower secondary education student athletes: A Case of competitive swimming environment. *International Journal of Psychology and Educational Studies, 7*(2), 98-110. https://doi.org/10.17220/ijpes.2020.02.009

Pluhar, E., McCracken, C., Griffith, K. L., Christino, M. A., Sugimoto, D., & Meehan, W. P. (2019). Team sport athletes may be less likely to suffer anxiety or depression than individual sport athletes. *Journal of Sports Science & Medicine, 18*(3), 490-486. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6683619/

Rottensteiner, C., Laakso, L., Pihlaja, T., & Konttinen, N. (2013). Personal reasons for withdrawal from team sports and the influence of significant others among youth athletes. International Journal of *Sports Science & Coaching, 8*(1), 19-32. https://doi.org/10.1260%2F1747-9541.8.1.19

Russell, W. D. (2002). Comparison of self-esteem, body satisfaction, and social physique anxiety across males of different exercise frequency and racial background. *Journal of Sport Behavior, 25*(1), 74–90.

Saxena, S., Ommeren, M. V., Tang, K. C., & Armstrong, T. P. (2009). Mental health benefits of physical activity. *Journal of Mental Health, 14*(5), 445-451. https://doi.org/10.1080/09638230500270776

Schmitz, N., Kruse, J., & Kugler, J. (2004). The association between physical exercises and health-related quality of life in subjects with mental disorders: Results from a crosssectional survey. *Preventive Medicine, 39*(6), 1200–1207. https://doi.org/10.1016/j.ypmed.2004.04.034

Storch, E. A., Brassard, M. R., & Masia-Warner, C. L. (2003). The relationship of peer victimization to social anxiety and loneliness in adolescence. *Child Study Journal, 33*(1), 1–18.

Taylor, C. B., Sallis, J. F., & Needle, R. (1985). The relation of physical activity and exercise to mental health. *Public Health Reports, 100*(2), 195-202.

Üstun, U. D., & Yapici, A. (2019). A comparison of perceived social anxiety among individual and team sports participant high school students. *World Journal of Education, 9*(6), 1-6. https://doi.org/10.5430/wje.v9n6p1

Wankel, L. M., & Berger, B. G. (1990). The Psychological and Social Benefits of Sport and Physical Activity. *Journal of Leisure Research, 22*(2), 167–182. http://doi:10.1080/00222216.1990.11969823

Warburton, D. E. R., Nicol, C. W., & Bredin, S. S. D. (2006). Health benefit of physical activity: the evidence. *CMAJ, 174*(6), 801-809. https://doi.org/10.1503/cmaj.051351

Wipfli, B. M., Rethorst, C. D., & Landers, D. M. (2008). The anxiolytic effects of exercise: A meta-analysis of randomized trails and dose-response analysis. *Journal of Sports and Exercise Psychology, 30*(4), 392-410. https://doi.org/10.1123/jsep.30.4.392

World Health Organization. (2020). *Adolescent health.* https://www.who.int/southeastasia/health-topics/adolescent-health

World Health Organization. (2020). *Physical activity*. https://www.who.int/news-room/fact-sheets/detail/physical-activity

World Health Organization. (2020). *What is the WHO definition of health?* https://www.who.int/about/who-we-are/frequently-asked-questions

The Health Benefits of Leisure Among Refugee Populations

Carole N. Edginton
Mount Mercy University

Introduction

Over 68.5 million refugees are displaced from their homes due to catastrophic events and protracted conflicts (UNHCR, 2017). Most recently, the Russian invasion of Ukraine has produced an exodus of refugees estimated to be over 1 million individuals in the first 7 days of the conflict according to the UNHCR (2022) as cited by CNN. Further projections suggest that there may be as many as 4-6 million additional refugees. Ukraine's refugees have elocated to Moldova, Poland, Romania, Slovakia, and Hungary. These refugees will find enormous challenges in coping with their current and future situations.

A refugee is defined as a displaced person who has a well-founded fear of staying in their country of origin because of persecution based on race, religion, nationality, membership in a particular social group, or political opinion (UNHCR, 2020). Resettlement may provide a sanctuary in the case of illness, injury, or significant issues in their home country. Worldwide refugee resettlement programs serve vulnerable populations who are facing immediate international or national emergencies and critical difficulties. Permanent or temporary resettlement in a host country for refugees can be considered a practical, durable solution for such displaced populations (Fiddian-Qasmiyah et al., 2014). Refugee resettlement programs may offer a "real life" integration and normalization into a host country (Fiddian-Qasmiyah et al., 2014).

The United States, Canada, and Australia house more refugees than any other country in the world. Together, these countries account for 90% of "global refugee capacity" (Fiddian-Qasmiyah et al., 2014). In countries like Myanmar, forced migration because of human rights violations has led to the displacement of over 1 million people (Fike et al., 2016). Over half a million Burmese have been granted refugee status by the United Nations High Commission on Refugees (UNHCR). Approximately 30,000 Burmese refugees resettled in the United States in 2019 (Fike et al., 2016; UNHCR, 2020; Vang & Trieu, 2014).

The following article will define what a refugee is, as well as discuss the trauma refugees' have experienced through conflict and/or natural disasters. In many instances, these distressing experiences have resulted in mental and physical health challenges and difficulties post-settlement. In addition, the article will discuss the importance of leisure experience and activities, as well as define wellbeing, and specifically apply these concepts to displaced refugees who have resettled in encampments, urban settings, or host countries. Furthermore, the article will explore how leisure activities in the form of art, music, sport, and celebrations and rituals are instrumental in contributing to the overall well-being of a displaced refugee. Last, the article will provide examples of organizations that provide leisure programming to refugees around the world.

Trauma in Refugees

Many refugees, such as the Burmese of Myanmar, have experienced the tragic loss of family members. Numerous refugees have provided accounts where their homes and possessions were violently destroyed, or they and family members were physically attacked. Additionally, Burmese refugees have been described in several research studies as being dehumanized, hopeless, powerless, immobile, weak, and vulnerable (Bartholomew et al., 2015). Schweitzer demonstrated in a study in 2011 that Karenni refugees of Thailand exhibited higher levels of anxiety, PTSD, depression, dissociation, reckless behaviors, and somatization related to pre and post-migration living difficulties. Many of these refugees have faced unspeakable hardship and violence, resulting in added mental health issues (Blount et al., 2018). Psychological challenges may also include nightmares, poor memory, poor concentration, reduced life span, and additional trust issues (Blount et al., 2018h; Ball & Stein, 2012; Clay, 2017).

In a study by Vonnahme et al. (2014), 579 Bhutanese refugees 18 years or older post settlement in multiple cities in the American states of Georgia, New York, Arizona, and Texas were assessed on a 4 point Likert scale to measure anxiety, depression, access to healthcare, religious issues, problems obtaining aid or support and issues with resettlement. Approximately 71% of the 21% of Bhutanese who showed symptoms of depression were also diagnosed with PTSD (Vonnahme et al., 2014). This number was 5 % higher than the meta-analysis of prominent refugees resettled in Western countries. Findings also suggested that the prevalence of depression symptoms was higher among women than men.

Furthermore, Barbieri et al. (2019) investigated 120 African refugees resettled in Italy and reported the following pre-resettlement traumas including torture, lack of food or water, imprisonment, non-sexual assault, lack of shelter, murder of one or more strangers, disappearance or kidnapping, being close to death, serious physical injury, ill health without access to medical care, murder of a family member or friend, unnatural death of a family member or friend, forced separation from a family member, non-sexual assault by a family member or someone you know, sexual assault by a stranger, serious accident, fire or explosion, enforced isolation from others, life-threatening illness, combat situation, sexual while under 18 with someone at least five years older, sexual assault by a family member, brainwashing and natural disaster experiences (Barbieri et al., 2019). According to the DSM-5 criteria, the rate of probable PTSD in a group of 120 African refugees was 79% (Barbieri et al., 2019).

Haar (2017) also interviewed Rohingya refugees who described witnessing mass shootings, rapes, stabbings, machete attacks, villages looted and destroyed, delayed medical treatment, landmine, and grenade injuries, gender violence, and some people were even set on fire by soldiers and villagers. One man witnessed a relative stomping on the neck by soldiers until he died. In contrast, other refugees witnessed women and children being brutally raped, stabbed, tortured, murdered, or beheaded while people fled and escaped into the jungles on foot. These horrific and graphic descriptions demonstrate why the Rohingya, among other refugee populations, urgently need medical and psychological support before, during, and after resettlement (Haar, 2017).

The trauma refugees experience in the form of "cultural, psychological, sociopolitical, ecological, historical, and economic" may influence their holistic wellness (Blount et al., 2018, p. 463). After resettlement, this may affect their ability for self-care, ability to cope and manage stress, cultural identity, and place them at risk (Blount et al., 2018; Bemak & Chung, 2017). Many refugees do not seek treatment and have difficulties accessing health care contributing to increases in morbidity and mortality (WHO, 2015).

Even in the face of such atrocities, many older refugees struggle with resettlement's everyday experiences during displacement or are reluctant to leave their homelands to which they hold a deep emotional attachment. Pi Ruat, a Chin refugee from Myanmar, who resettled in Malaysia in the urban city of Kuala Lumpur, notes, "For us old people, we are like old trees fixed to our place. Our roots are deep, strong." She had lived in a small village in the mountains and once resettled in displaced lands; she often claimed, "this is not our place" (Lamb et al., 2018, p. 1031). Even though many refugees have found many freedoms in their new communities, better healthcare, safety and security, and better nutrition, it still does not feel like home.

In addition to pre-settlement factors, the process of migration to another host country can be challenging and stressful, affecting the health and well-being of refugees (Stack et al., 2009; Beiser & Hou, 2006; Mui & Kang, 2006). Adapting and integrating into a new environment can be challenging, particularly to those who do not have the community support of their kinship systems.

Leisure and Wellbeing

The idea of wellness is defined differently throughout the world. Usually, it relates to a balance in life activities, achieving life satisfaction, and integrating mind, body, and spirit within environmental and social communities (Blount et al., 2018). The World Health Organization (WHO) suggests that health is not merely the absence of disease but physical, mental, and social wellbeing (WHO, 2014). Holistic wellness may include physical exercise, nutrition, managing stress, coping mechanisms, personal responsibility, environmental sensitivity, and positive lifestyle changes (Blount et al., 2018; Witmer, 1985). Blount et al. (2018) suggest that factors such as life tasks like "spirituality, love, work, friendship, and self-regulation" with life forces such as "family, community, religion, education" are interconnected and collectively form our well-being and quality of life (Blount et al., 2018, p. 462). Measures of wellbeing are also influenced by income, housing, food, educational level, physical and mental health, and leisure (Cummins, 2016).

Typically, scholars define leisure as free or discretionary time or time differentiated from work (Howe & Rancourt, 1990; Henderson, 2008). Leisure is an essential component in measuring wellbeing and is often defined as free time or contextually framed activities where people use their abilities and resources to participate in activities that are considered satisfying, restoring, enriching, and fulfilling. Examples may include community gardens, dance, music, arts, or team sports, and leisure activities that can be accomplished individually or collectively (Hurly, 2019).

Leisure can also be a subjective experience or involve choice and may include relaxation, intrinsic motivation, and a lack of evaluation. Furthermore, leisure may be conceptualized as a geographic space or loci, such as a physical or external environment like a shopping mall, recreational facility, museum, or amusement park (Gui et al., 2019; Shaw, 1984). Typically, this is a space where people can experience an escape from daily constraints (Gui et al., 2019; Tuan, 1998). Psychological fulfillment comes in emotions like enjoyment, relaxation, state of

flow (Gui et al., 2019; Csikszentmihalyi, 1997). Serious leisure (Stebbins, 1982, 1992), as opposed to casual leisure, has been shown to provide durable benefits such as personal enrichment, personal expression, positive self-image, and self-gratification along with social rewards such as group accomplishment, social attraction, and additional psychological and physical benefits throughout an individual's life. Serious Leisure has been linked to life satisfaction, well-being, and health (Kim, 2016).

Edginton and Chin, 2014; Barre, 2020, suggest that leisure, sports, and expressive arts, music, drama, art, and celebrations are not only valuable in constructing quality of life for people but a necessary social movement for our health and wellbeing. Recreation and leisure activities are generally meant to uplift a person, to help them relax and enjoy freedom from everyday stressors and workplace activities. Expressive arts within leisure can be a way to express emotions, cultural symbolism, values, traditions, myths, and stories, legitimize political movements and bring people together.

Leisure and Refugees

The Universal Declaration of Human Rights (1948) includes the necessity of leisure as a fundamental human right. Article 24 of the declaration states that "everyone has the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay" (UDHR, 1948, Article 24). Cultural models determine almost all our daily decisions as individuals and influence our behaviors (Scupin, 2006; Ferraro et al., 2010). Intimately interconnected, culture is a learned, collective guide of symbolic cues that gives meaning and structure to our lives (Guest, 2014). Culture can also be described as those skills needed by individuals to thrive and survive within cultural systems. Culture may include health and methods of diagnosis, communication, technologies, art, educational systems, religion, housing, morality, food choices, sense of time, organizational leadership, kinship, marital patterns, economic systems, family structures, and even leisure experiences and activities. While leisure is a universal quality of humanity, the application of leisure participation and pastimes can be contextual and cultural in ethnic refugees worldwide.

Stodolska et al. (2006) interviewed Muslim immigrants from countries such as Jordan, Lebanon, Iraq, and Egypt who had migrated to the United States and found the Islamic culture places a strong emphasis on family-oriented leisure. Afghan refugees resettled in Canada operate without separate life domains, and work, leisure, and family are all integrated (Stack et al., 2009). Contrary to the Western view of leisure and cosmology, Xiu xian (leisure) Chinese perceptions are related through elements of change, yin and yang, and interconnectedness (Peng, Spencer-Rodgers, & Nian, 2006). In a study by Gui et al. (2019), leisure was described by the Chinese as places of solitude or quietness, sunny weather, and fresh air, drawing, calligraphy, musical instruments, singing, dancing, flora arranging, concerts, games, sports, museums, jogging, swimming, ping pong, tennis, yoga, cycling, hiking, camping, canoeing, and sunbathing. The Chinese also described leisure as experiencing something novel, having a sense of freedom of choice, and feeling healthy physically and mentally (Gui et al., 2019).

Several studies demonstrate the benefits of leisure for refugee resettlement. They include strengthening kinship systems, mitigating stress, integration, and resettlement, reinforcing social and cultural identity, providing a sense of purpose, restoration and revitalization, and human development (Quirke, 2015; Rishbeth & Finney, 2006; Suto, 2013; Veal, 2015). As refugees attempt to redefine their lives, music, art, sports, celebrations that promote culture, along with family connections and friendships, are especially important (Shahidi et al., 2020). Recreation and leisure networks advance physical and mental health and harmonize relationships and communities (Ling, 2020).

Social identity theory also suggests that individuals are more inclined to form relationships and friendships with ingroup members who share analogous cultural understandings (Kim et al., 2016; Shinnar, 2008). Developing these ingroup relationships within the context of leisure can help individuals establish positive social identities and self-concepts (Kim et al.,2016; Brewer, 2007; Worchel, 2005). Research confirms that people often feel more secure with their own racial and ethnic groups who share language, sociocultural values, and identification. One's daily behaviors are rooted "structurally and relationally" in our social relationships as well as experiences of leisure (Bond, 2020).

Leisure has also been shown to help refugees, and displaced persons deal with psychological stressors and mental illnesses such as depression, anxiety, feelings of alienation, disconnect, and loneliness. Leisure activities can offer, in many cases, a nostalgic reproduction of familiarity and regularity (Hurly, 2019). Many refugees resettled may also experience social isolation and exclusion in their everyday life, and familiar leisure activities can provide them with a sense of belonging (Hassanli et al., 2020; Lewis, 2010, 2015). Personal expression, in many cases, has been repressed in refugees coming from areas of conflict. Many of those communicating contrary

viewpoints to the current regime have been silenced, arrested, imprisoned, and tortured. Refugees from Myanmar explained that village leaders were tortured to death, and their wives were raped to set an example and suppress individuals who spoke up in communities (Shannon et al., 2015). Through music, art, sports, and celebrations, many refugees may demonstrate a new sense of freedom of expression and a narrative voice that they could not communicate or articulate in their country of origin (Hurly, 2019).

During acculturation, leisure can serve as a mechanism for integration. In a study by Stack (2009), with Afghan refugees who had immigrated to Winnipeg, Canada, researchers provided evidence that leisure can play an essential role in adapting to new challenges in a host community. Leisure, in this case, was instrumental in establishing and maintaining family and friendship networks and developing cross-cultural interactions. Participating in leisure became a confirmation of Afghan immigrants' cultural strengths during the immigration process. Resettlement and participating in sport and recreation programs helped refugees cope with stress and adapt to their new environment (Stack, 2009).

By preserving cultural habits and reinforcing social roles, leisure activities help maintain cultural identity, and ethnic minority groups may express their differences in mainstream society through multicultural festivals, music, arts, and sports as a form of leisure. Ethnic and refugee festivals, music, arts, and sports can also unite people in a common goal, enhance social interactions and foster a sense of community (Hassanli et al., 2020). These leisure events can empower diasporic populations, provide a sense of belonging and cultivate a sense of self-worth by articulating cultural identification.

Leisure can also provide activities that involve achievement, enhance intrinsic motivations, creativity, and spontaneity during the challenging time of resettlement (Hurley, 2019). For example, art and music ability may also be beneficial in showcasing and demonstrating community member's abilities and skills, thus increasing a refugee's cultural capital in a new community (Hassanli et al., 2020: Permezel & Duffy, 2007; Mackley-Crump, 2015; Sinn & Wong, 2005).

Nature-based leisure has been demonstrated as invigorating and energizing and can provide restorative properties (Hurly, 2019). In a study by Hurly (2019), one African refugee woman describes the familiarity of being at home when sitting under trees and just talking in a relaxed and refreshed outdoor environment such as a park. Green spaces are often accessible and affordable to refugees resettling in a new environment with limited resources (Linn, 2020). For elderly Chin refugee women relocated in Kuala Lumpur who have had a strong tie to the land in Myanmar, gardening becomes an essential and therapeutic activity that helps them connect with their homeland's familiar landscape. Gardening also gives these women a sense of responsibility (Lamb et al., 2018). Another African woman discusses losing herself in singing hymns or dancing (Hurley, 2019). In a study of resettled female Syrian refugees in Amman and Beirut by Linn (2020), non-government agencies and religious organizations provided women with opportunities to learn skills, relax, and socialize where they could cultivate and master personal interests such as learning, sewing, and cooking. Leisure allows refugees to transcend beyond their experiences of displacement and trauma.

The Five-Factor Wellness Inventory was devised to determine the risk factors refugees may have that limit wellbeing and wellness-related constructs (Myers et al., 2004). Refugee risk factors fall under the following domains: the physical self, essential self, creative self, social self, and coping self (Blount et al., 2018, p. 463; Myers et al., 2004). The physical self includes risk factors related to exercise and nutrition, while the essential self includes self-care, cultural identification, and spirituality. The social self has threats to friendship, love, and social support. In contrast, the creative self consists of risks to emotions, control over one's environment, work, humor, and cognitive faculties. Myers and Sweeney (2004) also

suggest that the coping self-domain of refugees comprises perceptions of self-worth, realistic beliefs, stress management skills, and access to and behaviors related to leisure activity.

Art and Refugees

Art as leisure becomes a way refugees may nurture their cultural identity and may reflect symbolic visual expressions. In a study conducted by Sullivan et al. (2016), the implementation of creative expression therapy interventions in refugee and war-traumatized youth demonstrated that creative elements provided youth with an expressive outlet to process trauma feelings. Furthermore, art, music, and drama helped students develop social-emotional skills and improved academic skills.

In the case of the Rohingya Muslims, artwork in Myanmar became an empowering and safe mode of expression of resistance without protesting or rioting, which may have proved life-threatening (Farzana, 2017). Drawings and paintings by Rohingya artists give voice to the narratives of trauma and grief (Farzana, 2017). Struggle, suffering, injustice, and resentment, as well as designs of hope and resilience, become the artistic subject matter of many oppressed refugees within their country of origin and encampment settings (Farzana, 2017).

Leisure and expressive arts have also had significant mental health benefits for the Rohingya refugees living in Bangladesh encampments. Nonprofit programs such as Artolution, Anera, Syrian Art Initiative, Arts for Refugees in Transition (ART), Exile Voices Project, Art for Refugees in Lebanon, Amsterdam Painting Project, Za'atari Project, and the UNHCR's Artists for Refugees provide sustainable art programming for refugees around the world. Artolution is a nonprofit established in 2016 that provides five year-round, regional programs for refugees that include 68 local artists. The "program has impacted more than 6,000 youth annually" (Artolution, 2021). Artolution is described as a humanitarian effort to bring people together in "times of conflict and social turmoil" and solve those issues together and collaboratively through art, music, and dance (Artolution, 2021).

As noted in The New York Times article by Brown (2021), Rohingya Muslims have escaped traumatic experiences. While living in their country of origin, art, poetry, and many expressive arts were not allowed to be practiced. Many refugees have now set up residence in Kutupalong, the world's largest settlement. In Kutupalong, some Rohingya refugees, such as Nur, have emerged as renowned muralists and part of a group that uses "the power of the paintbrush to create life-affirming and potential lifesaving murals about COVID 19, safe hygiene practices, neonatal care, the dangers of domestic violence, and other public health concerns" (Brown, 2021).

Within the settlement, there are over 200 murals. Nur works with Artolution to teach local children and use art as a humanitarian tool and response. Art in this context becomes transformative and a way to add their voices to the world. The founders of Artolution provide an artistic expression platform to voice the refugees' stories (Brown, 2021). The nonprofit organization founder went door to door at the Rohingya settlement looking for mural artists until he found Nur.

Another artist, Dildar Begumhas, paints murals depicting gender equity. Dildar did not speak for nine months after she arrived at the encampment because of war-related trauma. Now Dildar is a leading teacher and artist in the community. The murals provide freedom to express the violence and social inequities the Rohingya have experienced and provide a format to remember the good that we are part of their past lives. Boshirullah, another Rohingya refugee in the encampment, has become a folkloric musician, singing, and playing his mandolin, flute, and telling stories. For him, "art is medicine and his life" (Brown, 2021). The Artolution program also offers music and dance workshops led by a local break-dancer.

Music and Refugees

Listening or participating in music is another form of leisure that promotes well-being in culturally diverse communities (Cain, 2019; MacDonald, 2013; Saarikallio, 2010; Weinberg & Joseph, 2016). Music can provide a host of physical, social, and emotional benefits to the listener and influence our moods and mind. Studies have shown that listening to music as a coping strategy provides significant advantages over television, social

media, and live streaming (Krause et al., 2020). Music, which is low cost and can be accomplished individually, has been an essential part of modifying our leisure behavior. In ethnic groups and countries of origin, music is often experienced at parties, clubs, social gatherings, and homes. Individuals may listen to recordings, radio, tapes, and CDs. Dancing and music become a means for cultural identification. Listening to or participating in musical activities may contribute to a shared awareness of space (Bennett, 2005). Music is also essential to "multi-ethnic association among diasporic populations facing racial exclusion and intolerance when they relocate to new countries and urban surroundings" (Bennett, 2005, p.336). According to Lipsitz (1994), music in immigrant communities may negotiate and parley between contested groups.

Cain et al. (2019) studied immigrant cultural groups in Brisbane, Australia. They measured the impact of listening to culture-centric music-making as a social activity (ethnomusicology) on personal well-being and cultural identity. The study explored how music created a sense of collective identity and provided social support. Furthermore, in marginalized populations that have undergone trauma, music, and art and how humans "interpret, experience, and react to music" may further provide happiness, friendship, and a social outlet for emotions (Cain et al., 2019, p. 70). The study looked at how music-making as leisure contributes to cultural and social synchrony and unity, emotional pride, integration, cultural resilience, and adaptation to a new community.

Music may also help reproduce ethnic, national culture and reinforce symbolic identities (Grossman & O'Brien, 2006; Huisman & Hondagneu-Sotelo, 2005). Harmony and melody offer moments of freedom in often uncertain situations that refugees may face (Lewis, 2014). Many refugees view music as essential and something that they could not live without, noting it is critical to their happiness and healing (Cain et al., 2019). Lewis (2014) suggests that music is transcendent during resettlement and important in renegotiating a sense of belonging in a new community. Music can transform and transcend structural and social distinctions such as class, age, gender and race (Bennett, 2005; Lewis, 2014). According to Olliff (2008), performing arts such as hip hop, dance, and beatboxing have been instrumental in capacity building and personal development in the refugee youth and youth of Australia's diverse backgrounds. Some bands, such as the Antiracism Action Band, focus on relative problems such as racism, identity, and sexual health.

Refugee music programs worldwide include Musiquati (sponsored by UNICEF), El Sistema Greece, Connect by Music, and Musicians for Human Rights. Musiqati, is a musical therapy program for Syrian refugee children that includes creating a small orchestra. The program cultivates free expression and an environment where children can be creative and "share their emotions through words, harmonies, rhythms and melodies" (Musiqati, 2021).

Sports and Refugees

Sports and leisure have been documented in several studies as providing both sociocultural and economic benefits to people. Additional studies have focused on how sports participation in refugee and ethnocultural populations also may facilitate integration (Olliff, 2008; Cortis, Sawrikar & Muir 2007). Through encouraging dialogical exchanges, leisure activities promote a sense of belonging into one's new community, whether in a new host country or encampment setting (Hurly, 2019; Olliff, 2008; Quirke, 2015).

Olliff (2008) from the Center for Multicultural Youth Issues (CMYI) of Australia suggests sport and recreational activities build trust among refugee youth which is

essential in facilitating health-seeking behaviors in the community. Furthermore, sports offer transitional and settlement support that may lead to mainstream connections and activities. Group sports may also provide a space to develop skills and explore personal development and provide therapeutic properties from the impact of living in trauma and conflict zones. As a diversionary activity, sports may also prevent risk-taking behaviors and increase self-esteem, mental health, and academic achievement among refugees (Olliff, 2008)

Active and group sports have also been shown to strengthen social networks and reduce stress (Hurley, 2019). In a study by Kim et al. (2016), Korean immigrants participating in sports together noted that the experiences were positive. Members felt both emotionally and socially supported, thereby enhancing their cultural identity and membership. As serious leisure participation, sports groups helped with acculturative stress, strengthened ethnicity and self-worth, expanded social networks, provided a sense of achievement, and contributed to overall social and psychological support and health. Group sports motivated community members to stay in shape and practice, and develop physical skills (Kim et al., 2016).

In another study by Knappe et al., 2019, 45 Greek male refugee camp participants ages 16-49 were given a pre-test and post-test to measure an intervention of an eight-week exercise and sports training on "PTSD, depression, anxiety, quality of life, pain, and fitness" (Knappe et al., 2019). Results showed that higher participation rates resulted in "fewer anxiety symptoms, better health-related quality of life, higher self-perceived fitness, higher handgrip strength, and better cardiovascular" (Knappe et al., 2019, p.1). There were also fewer complaints at post-intervention of PTSD and depressive symptoms. Findings support that physical activity can positively affect psychiatric health (Knappe et al., 2019).

Sports and leisure provide a distraction from everyday life, provide activity for asylum seekers and refugees who cannot take an active role in local and national economies for several reasons (Stone, 2017). Sports organizations that partner with UNHCR include the International Olympic Committee (IOC), FC Barcelona Foundation, World Taekwondo Federation, International Judo Foundation, and Asian Football Confederation (UNHCR, 2021). Climb Aid is a for-profit humanitarian program founded in Zurich, Switzerland that provides climbing walls, outdoor recreation, and additional activities to improve mental wellbeing, foster autonomy, and create environmentally aware humans. The organization works primarily in marginalized populations and communities with youth. (ClimbAID, 2021).

Community Festivals, Celebrations, and Refugees

Festivals and celebrations are another form of leisure and cultural expression and can create community solidarity. As marginalized populations, refugee celebrations may help connect displaced people to their homeland and allow them to recollect tradition. Furthermore, community-wide celebrations offer integration to a broader community, sharing with a host country and educating greater tolerance through cross-cultural understanding. Celebrations can mitigate oppressive hierarchies and language barriers and enhance well-being through acceptance (Hassanli, 2020). During a festival, self-esteem may be encouraged through a framework that showcases and validates refugee abilities and skills, producing cultural capital.

Like leisure celebrations, rituals can be a divergence from the everyday demands of living (De Lisle, 2009). Rituals can also be a positive use of leisure free time that signifies membership and commitment to a group (Liberman et al., 2017). Positive ritual through celebration can help refugees to reinforce social values, regulate social pressures and create social networks and has been linked to improvement in a person's health and quality of life (Dempsey et al., 2010). Humor, a common element in celebration and ritual can also create physiological changes that relieve stress. Further, celebrations can be instrumental in building community cohesion through collaboration and can create a sense of belonging for individuals (Dempsey et al., 2010).

There are a multitude of cultural events, celebrations, and rituals implemented at refugee camps worldwide. One popular ritual/celebration in Karen Burmese refugees is the animistic Wrist Tying Ceremony, where elders and monks distribute seven items (cold water, lumps of sticky rice, white threads, boiled bananas, flower branches, and sugarcane). As each item is placed in the participants' hands, a yellow or white cord is wrapped around their wrists to connect them to the spirit world and ensure good fortune (Minnesota Karen Organization, 2021). The Bhutanese Paro Tsechu is a community-wide event that takes place in the Spring. Members wear colorful religious masks, dance, and play folk songs with cymbals, drums, flutes, and yak horns as they commemorate the Guru Rinpoche or "lotus born teacher." During the festival, people receive a blessing, good karma, and move toward enlightenment as they wash away their sins (Conscious Journeys, 2021).

The Tumaini Festival, which is free of charge, takes place in the Dzaleka refugee camp in Dowa, Malawi that houses over 40,000 refugees. The festival brings together musicians, poets, filmmakers, comedians, theater, acrobats, fashion, dancers, singers, food, and workshops to promote peace and intercultural harmony. Tumaini means hope in Swahili, and the event is a combined effort between the refugees and the host country to empower refugees through the arts. Last, during the Ethiopian Timkat community festival, priests carry Tabots (models of the ark of the Covenant) wrapped in silk and cloth and lead a procession to the river where people witness a reenactment baptism of Jesus and renew their baptism. The celebration also involves a mass, wearing white clothing and head coverings, and sharing meat, vegetables, Doro wat (a spicy chicken dish), and coffee (Evisa Ethiopia, 2021).

Conclusion

Vulnerable populations such as refugees face critical difficulties worldwide as they resettle into encampments, urban settings, and new host countries. Many of these refugees have faced unspeakable violence, resulting in mental health issues in addition to the stress of resettling (Blount et al., 2018). Leisure, often defined as free time, becomes an essential component in measuring wellbeing. Leisure provides satisfying experiences, restoring, enriching, and fulfilling and provide freedom from everyday stressors and workplace activities, and may also strengthen kinship systems, facilitate integration, reinforce social and cultural identity, give refugees a sense of purpose, help refugees learn new skills and enhance self-esteem (Quirke, 2015; Rishbeth & Finney, 2006; Suto, 2013; Veal, 2015).

Art, as leisure, can nurture cultural identity and provide symbolic visual expressions and modes of healing for traumatic experiences and feelings (Sullivan et al., 2016). Artolution is a humanitarian organization that helps communities work through conflict through art, music, and dance (Artolution, 2021). Music is also essential to displaced populations and can help immigrant groups gain a sense of belonging, master new skills, and provide a mode of integration. Additionally, sports programming offers transitional support that can lead to mainstream connections, create a space to develop skills and provide therapeutic properties from the impact of living in trauma.

Celebrations and rituals are also influential in bringing people together, alleviating oppressive hierarchies and language barriers, and enhancing well-being through community acceptance (Hassanli, 2020). Iwasaki (2007) reasserts the importance and value of leisure in art, music, sports, and celebrations among refugees, developing a heightened sense of self, producing positive emotions, facilitating social connections, enabling spirituality, providing a sense of purpose, and fostering human development. Leisure experiences and activities offer restoration and affirmation for refugees fleeing from areas of conflict. As a mechanism for social, physical, psychological, and cultural growth and healing, leisure becomes an invaluable tool to assist with integration and resettlement in refugees across the world. RMA

References

Artolution (2021). Retrieved 4/17/2021 at https://www.artolution.org.

Ball, T. M., & Stein, M. B. (2012). Classification of posttraumatic stress disorder. In J. G. Beck & D. M. Sloan (Eds.), *The Oxford handbook of traumatic stress disorders* (pp. 39– 53). New York, NY: Oxford University Press.

Barbieri, A., Visco-Comandini , F., Alunni Fegatelli, D. , Schepisi C., Russo V., Calò, F., Dessì , A., Cannella, G., & Stellacci., A. (2019). Complex trauma, PTSD, and complex PTSD in African refugees. *European Journal of Psychotraumatology,* 10(1),1-13. DOI https://-doi.org/10.1080/20008198.2019.170062

Bartholomew, T., Gundel, B. & Katamreni, N. (2015). Dream best forgotten: The phenomenology of Karen refugees' pre-settlement stressors. The Counseling Psychologist, 43(8), 1114-1134.

Beiser, M.N., & Hou, F. (2006). Ethnic identity, resettlement stress, and depressive affect among Southeast Asian refugees in Canada. Social *Science and Medicine, 63*, 137–150.

Bemak, F., & Chung, R. C.-Y. (2017). Refugee trauma: Culturally responsive counseling interventions. *Journal of Counseling & Development, 95,* 299–308. doi:10.1002/jcad.12144

Bennet, A. (2005). Editorial: Popular Music and Leisure. *Journal of Leisure Studies, 24*(4), 333-342.

Blount, H. & Acquaye, H. (2018). Promoting Wellness in refugee populations. *Journal of Counseling & Development, 9*, 461-472.

Blount, A. J., & Lambie, G. W. (2018). Development and factor structure of the helping professional Wellness Discrepancy Scale (HPWDS). *Measurement and Evaluation in Counseling and Development, 51*, 92– 110. DOI:10.1080/07481756.2017.1358060 Crossref Web of Science®Google ScholarFind it @ UNI

Bond, M. (2021). Social psychologists grapple with the COVID-19 pandemic: How are we in Asia distinctive? *Journal of Social Psychology,* DOI: 10.1111/ajsp.1246
Brewer, M. B. (2007). When contact is not enough: Social identity and intergroup cooperation. *International Journal of Intercultural Relations*, 20(3), 291-303.Work, 51, 243–255.

Bricker, V. (1975). *Ritual humor in highland Chiapas.* Austin; London: University of Texas Press.

Brown, P. (2021, February 25). For Rohingya survivors, art bears witness. *New York Times.* https://www.nytimes.com/2021/03/19/arts/design/rohingya-survivors-art-bangladesh.html

Cable News Network (CNN). (2022,March 2). Retrieved 03/02/22 at https://www.cnn.com/2022/03/03/europe/ukraine-russia-invasion-thursday-intl-hnk/index.html

Cain, M., Istvandity, L. & Lakhani, A. (2019). Participatory music-making and well-being within immigrant cultural practice: exploratory case studies in South East Queensland, Australia. *Leisure Studies, 39* (1), 68-82, DOI: 10.1080/02614367.2019.1581248

Caldwell, L. L. (2005). Leisure and health: why is leisure therapeutic? *British Journal of Guidance & Counselling, 33*(1), 7-26.

Cherry, K. (2021, April 14). Happiness: *the psychology of flow.* Retrieved 4/17/2021 at https://www.verywellmind.com/what-is-flow-2794768#:~:text=Better%20emotional%20regulation%3A%20With%20increased,what%20they%20are%20doing%20more.

Clay, R. A. (2017). In search of hope and home. *Monitor on Psychology, 48*, 34– 40.

ClimbAid (2021, April 17). *https://climbaid.org*

Conscious Journeys. (2021, April 11). *Bhutanese- Paro Tshechu.* Retrieved on 4/17/2021 at https://www.consciousjourneys.com/en/works/paro-tshechu-2/

Cortis, N., Sawrikar, P., & Muir, K. (2007). *Participation in sport and recreation by culturally and linguistically diverse women.* Sydney, Australia: Social Policy Research Centre, University of New South Wales.

Cummins, R. A. (2016). Subjective wellbeing as a social indicator. *Social Indicators Research, 135*(3), 879–891.

Csikszentmihalyi, M. (1997). Finding flow: *The psychology of engagement with everyday life.* New York, NY: Basic Books.

DeLisle, L. (2009). Creating special events. Champaign: Illinois: Sagamore Publishing.

Dempsey, C. G., & Raj, S. J. (2010). *Sacred lay: ritual levity and humor in South Asian religions.* Albany: State University of New York Press.

De Martini Uglotti, N. (2019) (2021, April 14). The importance of leisure activities among refugees and forced migrants. https://www.bournemouth.ac.uk/research/bournemouth-research-chronicle/research-chronicle-2019/importance-leisure-activities-among-refugees-forced-migrants

Edginton, C. & Chin, P. (2014). Leisure as transformation (2nd ed.). Urbana, Ill: Sagamore.

Evisa Ethipia. (2021, April 11). *Ethiopian-Timkat.* Retrieved on 4/17/21 at https://www.ethiopiaonlinevisa.com/celebrating-timkat-festival/

European Journal of Psychotraumatology, 10(1), 1700621, DOI: 10.1080/20008198.2019.1700621

Faranza, K. (2017). *Memories of Burmese Rohingya refugees.* New York: Pallgrave, McMillan, 191-231.

Fiddian, Q, Loescher, K. & Sigona, N. (ed.) (2014). *The Oxford Handbook of Refugee and Forced Migration Studies*. Oxford: Oxford University Press.

Gallant, K., Aria, S., & Smale, B. (2013). Serious leisure as an avenue for nurturing community. *Leisure Sciences, 35,* 320-336.

Gezon, L. & Kottak, C. (2012). *Culture*. New York: McGraw Hill.

Gossen, G. (1975). Ritual Humor in Highland Chiapas. Victoria Reifler Bricker. *American Anthropologist, 77* (1), 122-123.

Guest, K. (2014). *Cultural anthropology: A toolkit for a global age*. New York: W.W. Norton & Company.

Gui, J., Gordon, J., & Harshaw, H. (2019). Meanings of xiū xián and leisure: a cross-cultural exploration of laypeople's definition of leisure. Leisure Sciences: *An Interdisciplinary Journal,* 1-19. DOI:https://doi.org/10.1080/01490400.2019.1571968

Haar, J., Wang, K.Venters, H., Salonen, S., Patal, R., Nelson, T., Mishori, R. & Parmar, P. (2019). Documentation of human rights abuses among Rohingya refugees from Myanmar. *Conflict and Health 13*(42).

Hassanli, N. Waters, T. & Friedmann, R. (2020). Can cultural festivals function as counter space for migrants and refugees? The case of the New Beginnings Festival in Sydney, *Leisure Studies, 39*(2), 165-180, DOI: 10.1080/02614367.2019.1666296

Hassanli, N., Walter, T. & Williamson, J. (2020). 'You feel you are not alone': how multicultural festivals foster social sustainability through multiple psychological sense of community, *Journal of Sustainable Tourism*, DOI: 10.1080/09669582.2020.1797756

Henderson, K. A. (2008). Expanding the meanings of leisure in both/and the world. *Loisir et Societe/Society and Leisure, 31*(1), 15–30.

Howe, C. Z., & Rancourt, A. M. (1990). The importance of definitions of selected concepts for leisure inquiry. *Leisure Sciences, 12*(4), 395–406.

Hurly, J. (2019). 'I feel something is still missing': leisure meanings of African refugee women in *Canada Leisure Studies, 38*(1), 1-14, DOI: 10.1080/02614367.2018.1515241

Iwasaki, Y., & Schneider, I.E. (2003). Leisure, stress, and coping: An evolving area of inquiry. *Leisure Sciences: An Interdisciplinary Journal, 25*(2/3), 107–113. (Special issue on Leisure, stress, and coping).

Iwasaki, Y., Nishino, H., Onda, T., & Bowling, C. (2007). Leisure research in a global world: Time to reverse the western domination in leisure research? *Leisure Sciences: An Interdisciplinary Journal, 29,* 113–117.

Iwasaki, Y. (2007). Leisure and quality of life in an international and multicultural context: What are major pathways linking leisure to quality of life? *Social Indicators Research, 82*(2), 233–264.

Junhyoung K., Kim, M., Karla A. Henderson, K., Areum Han & Se-Hyuk, P. (2016). Serious engagement in sport and health benefits among Korean immigrants in the USA. *International Journal of Qualitative Studies on Health and Well-being, 11*(1), 1-9, DOI: 10.3402/ qhw.v11.31340

Knappe, F., College, F. & Gerber, M. (2019). Impact of an 8-Week exercise and sport intervention on post-traumatic stress disorder symptoms, mental health, and physical fitness among male refugees living in a Greek refugee camp. *International Journal of Environmental Research and Public Health*, 1-17.

Krause, A., Dimmock, J., Rebar, A., & Jackson, B. (2020). Music listening predicted Improved life satisfaction in university students during the early stages of the COVID-19 pandemic. *Frontiers in Psychology, 11*(63), 1-9. DOI: https://doi.org/10.3389/fpsyg.2020.631033

Lamb, N. & Hoffstaeder, G. (2020). 'We walk, we laugh, we dance': refugee experiences of older Chin women in Kuala Lumpur. *Ageing & Society, 40,* 1021–1038, DOI:10.1017/S0144686X18001502

Lewis, H. (2015). Music, dancing, and clothing as belonging and freedom among people seeking asylum in the UK. *Leisure Studies, 34*(1), 42–58.

Liberman, Z., Kinzler, K., & Woodward, A. (2017). The early social significance of shared ritual actions. *Cognition, 171*, 42-51.

Ling, P. (2020). Interpretation of leisure sports in the pandemic situation of COVID 19. *World Leisure Journal, 62*(4), 319-321, DOI: 10.1080/16078055.2020.1828786.

Linn, S. (2020). Women refugees, leisure space, and the city. *Forced Migration Review, 63*, 36-38. ISSN 1460-9819.

MacDonald, R., Kreutz, G., & Mitchell, L. (2012). Music, health, and wellbeing. Oxford: Oxford University Press. MacDonald, R. A. R. (2013). Music, health, and well-being: A review. *International Journal of Qualitative Studies on Health and Well-Being, 8*(1), 206-235.

MacDonald, R. A. R. (2013). Music, health, and well-being: A review. *International Journal of Qualitative Studies on Health and Well-Being, 8*(1), 206-235.

Mackley-Crump, J., & Zemke, K. (2019). *The FAFSWAG Ball: Event spaces, counter-marginal narratives, and walking queer bodies into the centre*. In T. J. Walters & A. S. Jepson (Eds.), Marginalization and Events (pp. 95–109). Abingdon: Routledge.

Martin R. A., Ford T. (2018). *The psychology of humor: An integrative approach. Burlington*, MA: Elsevier Academic Press.

McConnell, E. A., Todd, N. R., Odahl-Ruan, C., & Shattell, M. (2016). Complicating counter spaces: Intersectionality and the Michigan women's music festival. *American Journal of Community Psychology, 57*(3–4), 473–488.

Minnesota Karen Organization (2021, April 12). https://www.mnkaren.org/history-culture/karen-culture/healthcare/

Myers, J., Luecht, R. & Sweeney, T. (2004). The factor structure of wellness: Reexamining theoretical and empirical models underlying the wellness evaluation of lifestyle (WEL) and the five-factor WEL. *Measurement and Evaluation in Counseling and Development, 36*, 194-208.

Myers, J. & Sweeney, T. (2004). The invisible self: An evidence-based model of wellness. *Journal of Individual Psychology, 60*, 234-244.

Miller, K. (2020). Retrieved 4/17/2021 at https://positivepsychology.com/theory-psychology-flow/

Moore, Karlin, Gaede, Walker, & Dotterweich, 2011; Heo, Lee, McCormick, & Pederson, 2010; Kim, Shinnar, R. S. (2008). Coping with negative social identity: The case of Mexican immigrants. *The Journal of Social Psychology, 148*(5), 553-576.

Mui, A.C., & Kang, S.Y. (2006). Acculturation stress and depression among Asian immigrant elders. *Social Work*, 51(3), 243–255, DOI: https://-doi.org/10.1093/sw/51.3.243

Musiqati (UNICEF). (2021, April 11). Retrieved 4/17/2021 at https://www.unicefusa.org/stories/new-music-therapy-program-helping-syrian-refugee-children-heal/34467

Ouwerkerk, L. (2020). *Bhutan's Paro Tshechu Festival: An expression of gross national happiness in the land of the thunder dragon*. Retrieved on 4/11/2021 at https://www.transitionsabroad.com/listings/travel/articles/bhutan-festival-travel-paro.shtml

Olliff, L. (2008). Playing for the future: the role of sport and recreation in supporting refugee young people to 'settle well' in Australia. *Youth Studies Australia, 27* (1), 52-60.

Peng, K., & Nisbett, R. E. (1999). Culture, dialectics, and reasoning about contradiction. *American Psychologist, 54*(9), 741–754.

Peng, K., Spencer-Rodgers, J., & Nian, Z. (2006). *Naïve dialecticism and the Tao of Chinese thought.* In U.
Kim, K.-S. Yang, & K.-K. Hwang (Eds.), Indigenous and cultural psychology: Understanding people in context (pp. 247–262). New York, NY: Springer.

Permezel, M., & Duffy, M. (2007). Negotiating the geographies of cultural differences in local communities: Two examples from suburban Melbourne. *Geographical Research, 45* (4), 358–375, DOI: https://-doi.org/10.1111/j.1745-5871. 2007.00475.x

Pintchman, Tracy. (2010) *Friendship, humor, levity, and love in a Hindu woman's ritual.* Selva Raj, J. Dempsey, G. Corrine. (eds.) In Sacred Play: Ritual Levity and Humor in South Asian Religions. New York Press: New York.

Quinn, N. (2014). Participatory action research with asylum seekers and refugees experiencing stigma and discrimination: The experience from Scotland. *Disability & Society, 29*, 58– 70.

Quirke, L. (2015). Searching for joy: The importance of leisure in newcomer settlement. *International Migration & Integration, 16*, 237–248.

Rishbeth, C., & Finney, N. (2006). Novelty and nostalgia in urban greenspace: Refugee perspectives. *Tyjdschrift voor Economische en Sociale Geografie, 97*(3), 281–295.

Rosenbaum, S.; Vancampfort, D.; Steel, Z.; Newby, J.; Ward, P.B.; Stubbs, B. Physical activity in the treatment of post-traumatic stress disorder: A systematic review and meta-analysis. *Psychiatry Res. 2015, 230,* 130–136.

Ryu, M. & Tuvilla, M. (2018). Resettled refugee youths' stories of migration, schooling, and future: challenging dominant narratives about refugees. *Urban Rev, 50*, 539–558. https://doi.org/10.1007/s11256-018-0455-z

Saarikallio, S. (2012). *Cross-cultural approaches to music and health.* In R. McDonald, G. Kreutz, & L. Mitchell (Eds.), Music, health, and wellbeing (pp. 478–490). Oxford: Oxford University Press.

Schweiter, R., Brough, M., Vromans, L. 7 Asic-Kobe, M. (2011). The mental health of newly arrived Burmese refugees in Australia: contributions of premigration and post-migration experiences. *Journal of Psychiatry, 54*, 299-307.

Scupin, R. (2006), Cultural anthropology: *A global perspective* (6th. Ed.). New Jersey: Pearson Prentice Hall.

Shahidi, S., Stewart, Williams, Hassani, F. (2020). Physical activity during COVID-19 *quarantine. Acta Paediatrica, 109*(10), 2147-2148, DOI: https://doi.org/10.1111/apa.15420

Shannon, P., Weiling, E., Simmelink-Mccleary, J., & Becher, E. (2015). Beyond stigma: Barriers to discussing mental health in refugee populations. *Journal of Loss and Trauma, 20*, 281-296.

Shaw, S. M. (1985). The meaning of leisure in everyday life. *Leisure Sciences, 7*(1), 1–24.

Sinn, E., & Wong, W. (2005). Place, identity, and immigrant communities: The organization of the Yulan Festival in post-war Hong Kong. *Asia Pacific Viewpoint, 46*(3), 295–306, DOI: https://doi.org/10.1111/-j.1467-8373.2005.00290.x

Snodgrass, J., Most, D. and Upadhyay, C. (2017). Religious ritual is good medicine for Indigenous Indian conservation refugees: Implications for global mental health. *Current Anthropology, 58*(2), 257-284.

Stack, J., Yoshitaka, I. (2009). The role of leisure pursuits in adaptation processes among Afghan refugees who have immigrated to Winnipeg, Canada. *Leisure Studies, 28*(3), 239-259, DOI: 10.1080/02614360902951658

Stebbins, R. A. (1982). Serious leisure: A conceptual statement. *Pacific Sociological Review, 25*(2), 251-272.

Stodolska, M., & Livengood, J. (2006). The influence of religion on the leisure behavior of immigrant Muslims in the United States. *Journal of Leisure Research, 38*, 293–320.

Stone, C. (2018). Utopian community football? Sport, hope, and belongingness in the lives of refugees and asylum seekers, *Leisure Studies, 37*(2), 171-183, DOI: 10.1080/02614367.2017.1329336

Suto, M. (2013). Leisure participation and well-being of immigrant women in Canada. *Journal of Occupational Science, 20*(1), 48–61.

Tuan, Y. F. (1998). *Escapism*. Baltimore, MD: Johns Hopkins University Press.

Tumaini Arts Festival (2021, April 11). Retrieved 4/17/2021 at https://www.kickstarter.com/projects/28211758/tumaini-festival-2019-at-dzaleka-refugee-camp

Tumaini Arts Festival (2021, April 11). Retrieved 4/17/2021 at https://www.ethiopiaonlinevisa.com/celebrating-timkat-festival/

United Nations High Commissioner for Refugees. (2021, February 11). *Resettlement in the United States.* Retrieved 4/17/2021 at https://www.unhcr.org/en-us/us-refugee-resettlement-facts.html

United Nations High Commissioner for Refugees. (2021, February 11). *UN Conventions on statelessness. Retrieved 4/17/2021 at* https://www.unhcr.org/ibelong/wp-content/uploads/1961-Convention-on-the-red https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx-?NewsID=23966&LangID=E

United Nations Human Rights Office of the High Commissioner (UNHCR). (2021, April 11). *Universal Declaration of Human Rights at 70: 30 Articles on 30 Articles - Article 24.* Retrieved 4/17/2021 at https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx-?NewsID=23966&LangID=E

United Nations Human Rights Office of the High Commissioner (UNHCR). (2021, April 11). *Sports partnerships.* Retrieved 4/17/2021 at https://www.unhcr.org/en-us/sport-partnerships.html

Veal, A. J. (2015). Human rights, leisure, and leisure studies. *World Leisure Journal, 57*(4), 249–272.

Vonnahme, A., Lankau, E., Ao, T., Shetty, S., Cardozo, B. (2015). Factors associated with symptoms of depression among Bhutanese refugees in the United States. *Journal of Immigrant Minority Health, 17*, 1705–1714, DOI: 10.1007/s10903-014-0120-x

Weinberg, M., & Joseph, D. (2016). If you're happy and you know it: Music engagement and subjective wellbeing. Psychology of *Music, 4*(2), 257–267.

Worchel, S. (2005). Culture's role in conflict and conflict management: Some suggestions, many questions. International Journal of *Intercultural Relations, 29*(6), 739-757.

World Health Organization (2021, February 11). *Traditional, complementary, and alternative health*. Retrieved 4/17/2021 at https://www.who.int/health-topics/traditional-complementary-and-integrative-medicine#tab=tab_

World Health Organization (2021, February 28) *General guidelines for methodologies on research and evaluation of traditional medicine.* Retrieved 4/17/2021 at https://apps.who.int/iris/bitstream/handle/10665/66783/WHO_EDMTRM_2000.1.pdf

World Health Organization (WHO). (2021, April 11). *Frequently asked questions.* Retrieved 4/17/2021 at https://www.who.int/about/who-we-are/-frequently-asked-questions

World Health Organization (WHO). (2021, April 11). *Refugee and migrant health.* Retrieved 4/17/2021 at https://www.who.int/health-topics/refugee-and-migrant-health#tab=tab_1

新暘印刷公司
SUNSHINE PRINTING COMPANY
九龍九龍灣宏開道業安工廠大廈第2座7字樓715室
Unit 715, Block 2, Yip On Factory Estate
Wang Hoi Road, kowloon Bay, Kowloon
Tel: 2757-8008, 9478-3538
Email: wu.sunshine8008@gmail.com

The Influence of Coaching Leadership Styles on the Coach-Athlete Relationship of Individual and Team Sports in Hong Kong

LEE Wing Kiu
Hong Kong Baptist University

Introduction

Coaches can either be the light of the direction towards success or be the guidance towards failure for the athletes. According to Jowett, Nicolas, and Yang (2017), the coach-athlete relationship is one of the key impacts of the athletes' performance, as well as the effectiveness and achievement of coaching (Jowett, 2017). In fact, the coaching leadership styles are the fundamental elements that influence the coach-athlete relationship (Jowett, Nicolas & Yang, 2017). Keatlholetswe and Malete (2019) mentioned in their research that there were six types of behaviors of the coaching leadership styles, which are training and instruction, autocratic behavior, democratic behavior, social support, positive feedback, and situation consideration.

Moreover, communication is important for sports coaching as it contributes to the quality of the coach-athlete relationship, the ambiance of practice, and athletic performance (Choi, Jeong & Kim, 2020). In line with Sagar and Jowett (2012), sports coaching is an instructional communication circumstance and an interpersonal context including interactions between coaches and athletes. Thus, coaching leadership styles affected the communication between coaches and athletes, which can influence the quality of their relationships. Those elements that affect athletic performance are interconnected and influence each other.

Among different sports aspects, Hong Kong athletes' performance is relatively inferior to other countries with a similar level of development, like Taiwan, Japan, and Korea. The quality of the coach-athlete relationship may be one of the significant factors that affect the performance of the athletes in Hong Kong, since the inappropriate coaching leadership styles may lead to the low quality of the coach-athlete relationship. So, the perception of coaches' leadership styles and the coach-athlete relationship in Hong Kong is going to be examined in order to identify the conjunction between the coaching behaviors and the coach-athlete relationship.

This research is aimed to understand the circumstances of the quality of the coach-and-athlete relationships in both individual and team sports in Hong Kong and investigate the influence of the coaching leadership styles on this relationship. The research was set with two purposes: (a) examining the situation of the relationship between coaches and athletes of both individual and team sports in Hong Kong, (b) investigating the association between perception of coaching leadership styles and the coach-athlete relationship. Hence, having a better understanding of how coaching behaviors influence the coach-athlete relationship, it would be easier to determine the way to heighten its quality, so as to assist Hong Kong athletes to enhance their athletic performance.

Review of Literature

Coach-Athlete Relationship:

In line with Foulds, Hoffmann, Hinck, and Carson (2019), when the coach-athlete relationship is close and positive, the athletes are more likely to perform better and achieve goals. Lafrenière, Jowett, Vallerand, and Carbonneau (2011) also mentioned that the mutual respect, trust, and communication of the coaches and athletes were the essential interpersonal elements that contribute to it. Besides, Davis, Jowett & Tafvelin (2019) referred that the

coach-athlete relationship's quality is fundamental with its association of the performance achievement and relationship satisfaction, team cohesion, collective efficacy, and motivation of the athletes. Moreover, Jowett and Ntoumanis (2004) indicated that the emotions, thoughts, and behaviors of coaches and athletes in the coach-athlete relationship were defined by closeness, commitment, and complementarity.

Athletic Performance:

A good-quality and positive coach-athlete relationship can enhance the performance of the athletes, as openness and honest relationship can heighten their communication, as well as raise the willingness of the athletes to tell coaches about their conditions, which allows coaches to deliver timely feedback (Foulds et al., 2019). Actually, athletic performance is separated into two types - physical performance and cognitive performance. Physical performance refers to the skills performed or strategies applied by athletes and as for cognitive performance, it is critical for athletic proficiency in the field of attention, working memory, and executive function (Davis et al., 2018).

Physical Performance:

Physical performance is negatively influenced by the low quality of the coach-athlete relationship - lack of closeness, commitment, and complementarity (Jowett, 2017), which may cause athletic burnout. Gustafsson, DeFreese, and Madigan (2017) referred that athletic burnout included physical exhaustion. Yet, the high-quality coach-athlete relationship could reduce athlete burnout such as exhaustion, performance errors, and decreased achievement (Davis et al., 2018).

Cognitive Performance:

According to Davis et al. (2018), the higher diathesis of the coach-athlete relationship provides athletes with a larger positive impact on cognitive performance. Batista et al. (2021) mentioned that athletes' cognitive performance could be influenced by mental fatigue since it can lead to a feeling of tiredness which is related to athletic burnout - emotional exhaustion (Davis et al., 2018).

Coaching Leadership Styles:

According to Keatlholetswe and Malete (2019), the coaches' leadership styles and coaching behaviors affect the efficiency and competency of coaching which affect the athletic performance. Besides, coaching leadership styles are the fundamental factor of the quality of team cohesion which may influence the success of a team and distinct leadership behavioral styles can demonstrate different degrees of team cohesion (Mohamed, Othman & Noordin, 2018). Yet, it depends on coaches' practical coaching behaviors and the conditions of the situation to influences the success of the coach-athlete relationship (Foulds et al., 2019).

Coaching Behaviors:

In line with the research examined by Keatlholetswe and Malete (2019), the coaching leadership behaviors contain six dimensions of coaching behaviors, including training and instruction, autocratic behavior, democratic behavior, social support, positive feedback, and situation consideration. Different coaching behaviors represented distinct coaching leadership styles, which may affect the quality of the coach-athlete relationship, as well as eventually the coaching efficiency and athlete's outcome.

Methods

Procedure: 156 coaches and 158 athletes from both individual sports and team sports in Hong Kong participated in the study and all of the participants completed a background information questionnaire. The participants include both the coaches and athletes who have individual and team sports experience at least 2 years.

Questionnaires: Data collection is via survey questionnaires and there are a total of 87 questions that were conducted to the participants. Those survey questionnaires are separated into 2 parts, one of the survey questionnaires is designed for the individual and team sports coaches and the other survey questionnaire is devised for the athletes that participate in individual and team sports. In the survey questionnaires, it contains four parts: (1) the consent form, (2) demographic data, sport type, years of participation, and other basic information of the coaches and athletes, (3) the Coach-Athlete Relationship Questionnaire (CART-Q) designed by Jowett and Ntoumanis (2004), (4) the Leadership Scale for Sports: Coaches' Scale and Athletes' Scale devised by Keatlholetswe and Malete (2019). Both the third and fourth parts of the survey questionnaire utilized the Likert scale.

Procedure: The questionnaire was distributed by internet due to the pandemic situation. Google form was utilized as the medium of the survey questionnaire. The google form was open to the public for one and a half month. The selection of the sample is by convenience sampling.

Statistical analysis: In this research study, SPSS Statistics are used to analyze the data collected from the survey questionnaires. Descriptive statistics, correlation statistics, and one-way ANOVA are used for the data analysis in this research study. Firstly, descriptive statistics are used to identify the difference in the coach-athlete relationship between individual sports and team sports, as well as the discrepancy in the perception of coaching leadership styles between individual sports and team sports. Furthermore, correlation statistics is used for identifying the conjunction between the perception of

coaching leadership styles and the coach-and-athlete relationship's quality in both individual and team sports. Lastly, one-way ANOVA is utilized to determine the quality of the coach-athlete relationship of coaches and athletes with different perceptions of coaching leadership styles in individual sports and that of the coaches and athletes in team sports. Thus, these three statistics can provide assistance for the data analysis in this research study.

Analysis of Data

Descriptive Statistics:

Table 1 showed the mean and standard deviation of the respondents from both individual and team sports of each question from the third part of the questionnaire - Coach-Athlete Relationship Questionnaire (CART-Q) designed by Jowett and Ntoumanis (2004). According to the scoring system designed by Jowett and Ntoumanis (2004), questions 3, 5, 8, and 9 are related to the type of coach-athlete relationship - closeness. As for questions 1, 2, and 6, they are representing the type - commitment, and questions 4, 7, 10, and 11 are related to the type - complementarity.

According to Table 1, comparing the average mean score of the questions of the coach-athlete relationship between the coaches and athletes from individual sports and team sports, the average the mean score of the respondents who are participating in or coaching individual sports is 5.75 for the whole CART-Q and that of the respondents who are participating in or coaching team sports is 5.60. The results showed that the coach-athlete relationship of the coaches and athletes of the individual sports was better than that of the coaches and athletes of the team sports in general, as well as the mean scores for all of the three types of relationship components - closeness, commitment, and complementarity of the individual sports were respectively higher than that of the team sports. However, Table 1 showed that the standard deviation of the answer of the coaches and athletes of individual sports was generally larger than that of the team sports, for example, the average standard deviation of the answer from individual sports was 1.25 and the average standard deviation of the answer from team sports was only 1.185, which meant that there were more extreme cases in the coaches and athletes of the individual sports.

Especially for the closeness and complementarity types of the relationship which represented the "closer" relationship between the coaches and athletes, the scoring results of the respondents from individual sports were higher than that of the respondents from team sports. As for closeness, the items such as "like", "trust", "respect" and "appreciate sacrifices" had an average mean score - 5.88 (see Table 1) were recorded from the respondents from individual sports, which is a high indicator of the closeness relationship. Yet, the average mean score of items representing closeness for the team sports was 5.79, which is only a moderately high indicator for closeness relationship. As a result, the individual sports respondents had a closer relationship with their coaches or athletes. As for complementarity, the average mean scores of the items "at ease", "responsive to effects", "ready to do the best" and "friendly stance" recorded from the respondents from individual sports was 5.86 (see Table 1), which is a high indicator for the complementarity relationship. But, the average mean score of the respondents from team sports was only 5.66, which was lower than those from individual sports. As a result, the coaches and athletes from individual sports have a more complementarity relationship with each other than the coaches and athletes from team sports. Therefore, there was a significant difference in the coach-and-athlete relationship between the respondents from individual sports and team sports, as well as the coaches and athletes had a "closer" and higher quality relationship than the respondents from team sports.

Table 1: Descriptive statistics of the variables of the coach-athlete relationship for individual sport and team sport

	Individual Sports			Team Sports		
Types	Average Mean	Average Std. Deviation	Mean Score Indicator	Average Mean	Average Std. Deviation	Mean Score Indicator
Closeness	5.8825	1.2255	High	5.7925	1.18375	Moderately High
Commitment	5.4333	1.3873	Moderately High	5.26	1.2073	Moderately High
Complementarity	5.865	1.192	High	5.6625	1.16525	Moderately High
All questions	5.754	1.257	Moderately High	5.60	1.1835	Moderately High

Mean Score Indicator: 1.00 - 2.20 (Low), 2.21 - 3.40 (Moderately Low), 3.41 - 4.60 (Moderate), 4.61 - 5.80 (Moderately High), 5.81 - 7.00 (High)

Table 2 below demonstrated the mean and standard deviation of the perception of coaching leadership styles of the respondents from both individual and team sports collected from the fourth part of the questionnaire - Revised Leadership Scale for Sports: Coaches' and Athletes' Scale designed by Mohamed, Othman, and Noordin (2018). In line with the scoring system examined by Mohamed, Othman, and Noordin (2018), items 1, 7, 13, 19, 25, 31, 37, 43, 49, 53, 57, and 59 are related to the democratic behavior of the coaching leadership styles. As for another style - positive feedback, items 2, 8, 14, 20, 26, 32, 38, 44, 50, 54, 58 and 60 are related to it. Besides,

items 3, 9, 15, 21, 27, 33, 39, 45, 51, and 55 are representing the coaching leadership style - Training and Instruction, as well as items 4, 10, 16, 22, 28, 34, 40, 46, 52 and 56, are related to the situation consideration style. As for the social support style, items 5, 11, 17, 23, 29, 35, 41, and 47 are related to it and 6, 12, 18, 24, 30, 36, 42, and 48 are representing autocratic behavior style. Since the scoring system was designed as a lower score means the action was conducted more frequently, the lower the score, the more the coaching leadership types existed in reality, which meant the more often the leadership style took place on the coaches in both individual and team sports.

In light of Table 2, it illustrated that there were three types of perceived coaching leadership styles most frequently adopted by the coaches from both individual sports and team sports which included positive feedback, training and instruction, and situation consideration. The average mean score for positive feedback style for individual sports' coaches was 2.38 and that of team sports' coaches was 2.14, which both of them were a moderately high indicator of this type of leadership style. Besides, the positive feedback style was the most frequently perceived coaching leadership style for the respondents from team sports. As for training and instructional style, the average mean score for individual sports coaches was 2.38 and that of team sports coaches was 2.17 and both of them were also a moderately high indicator for this coaching style. Yet, the training and instruction style was the most commonly perceived coaching leadership style for the respondents from individual sports. The third common style - situation consideration had an average mean score of 2.38 for the respondents of the individual sports and 2.18 for the respondents of team sports, which both of them were a moderately high indicator for this type of coaching leadership style. Moreover, according to Table 2, the most common leadership style for the individual sports' coaches was training and instruction, yet, the most frequently adopted coaching style was positive feedback for the team sports' coaches. Besides, the democratic behavior coaching leadership style was one of the moderately high indicators for the team sports' respondents, which had a 2.49 average mean score, but that of the individual sports respondents was 2.64 - a moderate indicator.

Apart from that, Table 2 demonstrated that the average standard deviation of the answer made by the respondents from team sports was smaller than that of the respondents from individual sports. The range of the average standard deviation of coaches and athletes of team sports was from 0.84 to 0.96, yet, the range of the average standard deviation of coaches and athletes of individual sports was from 1.00 to 1.15. As we can see from the result, there was a greater difference in the perceived coaching leadership styles between the coaches and athletes of the individual sports and had more extreme cases in the actual situation. However, the perceived coaching leadership styles for the coaches and athletes from team sports were more concentrated in the real circumstances. Therefore, there was a significant difference in the perceived coaching leadership styles between the coaches and athletes from individual and team sports in Hong Kong.

Table 2: Descriptive statistics of the variables of the perception of coaching leadership styles for individual and team sports

	Individual Sports			Team Sports		
Types	Average Mean	Average Std. Deviation	Indicator	Average Mean	Average Std. Deviation	Indicator
Democratic Behaviour	2.64	1.050	Moderate	2.49	0.903	Moderately High
Positive Feedback	2.38	1.042	Moderately High	2.14	0.865	Moderately High
Training and Instruction	2.37	1.000	Moderately High	2.17	0.842	Moderately High
Situation Consideration	2.38	1.025	Moderately High	2.18	0.844	Moderately High
Social Support	2.79	1.154	Moderate	2.61	0.964	Moderate
Autocratic Behaviour	3.06	1.023	Moderate	3.03	0.926	Moderate

Mean Score Indicator: 1.00 - 1.80 (High), 1.81 - 2.60 (Moderately High), 2.61 - 3.40 (Moderate), 3.41 - 4.20 (Moderately Low), 4.21 - 5.00 (Low)

Correlation Statistics:

Referring to Table 3, Pearson Correlation was employed to examine the quality of the coach-and-athlete relationship and the perception of coaching leadership styles. The results of the democratic behavior style were found to be p=0,001, p=0.035 for the positive feedback style, p=0.033 for the training and instruction style, p=0,016 for the situation consideration style, and p=0.043 for the social support style, which all of the p value for these five coaching leadership styles were smaller than 0.05. Thereby, the quality of the coach-and-athlete relationship was investigated to be correlated with these five perceived coaching leadership styles in both individual and team sports. However, as for the autocratic behavior style, the result was found to be p=0.245 which the p value was greater than 0.05. Thus, there was no correlation between the autocratic behavior coaching style and the

quality of the coach-and-athlete relationship for both individual sports and team sports in Hong Kong.

Furthermore, Table 3 revealed that the Pearson Correlation of the overall coach-athlete relationship for both individual and team sports and the six types of the perceived coaching leadership styles ranged from -0.031 to -0.245, which showed that there was a negative relationship between the quality of the coach-athlete relationship and the perception of the coaching leadership styles. However, the scoring system of the two questionnaires - CART-Q (Jowett and Ntoumanis, 2004) and Revised Leadership Scale for Sports: Coaches' and Athletes' Scale (Mohamed, Othman, and Noordin, 2018) were different from each other. For instance, the Likert scale for the CART-Q scored from 1 to 7, which 1 equals to strongly disagree and 7 means strongly agree. Yet, the Likert scale for the Revised Leadership Scale for Sports: Coaches' and Athletes' Scale scored from 1 to 5, which 1 represents the behavior always happened and 5 indicates the action never occurred. Hence, the meaning of the scores was reversed. Hence, the negative correlation between the quality of the coach-athlete relationship and the perceived coaching leadership styles demonstrated in Table 3 should also be inverted. Therefore, there was a positive correlation between the overall coach-athlete relationship and the perception of the coaching leadership styles. Nevertheless, the Pearson correlation coefficient of the five leadership styles - democratic behavior, positive feedback, training and instruction, situation consideration, and social support ranged from -0.20 to -0.29 (see Table 3), which were a low degree of correction between the coach-and-athlete relationship and these five coaching leadership styles. Therefore, the connection between the quality of the relationship between coaches and athletes for both individual and team sports in Hong Kong and the five perceived coaching leadership styles were examined only with small correlations.

Table 3: Correlation of the overall Coach-Athlete Relationship and the Perceived Coaching Leadership Styles

Coach-Athlete Relationship		
Perceived Coaching Leadership Styles	Pearson Correlation	Sig. (2-tailed)
Democratic Behaviour	-0.291	0.001
Positive Feedback	-0.205	0.035
Training and Instruction	-0.233	0.033
Situation Consideration	-0.225	0.016
Social Support	-0.245	0.043
Autocratic Behaviour	-0.031	0.245

One-way ANOVA:

In light of Table 4, it illustrated the mean and standard deviation of different types of perceived coaching leadership styles on the scores of the coach-and-athlete relationship for the respondents from individual sports, as well as the discrepancy in the coach-and-athlete relationship between these six types of styles. According to Table 4, the mean score of the quality of the relationship for democratic behavior style was 5.78, mean score for positive feedback style was 6.02, training and instruction style was 5.52, situation consideration style was 6.31, social support was 5.60, and autocratic behavior style was only 3.95. There was a huge difference between the autocratic behavior style and other coaching styles.

Furthermore, in order to determine if there is any significant difference in the quality of the coach-and-athlete relationship of the respondent from individual sports with distinct perceived coaching leadership styles, One-way ANOVA was applied to investigate. The result was found to be p=0.004, which the p value was smaller than 0.005. Thereby, there was a significant difference in the quality of the coach-and-athlete relationship between distinct types of coaching leadership styles within the coaches and athletes who coached or participated in individual sports in Hong Kong.

Table 4: One-Way Anova of the quality of the coach-and-athlete relationship of coaches and athlete with different perceived coaching leadership styles in individual sports

Coach-and-Athlete Relationship				Anova			
Types of Coaching Leadership Styles	N	Mean	Std.Deviation	df1	df2	F	Sig.
Democratic Behaviour	9	5.787	0.644	5	95	12.080	0.004
Positive Feedback	34	6.024	0.421				
Training and Instruction	24	5.527	0.883				
Situation Consideration	20	6.318	0.677				
Social Support	6	5.606	0.873				
Autocratic Behaviour	8	3.955	1.567				

Referring to Table 5 showed the mean and standard deviation of distinct types of perceived coaching leadership styles on the scores of the coach-and-athlete relationship for the respondents from team sports, as well as the difference in the coach-and-athlete relationship between these six coaching leadership styles. As observed, the difference in the scores of the coach-and-athlete relationship was not huge and they were highly concentrated in around 5 points.

In addition, One-way ANOVA analysis was employed to examine the discrepancy of the quality of the coach-and-athlete relationship of the coaches and athletes from team sports with different perceived coaching leadership styles. The results showed that p=0.160, the p value was greater than 0.05 and the hypothesis should be rejected. Therefore, there was no significant difference in the quality of the coach-and-athlete relationship between different types of coaching leadership styles within the team sports' coaches and athletes in Hong Kong.

Table 5: One-Way Anova of the quality of the coach-and-athlete relationship of coaches and athlete with different perceived coaching leadership styles in team sports

Coach-and-Athlete Relationship				Anova			
Types of Coaching Leadership Styles	N	Mean	Std.Deviation	df1	df2	F	Sig.
Democratic Behaviour	21	5.411	0.945	5	207	1.606	0.160
Positive Feedback	68	5.739	1.022				
Training and Instruction	59	5.707	0.807				
Situation Consideration	56	5.378	1.020				
Social Support	4	6.159	0.977				
Autocratic Behaviour	5	5.255	0.976				

Discussions

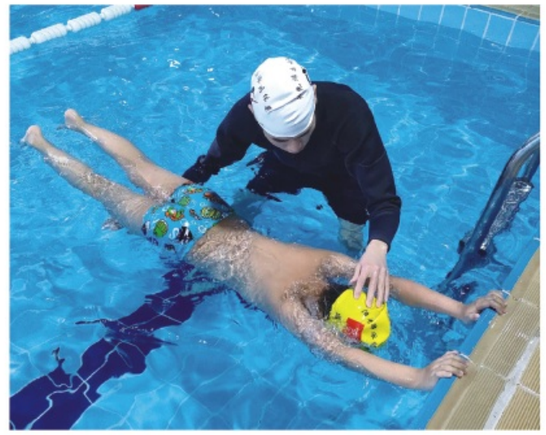
The findings of this study disentombed the quality of the coach-and-athlete relationship and compared the relationship of the respondents from individual and team sports, as well as uncovered the perception of the coaches and the athletes on their own or their coaches' coaching leadership styles. Besides, the data analysis of this research unearthed correlations between coach-and-athlete relationships and the perceived coaching leadership styles in the respondents from individual and team sports. Apart from that, the findings also uncovered the difference in the quality of the coach-and-athlete relationship with distinct coaching leadership styles within the respondents from both individual and team sports. A further discussion is as follows:

To begin with, according to the result found in this study, the quality of the coach-and-athlete relationship of the respondents from individual sports was found to be better and had a closer relationship than that of the respondents from team sports. Jowett, Nicolas, and Yang (2017) mentioned that the coach-athlete relationship represented a social situation in which the coaches and coaches are interdependently influenced by closeness, commitment, and complementarity. Closeness is the affective bond experienced by the coaches and athletes, commitment is the intention of the coaches and athletes to preserve or retain this close bond over time, as well as complimentary, is the interaction types which associate co-operation between coaches and athletes. Since the training is more individualized and the ratio of the time of interaction of the coaches and athletes was much more for the individual sports, the common experiences would be more and able to establish higher affective bonding than team sports over time. Besides, individualized training created opportunities for the coaches and athletes to interact and more cooperation is needed between coaches and coaches in individual sports. According to the research

conducted by Kim and Park (2020), effective communication between coaches and athletes is a significant element for developing a successful and high-quality coach-athlete relationship. Thus, when the interaction and cooperation time was more, the necessity of communication and the amount of the athletes and coaches from individual sports to communicate was higher and more than that of the team sports, as well as the effectiveness of their communication could be heightened, which having more communication opportunities could lead to a better and closer relationship between the coaches and athletes of the individual sports. Thereby, individual sports respondents had a closer relationship than that of the coaches and athletes from team sports.

Furthermore, referring to the research conducted by Jowett, Nicolas, and Yang (2017), if the athletes have a good relationship with their coaches, it would emerge to generate the athletes some positive and well-pleasing rewards which could facilitate effective coaching. Moreover, Jowett, Kanakoglou, and Passmore (2012) mentioned that a high-quality relationship can offer coaches more opportunities to identify and admire the demands and weaknesses of the athletes. As a result, the coach-athlete relationship would get into a positive and effective cycle and get better and better, as well as having more efficient and successful coaching and performance outcomes. It might be the reason why some individual sports athletes were able to stand their ground in the international tournament and gain great results. For example, cycling, swimming, track and field, fencing, windsurfing and etc. Therefore, having a good-quality coach-athlete relationship is essential for the success of coaching and the achievement of good performance, as well as the individual sports athletes, could have a higher achievement on performance in the international competition when they had a better quality of the coach-athlete relationship than the coaches and athletes in team sports.

Apart from the coach-athlete relationship, this study also investigated the situation of the perceived coaching leadership styles of the respondents from both individual and team sports in Hong Kong. In line with the results of this research, there were three general coaching leadership styles for both the individual and team sports that were found based on the behavior that coaches conducted during the training, competition, and daily life, which were positive feedback, training and instruction, and situation consideration. Mohamed, Othman, and Noordin (2018) mentioned that leadership is an individual process that affects a group of people to accomplish some common goals, which indicated that the coaching leadership styles are significant factors that influence the coaching outcomes. The leadership styles that were mostly used for the coaches from individual sports were training and instruction. In the light of Light and Harvey (2019), in the process of coaching individual sports, it involved direct instruction and designing individual training programs as most of the individual sports coaches applied



athlete-centered coaching, which comprised the dialogue, reflection, and collaboration so as to improve coach-athlete relation for enhancing the performance of the athletes. Since most individual sports are highly involved in personal skills development and the training should be individualized, the athletes require a lot of detailed instruction for different skills. Thus, the perception of the athletes on the coaching leadership styles would be focused on the sports skills and technique development. For example, offering individual training for skills of the sports, recognizing the strengths and weaknesses of the individual athletes, as well as paying attention and providing instruction to rectify the mistakes (Mohamed, Othman & Noordin, 2018). Thereby, the training and instruction coaching leadership styles were employed by the coaches from individual sports generally, so as to enhance the performance of the athletes from individual sports.

Additionally, the leadership style mostly applied for coaches from team sports was positive feedback, in which the coaches showed the appreciation of the athlete's good performance and praised it in front of others (Mohamed, Othman, and Noordin, 2018). Although the individual performance of the athletes is significant for playing team sports, the cooperation and cohesion between the athletes are also fundamental for playing team sports. In line with the experience of the authors of the book - "Positive Pedagogy for Sport Coaching", Light and Harvey (2019) mentioned that adopting positive pedagogy in team sports via applying inquiry-based learning, instead of punishing the athletes, encouraging them to be curious and try new things were recommended and coaches should teach the athletes about learning to learn, as well as positioning themselves as a co-learner with the players so as to assist the athlete to gain a genuine sense of enjoyment of training, so as to establish a positive learning environment and experience and turning the athletes to become energized and motivated to training. Thus, when coaches are able to offer positive feedback to the team sports athletes, it can establish a more positive atmosphere for the team and contributes to the development of team cohesion. Therefore,

positive feedback was commonly employed by coaches from team sports in order to build a good relationship and a better atmosphere within the team.

As for the correlation between the quality of the coach-athlete relationship and the perceived coaching leadership styles, referring to the results, there was a low correlation between the relationship and the five leadership styles in Hong Kong coaches and athletes - democratic behavior, positive feedback, training and instruction, situation consideration, and social support. There was no relationship between the coach-athlete relationship and the autocratic behavior coaching styles. Although the correlation for the relationship and coaching styles was low for the coaches and athletes from both individual and team sports, according to Jowett (2017), the leadership of coaches is not only a behavioral process, it is also an interpersonal influencer of the interpersonal variables which related to the relationship between coaches and athletes, and coaching behaviors are good predictors of the athletes' performance and coaching consequences. The differences in the utilization of distinct coaching leadership styles still influence the quality of the coach-athlete relationship in Hong Kong as the coaching behaviors affected the nature of the message delivered and the communication with the athletes (Sagar & Jowett, 2012), as well as bring an impact on the coaching efficiency (Keatlholetswe & Malete, 2019) and influence the sports achievement of the athletes (Nicolas, Gaudreau & Franche, 2011). Jowett, Nicolas, and Yang (2017) also pointed out that the coach-and-athlete relationship and coaching leadership are associated with each other. The perceived coaching leadership styles were still an important factor for the establishment of the high-quality coach-and-athlete relationship and influencing the effectiveness and efficiency of coaching.

Moreover, positive relationships were found between the coach-and-athlete relationship and each of the five coaching leadership styles - democratic behavior, positive feedback, training and instruction, situation consideration, and social support. According to the research conducted by Lisinskiene (2018), the result illustrated that the educational program on coaching behaviors had a positive effect on strengthening the coach-athlete interpersonal relationship in sports, which indicated that the more the coaches perform the actions related to that particular coaching leadership style, the better the quality of the relationship between themselves and the athletes could be. Taking the democratic behavior style as an example, if the coach always puts the recommendations made by the team members into operation and encourages more the athletes to make suggestions for ways to conduct training (Mohamed, Othman & Noordin, 2018), the relationship between the coach and athletes could be improved. So, the relationship between coaches and athletes could be closer, more committed, and have higher complementarity. Besides, enhancing the positive coaching behaviors such as giving more positive feedback and letting athletes voice out their opinions while reducing the negative coaching behaviors such as controlling the action of the athlete and forcing the athletes to conduct something they do not want to do were able to facilitate the relationship and the coaching efficiency (Jowett, Nicolas & Yang, 2017).

As for the autocratic behavior coaching styles, referring to the result, there was no correlation between the coach-athlete relationship and the autocratic behavior coaching style and had more extreme cases, for instance, some respondents could establish a good coach-athlete relationship with the autocratic behaviors from coaches, while some of the respondents could not. According to the research conducted by Castillo et al. (2014), the study demonstrated that autocratic behaviors coaching styles were preferred by the novice dancers as they believed this coaching style could facilitate their intrinsic motivation and improve personal dance performance, which the result was opposite as the result found by Jiménez et al. (2019). We can notice that each individual athlete could have their own preferred perceived coaching leadership styles and if the coaches can apply the preferred styles, a good-quality coach-athlete relationship could be established. Thus, Jiménez et al. (2019) suggested that it is necessary for coaches to identify a coaching leadership style that suits their athletes themselves and apply the right coaching leadership styles to enhance the coach-athlete relationship and the efficiency of the coaching. Therefore, the usage of different coaching styles should depend on the real situation and the athletes themselves, the most important point is the relationship and coaching styles should be athlete-centered (Light & Harvey, 2019).

As for the discrepancy of the quality of the coach-and-athlete relationship with distinct perceived coaching leadership styles of the coaches and athletes from both individual and team sports, there was a significant difference in the quality of the coach-athlete relationship for the individual sports respondents with distinct perceived styles of coaching leadership, yet, the significant difference was not found in the team sports respondents with different perceived coaching behavior. There are plenty of factors that can affect the individual perception of the coaching styles and the coach-athlete relationship, the time that is spent on the relationship is one of the reasons. Sagar and Jowett (2012) referred in their study that the quality of the coach-athlete relationship can influence and be influenced by the situational circumstances of the coaches and athletes themselves at any particular moment. Since there is relatively more time for the coaches and athletes from individual sports to communicate and get along with each other than the team sports' coaches and athletes and the training of individual sports are more personalized coaches have to closely monitor the process of the athletes, as well as communicate with the athletes about their own condition, the difference in coaching leadership styles could have more influence on the communication between coaches and athletes and their relationship in individual sports. Because the perceived

coaching leadership styles can affect the behaviors of coaches when communicating with the athlete (Choi, Jeong & Kim, 2020) and there is a latent cyclical relationship between communication and the quality of coach-athlete relationship across time (Davis, Jowett & Tafvelin, 2019). Especially, if there were some negative behaviors conducted by the coaches of individual sports, the effect of those negative behaviors would directly affect the athletes' perception towards coaches and immediately influence the coach-and-athlete relationship. Hence, there was a significant difference in the quality of the coach-athlete relationship with different perceived coaching leadership styles in individual sports.

Additionally, team sports athletes spend most of their time with their teammates and have relatively fewer individual conversations with coaches than individual sports athletes, as most of the briefing conducted by team sports coaches is towards the whole team. In the light of the study done by Marcos, Miguel, Oliva, and Calvo (2010), the coaches who communicate high efficacy principles to the athletes in their sports teams, the team would turn into more efficacious and the team performance would be enhanced subsequently. However, having relatively less interaction between the coaches and athletes and less time to communicate with each other for the team sports, which could not transmit high efficacy principles in their communication, caused the team sports respondents to be less sensitive to the discrepancy of the coaching leadership styles and have less influence on the relationship between them. Besides, Ahmad, Ada, Jowett, Alabduljader, and Kazak (2021) mentioned in their research that in order to establish a good-quality coach-athlete relationship for enhancing athletes' performance accomplishment and understanding for coaching behaviors, coaches needed to deliberately create situations to offer opportunities to connect with their athletes. Yet, the athletes from team sports have relatively less chance to report their own conditions to their coaches and the coaches have insufficient time to have a deep conversation with every single athlete in every training, the coaches and athletes have fewer opportunities to establish a very close relationship or understand the coaching styles of the coaches. Therefore, there was no significant difference in the coach-and-athlete relationship when the coaches were adopting distinct perceived coaching leadership styles in team sports.

Conclusions

In conclusion, this study is to examine the influence of the perceived coaching leadership styles on the coach-and-athlete relationship in both individual sports and team sports. Since the coach-and-athlete relationships can influence the athletic performance on both physical and cognitive performance of the athletes, motivation of the athletes, the communication between coaches and athletes, team cohesion and etc, it is necessary to identify the real situation of the coach-athlete relationship in Hong Kong. The research has investigated that a close, committed and complementary coach-athlete relationship could be associated with the different perceived coaching leadership styles, especially for democratic behaviour, positive feedback, training and instruction, situation consideration, and social support coaching styles. Thus, the coaches from both individual and team sports in Hong Kong should employ a proper coaching leadership style to coach their athletes so as to establish a good-quality coach-athlete relationship with their coachees. So that, the coaching effectiveness and efficiency can be enhanced through a better relationship, as well as having good coaching outcomes. Therefore, the athletic performance for both physical and cognitive performance is able to be heightened and assist the athletes to achieve great success in Hong Kong or on the stance of the international competition, as well as improving the whole sports level of the Hong Kong athletes. RMA

References

Ahmad, H., Ada, E. N., Jowett, S., Alabduljader, K., & Kazak, Z. (2021). The validation of direct and meta versions of the coach–athlete relationship questionnaire (arcart-q) in the arabic language: Their relationship to athlete's satisfaction with individual performance. *International Journal of Environmental Research and Public Health, 18*(4), 1998. doi:10.3390/ijerph18041998

Batista, M. M., Paludo, A. C., da Silva, M. P., Martins, M. V., Pauli, P. H., Dal'maz, G., Stefanello, J. M., & Tartaruga, M. P. (2021). Effect of mental fatigue on performance, perceptual and physiological responses in orienteering athletes. *The Journal of Sports Medicine and Physical Fitness.* 2021 Feb 15. doi: 10.23736/S0022-4707.21.11334-9.

Castillo, D. B., Balibay, M. A. V., Alarcon, J. M., Picar, J. M., Lampitoc, R. R., Baylon, M. C., & Espinosa, A.A. (2014). Autocratic and participative coaching styles and its effects on students' dance performance. *International Journal of Learning, Teaching and Educational Research, 3*(1), 32-44. Retrieved from https://www.semanticscholar.org/paper/Autocratic-and-Participative-Coaching-Styles-and-on-Castillo-Espinosa/5e673fc515028364ca1d0b92856603029aa96688

Choi, H., Jeong, Y., & Kim, S. K. (2020). The relationship between coaching behavior and athlete burnout: Mediating effects of communication and the coach-athlete relationship. *International Journal of Environmental Research and Public Health, 17*(22), 8618. doi:http://dx.doi.org.lib-ezproxy.hkbu.edu.hk/10.3390/ijerph17228618

Davis, L., Appleby, R., Davis, P., Wetherell, M., & Gustafsson, H. (2018). The role of coach-athlete relationship quality in team sport athletes' psychophysiological exhaustion: implications for physical and cognitive performance. *Journal of Sports Sciences,* 36:17, 1985-1992, doi: 10.1080/02640414.2018.1429176

Davis, L., Jowett, S., & Tafvelin, S. (2019) Communication strategies: The fuel for quality coach-athlete relationships and athlete satisfaction. *Front. Psychol.,* 10:2156. doi: 10.3389/fpsyg.2019.02156

Foulds, S. J., Hoffmann, S. M., Hinck, K., & Carson, F. (2019). The coach-athlete relationship in strength and conditioning: High performance athletes' perceptions. *Sports, 7*(12), 244. Retrieved from https://doi.org/10.3390/sports7120244

Gustafsson, H., DeFreese, J., & Madigan, D. J. (2017). Athlete burnout: Review and recommendations. Current Opinion in *Psychology, 16,* 109-113. doi:10.1016/j.copsyc.2017.05.002

Hampson, R., & Jowett, S. (2012). Effects of coach leadership and coach-athlete relationship on collective efficacy. *Scandinavian Journal of Medicine & Science in Sports, 24*(2), 454-460. doi:10.1111/j.1600-0838.2012.01527.x

Jiménez, M., Fernández-Navas, M., Alvero-Cruz, J. R., García-Romero, J., García-Coll, V., Rivilla, I., & Clemente-Suárez, V. J. (2019). Differences in psychoneuroendocrine stress responses of high-level swimmers depending on autocratic and democratic coaching style. *International Journal of Environmental Research and Public Health, 16*(24), 5089. doi:10.3390/ijerph16245089

Jowett, S. (2017). Coaching effectiveness: the coach-athlete relationship at its heart. *Current Opinion in Psychology, 16,* 154–158. doi:10.1016/j.copsyc.2017.05.006 Jowett, S., Kanakoglou, K., & Passmore, J. (2012). The application of the 3+1csrelationship model in executive coaching. Consulting Psychology Journal: Practice and Research, 64(3), 183-197. doi:10.1037/a0030316

Jowett, S., & Nezlek, J. (2011). Relationship interdependence and satisfaction with important outcomes in coach-athlete dyads. *Journal of Social and Personal Relationships, 29*(3), 287-301. doi:10.1177/0265407511420980

Jowett, S., Nicolas, M., & Yang, S. (2017). Unravelling the links between coach behaviours and coach-athlete relationships. *European Journal of Sports & Exercise Science, 5* (3):10-19. Retrieved from https://www.researchgate.net/publication/323367362_Unravelling_the_Links_between_Coach_Behaviours_and_Coach-Athlete_Relationships

Jowett, S., & Ntoumanis, N. (2004). The coach-athlete relationship questionnaire (cart-q): development and initial validation. *Scandinavian Journal of Medicine & Science In Sports, 14,* 245-257. doi:10.1046/j.1600-0838.2003.00338.x

Keatlholetswe, L., & Malete, L. (2019). Coaching efficacy, player perceptions of coaches' leadership styles, and team performance in premier league soccer. *Research Quarterly for Exercise and Sport, 90*(1), 71-79. doi: 10.1080/02701367.2018.1563277

Kim, Y., & Park, I. (2020). "Coach really knew what i needed and understood me well as a person": Effective communication acts in coach–athlete interactions among korean olympic archers. *International Journal of Environmental Research and Public Health, 17*(9), 3101. doi:10.3390/ijerph17093101

Lisinskiene, A. (2018). The effect of a 6-month coach educational program on strengthening coach-athlete interpersonal relationships in individual youth sport. *Sports, 6*(3), 74. doi:10.3390/sports6030074

Light, R., & Harvey, S. (2019). *Positive Pedagogy for Sport Coaching* [PDF version]. Retrieved from https://www-taylorfrancis-com.lib-ezproxy.hkbu.edu.hk/books/edit/10.4324/9780429266300/positive-pedagogy-sport-coaching-richard-light-stephen-harvey

Lafrenière, M. K., Jowett, S., Vallerand, R. J., & Carbonneau, N. (2011). Passion for coaching and the quality of the coach–athlete relationship: The mediating role of coaching behaviors. *Psychology of Sport and Exercise, 12*(2), 144-152. doi:10.1016/j.psychsport.2010.08.002

Marcos, F. M., Miguel, P. A., Oliva, D. S., & Calvo, T. G. (2010). Interactive effects of team cohesion on perceived efficacy in semi-professional sport. *Journal of sports science & medicine, 9*(2), 320–325. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3761725/

Mohamed, M., Othman, M. N., & Noordin, N. M. (2018). Perceived leadership styles and its relationship with team cohesion: Coaching preference by university athletes. *Journal of Economic & Management Perspectives,12*(1),610-615.Retrieved from https://login.lib-ezproxy.hbu.edu.hk/login?qurl=https%3A%2F%2Fwww.proquest.com%2Fscholarly-journals%2Fperceived-leadership-styles-relationship-with%2Fdocview%2F2266300747%2Fse-2%3Faccountid%3D11440

Mageau, G. A., & Vallerand, R. J. (2003). The coach-athlete relationship: a motivational model. *Journal of Sports Science,* 21:11, 883-904. doi: 10.1080/0264041031000140374

Nicolas, M., Gaudreau, P., & Franche, V. (2011). Perception of coaching behaviors, coping, and achievement in a sport competition. Journal of Sport and *Exercise Psychology, 33*(3), 460-468. doi:10.1123/jsep.33.3.460

Olympiou, A., Jowett, S., & Duda, J. L. (2008). The psychological interface between the coach-created motivational climate and the coach-athlete relationship in team sports. *The Sport Psychologist, 22*(4), 423-438. doi:10.1123/tsp.22.4.423

Rhind, D. J. A., & Jowett, S. (2010). Relationship maintenance strategies in the coach-athlete relationship: The development of the compass model. *Journal of Applied Sport Psychology, 22*(1), 106-121. doi:10.1080/10413200903474472

Rhind, D. J. A., & Jowett, S. (2012). Development of the coach-athlete relationship maintenance questionnaire (carm-q). *International Journal of Sports Science & Coaching, 7*(1), 121-137. doi:10.1260/1747-9541.7.1.121

Sagar, S. S., & Jowett, S. (2012). Communicative acts in coach-athlete interactions: When losing competitions and when making mistakes in training. *Western Journal of Communication, 76*(2), 148-174. doi:10.1080/10570314.2011.651256

Thelwell, R. C., Wagstaff, C. R. D., Chapman, M. T., & Kenttä, G. (2017). Examining coaches' perceptions of how their stress influences the coach-athlete relationship. Journal of *Sports Sciences, 35*(19), 1928-1939. doi: 10.1080/02640414.2016.1241422

Yang, S., & Jowett, S. (2012). Psychometric properties of the coach-athlete relationship questionnaire (cart-q) in seven countries. *Psychology of Sport and Exercise, 13*(1), 36-43. doi:10.1016/j.psychsport.2011.07.010

慈雲山中心（黃大仙）
Tze Wan Shan Shopping Centre (Wong Tai Sin)

香港加拿大國際學校（香港仔）
Canadian International School of Hong Kong (Aberdeen)

"遊玩就是小孩的工作"
– 瑪利亞·蒙特梭利

"Play is the work of the child"
- Maria Montessori

啟德大道公園（九龍城）
Kai Tak Avenue Park (kowloon City)

香港海洋公園萬豪酒店（黃竹坑）
Hong Kong Ocean Park Marriott Hotel (Wong Chuk Hang)

專供世界
頂級運動及康樂設備
The Professionals in Sports, Recreational & Landscaping Facilities

沙田馬場（沙田）
Sha Tin Racecourse (Sha Tin)

帝選豪庭（港島西半山）
Wellesley (West Mid-levels)

柏溢名基康體設備有限公司
Parks Supplies Company Limited
established in 1982

地址：香港上環皇后大道中208號勝基中心11樓A室
Room A, 11th Floor, Winbase Centre, 208 Queen's Road Central, Sheung Wan, Hong Kong

Tel: +852 2390 6833 **Fax:** +852 2390 6866
Email: hq@parks.com.hk **www.parks-supplies.com**