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MAJLIS SUKAN NEGARA MALAYSIA

COACHING JOURNAL

AKADEMI KEJURULATIHAN KEBANGSAAN

2013

A COACH

DEVOTION

ADVANCING KNOWLEDGE

ACHIEVEMENTS

DEDICATED

REALISING DREAMS

PASSIONATE

COMMITED

KE ARAH KECEMERLANGAN SUKAN
Towards Excellence in Sports

SUCCESS

PROGRAMMES FOR COACHES FROM JULY – NOV 2013

KE ARAH KECEMERLANGAN SUKAN
Towards Excellence in Sports

1,2&3. World Cycling Centre (WCC) Cycling Internship in Aigle, Switzerland (3 months) attended by Coach Harnizam Basri

4&5. World Archery Centre Coaching Course Level 2 in Bangkok, Thailand attended by Coach Zainuddin b. Talip & Mohd. Noor Affizan.

6. Wushu International Coaching Course (Taolu Level 3) in Chendu, China attended by Coach Tan Ching Fung & Lim Yew Fai

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MAJLIS SUKAN NEGARA MALAYSIA

COACHING JOURNAL

AKADEMI KEJURULATIHAN KEBANGSAAN

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Message from Editorial Advisor

"The development of the game is so fast these days that the coach who says it can't be done is generally interrupted by someone doing it". Coaches tend to be lifelong learners, who approach almost everything with an open mind. They are continually looking for an edge that can help improve their athletes or themselves. Many are voracious readers with a wide variety of interests , but their reading tends to be dominated by scientific literature and popular leadership resources.

We should possess a strong bias in how to develop coaches and be a true believer in coaches' education . Coaches should learn skills and information that would make them a better coach and improve in the same way. However, I would like to see a repository for coaching knowledge that is easily accessible , for example, research that can be used and understood by coaches should be widely distributed. Coaches don't have lot have time, so lets help them. Articles based on Sports Science written by experienced sports personals on selected fields , are some interesting information materials for coaches and all readers.

Once again I would like to take this opportunity to thanks each and every individual who had worked hand in hand with me to produce this Volume 2 Issue 2 Coaching Journal. I believe with more help and cooperation we can make this journal more interesting added with knowledge based information in the coming issues.

I am deeply indebted to all those who had been helping me since day one of establishing the Academy . I wish to take this opportunity to convey my deepest thanks and gratitude to Dato'Seri Zolkples Embong our Director General National Sports Council of Malaysia for allotting me this space to deliver my message.

EN. AHMAD ZAWAWI ZAKARIA
Editorial Advisor
COACHING JOURNAL
AKADEMI KEJURULATIHAN KEBANGSAAN

EDITORIAL BOARD

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Towards Excellence in Sports

COACHING JOURNAL is published twice a year by the NATIONAL SPORTS COUNCIL OF MALAYSIA. Contributors are welcome to submit related articles at any time throughout the year. Article should be submitted via email to **lboonhooi62@gmail.com** | **hockey-vive@yahoo.com** and be submitted in English. Each article will be reviewed and edited if necessary and authors will be notified of acceptance within 6 to 8 weeks from the date of submission.

Article Contribution for Coaching Journal Akademi Kejurulatihan Kebangsaan

OBJECTIVE OF THE JOURNAL

TO KEEP THE COACHES ABREAST OF THE LATEST DEVELOPMENTS IN COACHING RELATED AREAS OF INTERESTS

TARGET AUDIENCE

Coaches - the Journal will be distributed to coaches (grassroots right up to elite level). The other possible readers would be the athletes.

We have endevoured to make the Coaching Journal a much better read. To a certain extent we have succeded in streamlining the content, but overall are still far from satisfied. As part of our efforts to further improve the Journal, we are continuosly accepting article contributions from interested parties.We invite submissions from sports associations, academicians, sports adminitrators as well as coaches on topics ranging from academic to on field applied areas of interest. It can be an original research, technical commentary, knowledge base update or even association report; as long as it is related to coaching matters – it will be considered. Below are some guidelines to submitting an article:

CONTENT

It should be straight forward and easy to understand. The methods and statistic section need not be too detailed. It is alright to use previous published work with the relevant permissions acquired. More importantly, instead of a general conclusion please add a section "Practical Application for Coaches". In this section, explain how coaches can utilize the content of your article in their everyday work. We also recommend that you highlight important lines/ paragraphs in your article. As with any printed work, please cite the relevant sources should the article include any external content/picture/table/figures.

FORMAT

- Arial, 11 pts, single spacing
- Justified alignment, margins 2.54cm all around (letter)
- Title is Bold, include the affiliations under it.
- Reference Citation in text is (numbered) - Notes style, Vancouver
- Include a picture of the first author

The Journal is a registered periodical with a designated ISSN number. This makes it easier to catalogue and cite. Consequently, we also send copies of the Journal to all the relevant libraries.

For further information and article submission, please email to **lboonhooi62@gmail.com** and **hockey_vive@yahoo.com**

DR. LIM BOON HOOI
Editor in Chief
The Official Journal of the Akademi Kejurulatihan Kebangsaan Majlis Sukan Negara Malaysia

THEORY AND APPLICATION OF GENERAL FOUNDATION CORE TRAINING - part 1

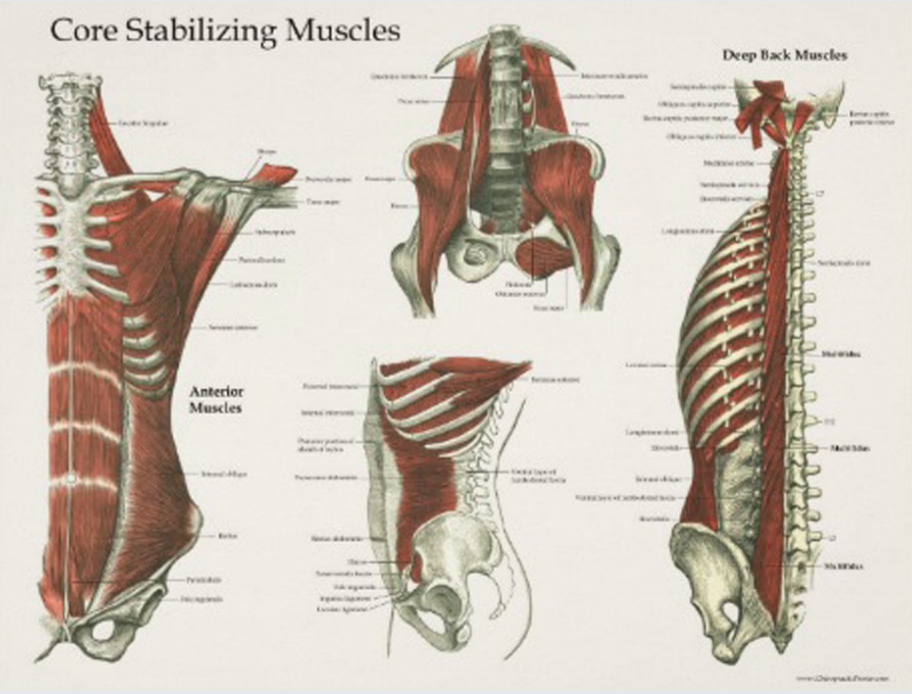
SEAN STURGESS

High Performance Team, National Sports Institute of Malaysia

The following 2 part article aims to provide coaches with a simple understanding of the core and how it can be trained with proper technique and progression. Part 1 will focus on general foundation core training and Part 2 on strength and power training for the core.

WHAT IS THE CORE AND CORE STABILITY?

Ask ten different scientists what the core is and you will get ten different answers. For the purpose of this article the core can be referred to as all structures (spine, ligaments, tendons, fascia) between the rib cage and pelvis. The major muscles of the core are the transverse abdominus, rectus abdominus, internal/external obliques, quadratuslumborum, multifidus, erector spinae as well as the psoas and gluteals.



Core stability is the ability of the core to maintain appropriate trunk and hip posture, balance and control during both static and dynamic movement

WHY TRAIN THE CORE?

CORE TRAINING SHOULD BE OF INTEREST TO COACHES FOR THREE KEY REASONS:

1. Movement technique
2. Injuries
3. Power development (to be discussed in 'Core training for Coaches – Part 2')

MOVEMENT TECHNIQUE

In sport and exercise, the core plays an important role in almost all movements. The following pictures provide some examples of where the core is involved in movement technique.In sport, the muscles of the core are responsible for providing a stable base for extremity function and force transfer [11].

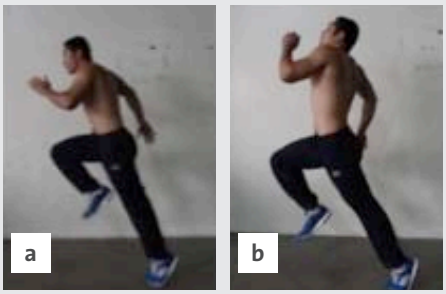


Figure 2 Sprinting:
Ideal core alignment (a) compared to poor technique (b) with extended cervical and lumbar spine during fatigued sprinting which impedes force production.

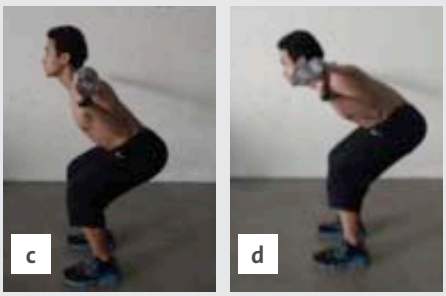


Figure 3 Resistance Training - Squat:
Ideal core alignment (c) compared to spinal flexion (d) which places dangerous compressive forces on the spine.

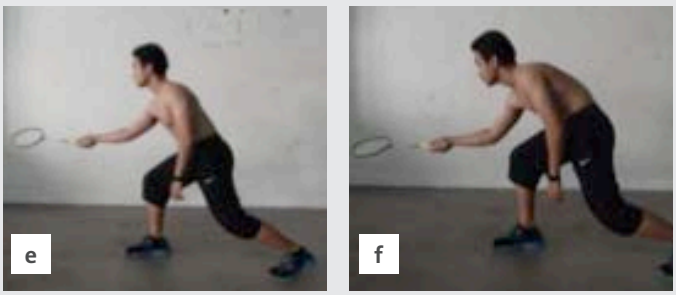


Figure 4 Badminton Lunge:
Ideal posture (e) compared to (f) which is unbalanced to execute the shot, slow to return after shot, high in energy expenditure and back fatigue.

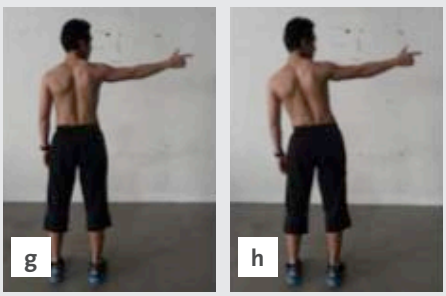


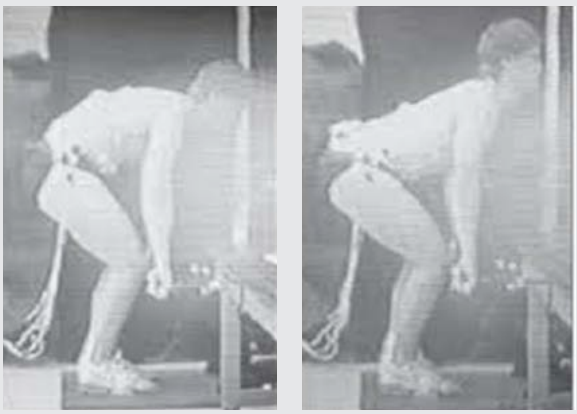
Figure 5 Shooting:
Thousands of hours in poor posture (h) will eventuate in imbalances and back pain, which will affect quality of training

INJURIES

Many studies have proposed that core training is required for injury prevention. Poor core stability and weakness has been cited to be predictive of anterior cruciate ligament injury, patellofemoral pain, iliotibial band syndrome, improper landing kinematics and low back pain [1,2].

The lower back receives the most attention for injury research and core stability. Colston [3] found that lower back pain represents 10 to 15% of all athletic injuries and that 80% of the population will experience it at some point. Back pain is multi factorial (posture, muscle imbalances, stress, anxiety, repetitive strain, poor strength/ endurance, obesity)and its exact cause is often difficult to ascertain. Regardless, it is important that the spine is able to withstand forces that are imposed upon it. Mechanical fatigue studies have found that compressive loads on the spine in sport and exercise exceed the forces that cause pathologic changes in spinal discs[4]. The safe limit for loading on the lumbar spine on a person with low back pain is 3000N. The traditional sit-up (Figure 7 a) imposes approximately 3350 N (330+kg) of compression on the spine and supermans(Figure 7d) 6000N [8]. Capozzo et al (1985) cited in Faries[4] showed that a1.6x body weight squat imposes 10x bodyweight compressive forces on the spine (eg145kg barbell squat can impose 8900N on the spine of an 90kg athlete).

The spine is also susceptible to shear forces and a comprehensive review byGallagher [5] concluded that 1000N of lumbar spine shear force is the acceptable load limit for 90% of the working population. McGill [8]demonstrated the contrasting differences in lumbar spine shear force when comparing lifting with a flexed (Figure 6a) or neutral (Figure 6b) spine posture. Rotary forces on the lumbar spine are also potentially injurious to athletes as overall lumbar rotation range is only 13 degrees with 0-2 degrees between each segment from T10 (thoracic vertebrae 10) to L5 (lumber vertebrae 5). Disruption to the intervertebral discs can occur with just 3 degrees rotation.



1,900 N Shear Loading 200 N Shear Loading

Figure 6, McGill [8]: Sheer loading when lifting with flexed spine (a) compared to neutral spine (b)

CURRENT CONCEPTS OF CORE TRAINING

Findings on spinal load, such as above, has forced a paradigm shift in core training away from using movements that involve flexion (sit up variations, ab crunch machines) extension (supermans, back arches) and rotation (Russian twists, rotary machines, broom stick twists)of the spine in training (Figure 7a,b,c,d,e). Dr Stuart McGill [10], a renowned Professor in spine biomechanics expressed his research based opinion:

"Given that the sit-up imposes such a large compression load on the spine, regardless of the leg being bent or straight, the issue is not which type of sit-up should be recommended. Rather sit-ups should not be performed at all by most people".

Similarly, Shirley Sahrman[11], a renowned Professor in Physical Therapy stated the following on lumbar rotation:

"Rotation of the lumbar spine is more dangerous than beneficial. During most activities, the primary role of the abdominal muscles is to provide isometric support and limit the degree of rotation of the trunk which is limited in the lumbar spine."

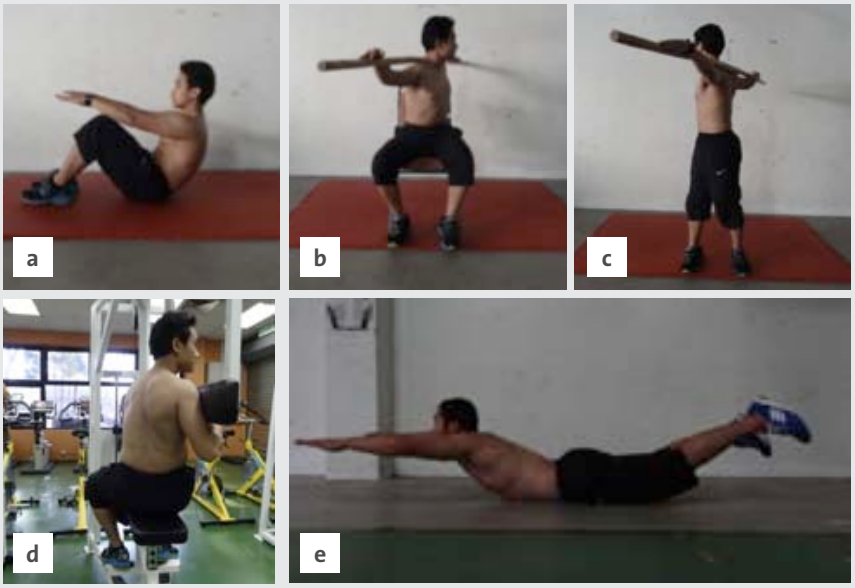


Figure 7:
Contraindicated core training exercises

STABILIZATION, BRACING AND POSTURE

Current general foundation core training also focuses on the key concepts of stabilization, bracing and posture.

STABILIZATION AND BRACING

Independently the spine is unstable and requires tension development of the core muscles to increase stiffness of the spine and enhance stability [1]. The unstable spine is less effective at transferring force through the kinetic chain (eg ground reaction force of legs through core to arms to throw or strike) and is associated with back pain[1].Research has proven that 'bracing' to create intra-abdominal pressure is the optimal method to stabilize the spine and can increase spine stabilization by 36-64% [7]. The proper bracing technique requires the contraction of all of the muscles surrounding the spine, without holding one's breath. This has been described as '360 degree stiffness' or 'super stiffness' [10]as all of the musculature surrounding the anterior, lateral and posterior spine is contracted and stiff. During general foundation core exercises, Coaches can palpate the abdominal, oblique and lower back area to ensure the athlete is actively bracing with 360 degree stiffness.

POSTURE

Posture is the final key concept for core training, as well as all exercises and activities of daily living. Good posture enables efficient movement, free of impairment and dysfunction [6]. Poor posture may indicate the presence of muscle impairments, which can be associated with movement impairments[11]. Any restriction, imbalance or malalignment within the musculoskeletal structure can affect optimal range of motion and, thus, the quality of force production, force application and movement efficiency [6]. It is imperative that proper posture is strictly enforced during core training (all other training too) to provide the athlete with awareness and a physical foundation to move efficiently and free of impairment. The key coaching point for good posture in general foundation core training is 'neutral pelvis'.

A neutral pelvis, not anteriorly or posteriorly tilted, must be maintained throughout general foundation core training. Anterior and posterior pelvic tilts may provide some biomechanical advantage for some sporting movements, however they must be strictly eliminated for general foundation core training to reduce spine load and learn properlumbo-pelvic stabilization patterns. A properly trained and stabilized core will help the athlete endure forces when anterior or pelvic tilting occurs in sport. The following exercises will help the athlete determine and be aware of neutral pelvis posture.

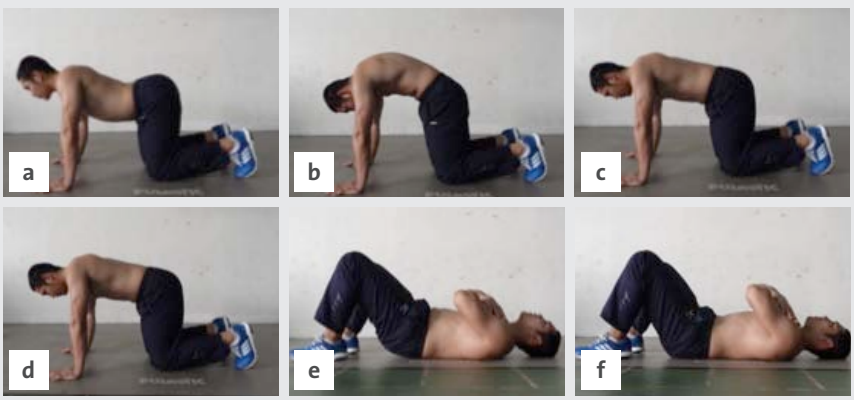
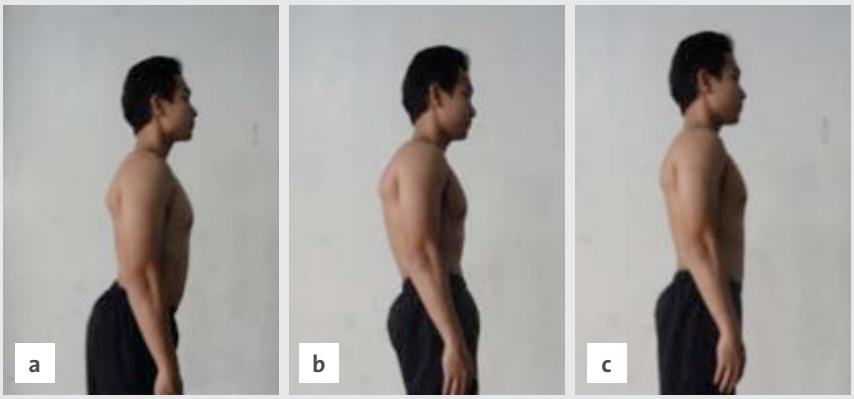


Figure 8 Finding neutral pelvis:
Athlete starts in anterior pelvic tilt (all figure a), moves into posterior tilt (all figure b) and finds the middle position (all figure c). Figure c is neutral pelvis and the correct pelvic posture for general foundation core training.

Athlete starts by 'anteriorly tilting' the pelvis by separating the rib cage away from the pelvis (all figure a). Athlete moves into posterior pelvic tilt by bring the ribs toward the pelvis(all figure b). Figure c is neutral pelvis, the mid-point between anterior and posterior pelvic tilt and is the correct pelvic posture for general foundation core training.



APPLIED GENERAL FOUNDATION CORE TRAINING

In summary of the preceding theory, coaches and athletes must focus on and monitor two crucial cues during core training.

1. "Neutral Pelvis": Before and during each repetition or set the athlete must find and maintain neutral pelvis. Coaches and athletes must ensure that there is no shift into anterior or posterior tilt throughout each exercise.

2. "Brace": Coaches can palpate to ensure that a 360degree brace is held throughout the exercises. Athletes should be bracing hard enough to feel the contraction, but light enough to breathe normally and not hold their breath.

The following pictures illustratesome general foundational core exercises.
Anterior Core: Plank (aka front bridge)
Correct technique

Figure 9:
Correct plank technique: Athlete must brace core, quads and glutes. Coach can palpate 360degrees around the core to ensure proper bracing. A pvc pipe or dowel can be used to ensure correct technique (optional). The head, thoracic spine and glutes should always be in contact with dowel.

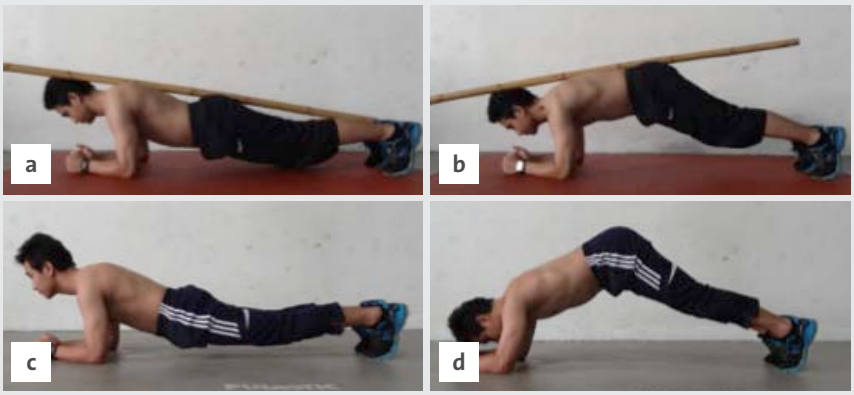


Figure 10 Incorrect plank technique:
Note the anterior tilt and lumbar extension in figure a (gap between lumbar and dowel) and figure c. In figure a and d the athlete is positioned in hip flexion which does not enable the correct recruitment of core stabilizing muscles.
Posterior Core: Bridge

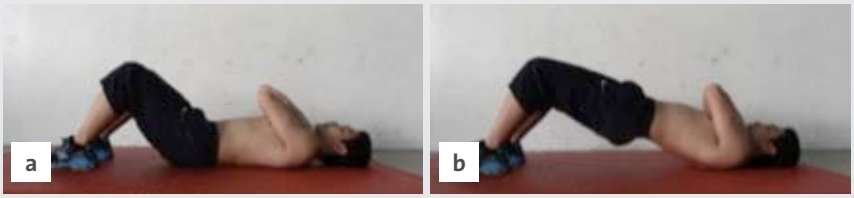


Figure 11 Correct bridge technique:
The exercise starts and finishes (figure a) with neutral pelvis. Athlete lifts hips until knees, hips and shoulders are aligned and maintains neutral pelvis. Athlete should feel the glutes and braced core working.

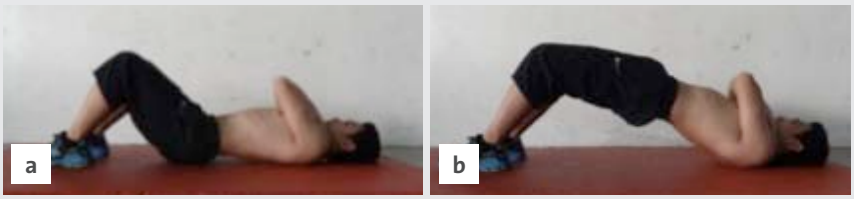


Figure 12 Incorrect bridge technique:
Note the anterior tilt and lumbar extension in start/finish (fig. a) and execution (fig. b). Athlete will incorrectly feel more muscle contraction in the hamstrings and lower back.
Lateral Core: Side bridge (aka side plank)

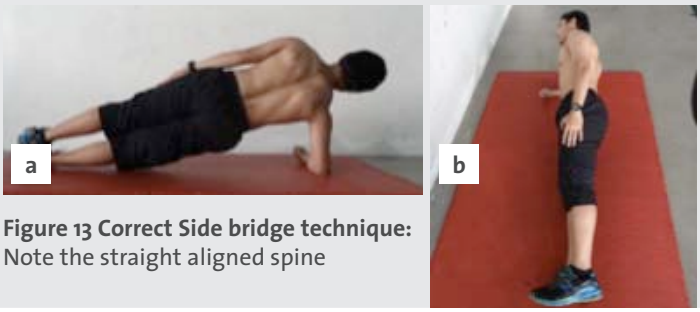


Figure 13 Correct Side bridge technique:
Note the straight aligned spine

Figure 14 Incorrect Side bridge technique:
Note the poor spine and hip alignment. Athlete will feel more emphasis in lower back, hip flexors or abdominals. Athlete should feel the emphasis in the quadratuslumborum (lateral aspect of the core), and also the anterior and posterior core of the side closest to the floor.

Core Control for rotation, extension, flexion: Bird Dog

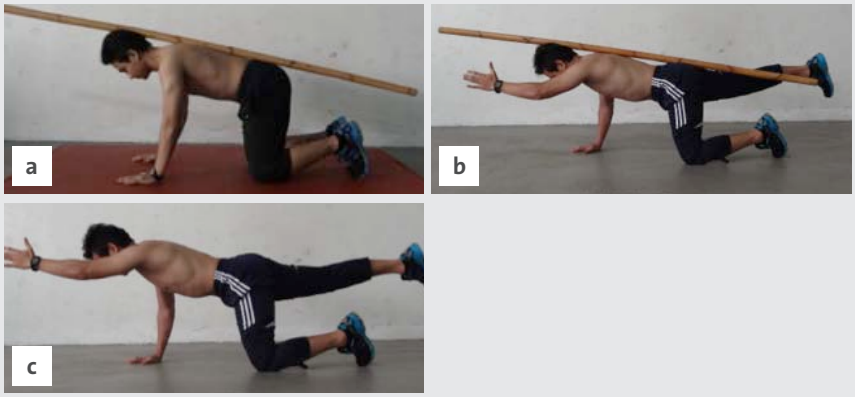


Figure 15 Correct Bird/Dog technique:
Dowel can be used (optional) for correction and education.Note 3 points of contact with bamboo rod (fig. a, b) and straight aligned spine (fig. c)

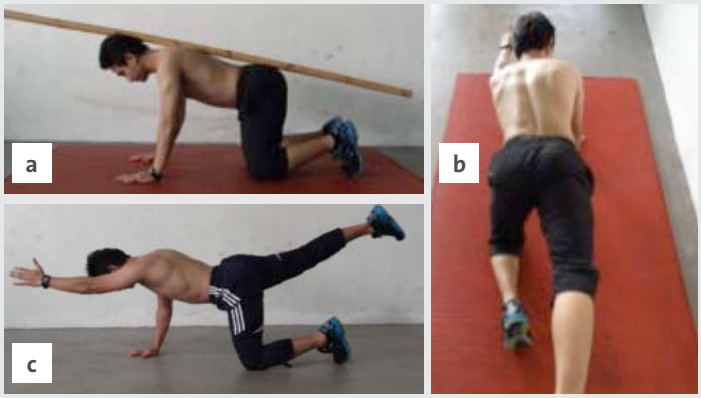


Figure 16 Incorrect Bird/Dog technique:
Note the anterior tilt, lumbar extension (fig. a, b) and rotated trunk (fig c). The exercise stops if any extension, flexion or rotation of the spine occurs.

BEGINNER'S GENERAL FOUNDATION CORE TRAINING PROGRAM

A basic program is outlined below.Note that repeated sets of shorter duration and perfect technique are recommended. Longer sets (eg.>10s) should only be used for testing purposes [8]. Keep isometric exercises under 10 seconds and build endurance with repetitions (reps), not prolonged holds, to facilitate muscle oxygenation and reduced acid build up [10].

	Week 1&2 2 rounds	Week 3&4 3 rounds	Week 5&6 3 rounds	Notes
Complete exercises 1,2,3,4 consecutively. Then repeat for a total of 2 rounds in weeks 1,2 and 3 rounds for weeks 3,4 and 5,6.				
1. Front Plank (aka front bridge)	10x5s hold	8x8s holds	8x10s holds	Rest 5s between holds.
2. Bridge	10x3s hold	8x5s holds	7x7s holds	Must be perfect technique. Stop or limit range of motion if any movement of spine/ pelvis occurs.
3. Lateral plank (aka side bridge)	5x6s hold	5x8s	6x10s	
4. Bird Dog	10 perfect rep	10x3s hold (5/side)	10x5s hold (5/side)	Progress or regress exercise choice if too difficult or easy.

Table 1: Sample beginners general foundation core program

There are many progressive and regressive variations of the above exercises. Talk to a conditioning specialist or physiotherapist for further exercise choices. Choose exercises that challenge the athlete for 10 seconds. For example if a standard plank is too easy it can be progressed to 3 points or regressed to perform on the knees if too difficult.

ASSESSING CORE STABILITY AND ENDURANCE

Athletes will have varying abilities of core stability and endurance. Athletes should be assessed to determine their progress and suitability for General foundation core training. Coaches can assess their athletes with the following simple tests and suggested standards. If pain exists for any tests, consult a Dr or physiotherapist.

TEST	DURATION	NOTES
PLANK 	120s	Strict techniqueisrequired. If the hips drop/rise or the gap between the dowel and lower back increases/ decreases by more than 1cm then the test stops.
SIDE BRIDGE  	90s	Strict techniqueis required. Balance on two feet by placing the top leg in front and lower leg behind. If greater than 10% difference exists between left and right sides, train the weaker side until equal.Eg 3 sets, 3x/ week for weaker side, 1 set, 3x/week for stronger side.
BACK EXTENSION  	120s	Test stops when athlete moves away from horizontalas in figure b.

Table 2: General foundation core assessments [9]

Use the above tests as tests only. Do not use the tests for training. Remember shorter duration reps with perfect technique are preferred to long duration sets. Achieving these standards, with perfect posture and technique, indicates that the athlete has an adequate foundation of core training and is ready to progress to strength and power exercises for the core (Part 2). If the athlete fails to achieve the above standards he/she should continue with general foundation core training with similar exercises and format as outlined in the program.

SOME DISCLAIMER

Core training is just a part of training. If the athlete does not exhibit any problems (passes basic standards, exercise technique is good, no back pain) then there is no need to focus on core training but rather to simply maintain its condition with 2 to 3 times per week training. Consult a physiotherapist or conditioning staff if you are unsure on any of the above concepts.

An athlete with anterior or posterior pelvic tilt posture does not necessarily equate to poor performance or back pain. It may even be advantageous in some situations eg anterior pelvic tilt and sprinting. The key is point is that athletes must be able to stabilize and achieve minimum standards as outlined.

General foundation core training focuses on stabilization, bracing, posture and minimising movement in the spine. The message of this article is not to say that all sport movements must keep a neutral pelvis with no spinal movement. Rather it is providing the foundation for the athlete to withstand the demands placed on the spine during sport as well ensuring correct movement patterns between the core and extremities. The spine will inevitably flex, extend and rotate in sport. Part 2 of this article will discuss the training to strengthen the core for movements of the spine, the concept of controlling spinal flexion, extension, rotation that happens in sport movements, as well progressions for improving power through the trunk.

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THE EFFECT OF WHOLE BODY VIBRATION (WBV) DURING INTER-SET REST PERIOD ON SQUAT MUSCLE ACTIVATION LEVEL

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ABSTRACT

The main aim of this study is to investigate neural effect of using whole-body vibration (WBV) modality, as a non-fatiguing training stimulus (active recovery) during the inter-set rest period of hypertrophy based loading. Second to this, comparisons were also made between WBV effects versus traditionally use passive recovery method. Eight recreationally trained men were recruited for this study. Subjects randomly attended two testing sessions, where WBV modality was used during the inter-set rest period in one session, and passive standing recovery was used in another session. In both sessions, subjects performed three sets of 12 repetitions of squat exercise at 70% 1RM with 2 minutes inter-set rest period. Quadriceps and hamstring in-vivo muscle activation were assessed during the squat performance. The result of this study indicated that no significant differences were found between WBV active recoveries versus non-WBV passive recoveries in term of rate of muscle activation. Thus, while WBV commercially promoted as an effective training tools, it usefulness as an inter-set strength training active recovery tools seems questionable. WBV application during the inter-set rest period did not promotes muscle neural drive, and it similarities with passive recovery in term of muscle activation indicates that it did not provide any additional stimulus that was hope for practically, WBV as an inter-set recovery modality can be used as an alternative to passive recovery, but possible additional benefits in training stimulus is questionable. However, further studies are needed before any solid conclusion can be made.

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INTRODUCTION

Whole body vibration or also known as WBV has gain a lot of attention for strength development within the sports and exercise science fraternity over the past few years. Studies have been conducted on the effectiveness of using WBV as a strength training tools in many different set-ups such as sports performance [11, 45], rehabilitation [8] and general fitness [39]. Specifically, whole body vibration has been found to be effective in developing strength and power [1, 14, 30, 31]; improving postural stability and balance [17, 45]; and increased leg muscle activity [45]. The use of whole body vibration as a recovery so far have shown to possibly is able to promote post-session recovery by implementing it before and after exercise [26]. Due to its capabilities in inducing better isometric squat and counter movement jump performance, whole-body vibration has also been proposed to be used as a warm-up modality prior strength and power exercises [14]. A more current study has shown positive effect of whole-body vibration warm-up on golfer's flexibility and power output [9]. However, none of these studies have used whole body vibration as in between set recovery modality during a strength training session, with additional aim of producing additional training stimulus.

Studies on active recovery using other modalities or light exercises during strength training session has indicated that active recovery is useful in a manner that it will improves blood lactate clearance rate or lactate metabolism [3, 13, 32], improves power output [5, 12] and increased amount of work performed [43]. But much still need to be explored as in-session recovery are influence by many factors such as inter-set rest duration [10, 14, 22], inter-repetition rest duration [25, 29], rest frequency [15], type of recovery activities or modalities [21, 23], type of loading schemes use [36], work to rest ratio [4, 37]. A study investigating the possibility of WBV as a recovery modality for Delayed Onset Muscle Soreness (DOMS) effect has found that WBV yield similar effect as light exercise in treating post-exercise session muscle fatigue [46].

Main area of focus for most coaches and researchers alike is the work period during strength and conditioning sets and session, such as the use of vibration as a training modality during the work period. But rarely attention is given to the modalities use during rest and recovery period available between the sets during a strength training session in order to improve overall training stimulus given within each training session. The rationale behind this is that if the overall stimulus for each session can be increased, overall adaptation longitudinally might be increased too. At present, most of the studies are focusing on vibration as training tools instead of active recovery (recovery with training stimulus) tools. Similar to cycling or stretching activities, vibration might also be able to be changed into recovery method during the inter-set rest period, in a ways such as by reducing the vibration intensity used, thus making it more recovery-like intensity. Acute study as this provided a ground base for other further acute and longitudinal studies in future.

Therefore, main purpose of this research is to investigate the effect of having whole body vibration as an active recovery modality as opposed to typically used passive recovery, during the inter-set rest period on squat exercise rate of muscle activation.

METHODS

EXPERIMENTAL APPROACH TO THE PROBLEM

The study was an acute randomized within-subject crossover design study. Stratified random sampling was used in which number of subjects recruited for this study has been identified as sufficient based on number of ISN Conditioning Centre recreational athletes user. Similar number of subjects has also been used in other similar type of studies [2, 6, 33].

SUBJECTS

Eight recreationally active men had been recruited for this study voluntarily. The subjects' mean age, height, body weight, body mass index and 1RM were 26.63 ± 3.96 years old, 1.71 ± 0.02 meter, 72.01 ± 8.76 kg, 24.54 ± 2.78kg and 135.63 ± 24.84kg respectively. The subjects were fully informed of any risks and discomforts while performing this experiments prior their participation. Research was approved by Research Management Centre of Sultan Idris Education University and Research Division of National Sports Institute, Malaysia.

EQUIPMENT

Squat exercises was performed on a force plate inside the power cage (FT700 Isotronic Power System, Fitness Technology, Australia) with 20kg Olympic barbell (Olympic bar, Uesaka, USA) on the back of each participant. Lifting load for each participants were adjusted by adjusting the iron cast weight plates (Metal Plates, Uesaka, USA) used with the Olympic bar. Whole body vibration machine were used during active recovery interset rest period (Powerplate, USA). Muscle activation was assessed using an electromyography (EMG) machine (Noraxon, USA) as a measurement method in biomechanical analysis. Therefore, four channels were placed on muscles (selected areas) to record muscles activity during squat exercises.

PROCEDURES

BASELINE MEASURES AND FAMILIARIZATION

Prior to the testing sessions, subjects involved in familiarization and 1-RM testing session. The familiarization session begun with a briefing from the researcher on exercise program and testing procedures involved. Briefings also included exercise technique, exercise demonstration and explanation on 1-RM testing session that will be performed 72 hours after the familiarization. Subjects were then given participation consent letter to be read and voluntarily signed once all doubt and questions arise has been answered. Subjects were reminded that they were allowed to quit the study at any time during any phase of the study without the need to give a reason for it. Subjects later were guided into a warm-up session and performed a squat and WBV trial on a set-up similar to what will be used during the actual testing sessions. Quarter squat posture was used during the WBV recovery by all subjects.

1-RM TESTING OCCASIONS

The 1-RM test begins with a standardized warm-up for 10 minutes, involving 5 minutes of ergometer cycling and 5 minutes of active stretching. The squat 1RM was assessed according to the protocols recommended by National Strength and Conditioning Association (NSCA) [2]. Proper cooling down was performed at the end of the session and a rest period of at least 72 hours were given before the first testing session. Percentage of loading was calculated from the 1-RM assessment result. Loading parameters used for this study was equivalent to hypertrophy loading (3 sets of 12 repetitions at 70% 1RM with 2 minutes inter-set rest period) as recommended by leading organization and scientific findings [7, 28, 35,41] at self selected tempo.

TESTING PROCEDURES

Subjects attended two testing sessions, with session's order was randomly selected by the researcher. For the passive recovery session (non-WBV), subject completed the inter-set rest period by standing passively on the whole body vibration machine which was turned off. As for the active recovery session (WBV), the only difference was that subject's stand on the whole body vibration machine, which was set to 40Hz frequency with 4mm amplitude for 60 seconds duration during the inter-set rest period. During both testing sessions, subjects were asked to perform a standardized warm-up consist of cycling on the cycle ergometer for 5 minutes or more up until the heart rate response was equivalent to warm-up heart rate response [18, 19, 20]. Squat exercise was then performed at the power rack station with hypertrophy loading as described earlier.

Rate of muscle activation for each set during the squat performance was assessed using a 4-channel portable surface electromyography (EMG). Muscles involved were quadriceps rectus femoris and hamstring biceps femoris for both left and right legs. Portable EMG was used where it was placed on subject's waist and switched on. Data was then transferred wirelessly by the portable EMG to monitoring software. Subjects were all instructed to worn light short pants to allow proper electrodes placement. Prior to electrode placement, all involved muscle areas were shaved. The electrode had two wires for each channel of each muscle. One of the electrodes was used for a reference. For the right leg, wires of odd number were placed on the rectus femoris and biceps femoris; while wires with even numbers were placed on the left leg. Therefore, the muscles amplitudes recorded from the portable EMG via wireless into the software can later be recognized. For analyses, data selected were 5 seconds before the subject started and 5 seconds after the subject completed the squat performance. Data cropping was used eliminate data at ready position (non active contraction). All the data were rectified to exclude noise that may involved while recording was done, with the protocol used were standardized and the same for all subjects. Subjects performed standardized cooling down and stretching at the end of the session.

RESULTS

TRAINING EXPERIENCES AND DROP-OUT

All subjects recruited had no problems in performing the study due to their familiarity and training experience at the location of the data collection, with all of them have been performing squat exercise for more than a year during the time of recruitment. While WBV modality was a new experience to them, none of the subjects had reported any side effects or inconvenient when using WBV during the period of the study. Total number of subjects recruited at the beginning of the study was thirteen people. Five of the subjects had completed all sessions required but had failed to worn EMG electrodes due to technical errors, and thus considered had dropped-out from this study. The session had not been able to be repeated as the WBV machine was only on-loan for 14 days during the testing session, and all of the five subjects had unable to find suitable time due to other commitments (study, work etc.). Normality test performed on 1RM test outcome of each subjects had shown equal strength performance among all subjects participated in this study (normal distribution).

Table 1:
Comparisons in rate of muscle activation between session with WBV versus session without WBV (non-WBV) on rectus femoris and bicep femoris muscle.

Muscle	Mean ± SD		% Difference	p Value
	WBV	Non WBV		
Right Rectus femoris	355.56 ± 35.16	484 ± 158.51	30.6	0.81
Left rectus femoris	309.25 ± 18.12	314 ± 22.10	1.52	0.78
Right biceps femoris	154.42 ± 10.38	160 ± 29.30	3.55	0.83
Left biceps femoris	160.63 ± 13.54	118 ± 5.38	30.6	0.26

Neuromuscular activation assessed, as indicated in Table 1, a non-significant differences were found (P > 0.05) between WBV versus Non-WBV session of right rectus femoris, left rectus femoris, right biceps femoris and left biceps femoris.

Table 2:
Neural performance during squat training exercise with whole body vibration (WBV) treatment

Muscle	Mean ± SD			p Value
	Set 1	Set 2	Set 3	
Right Rectus Femoris	322.73 ± 90.02	351.29 ± 94.17	392.66 ± 152.53	0.328
Left Rectus Femoris	289.17 ± 96.71	324.40 ± 86.11	314.17 ± 143.20	0.709
Right Bicep Femoris	153.18 ± 108.68	144.72 ± 64.24	165.37 ± 71.36	0.825
Left Bicep Femoris	175.69 ± 140.01	149.46 ± 101.49	156.73 ± 51.93	0.688

The results shown for all the muscles that p value is greater than 0.05. The hypotheses are rejected as the results are not significant between the variables within sets as right rectus femoris, left rectus femoris, right biceps femoris and left biceps femoris were stated the p value 0.328, 0.709, 0.825 and 0.688.

Table 3:
Neural Performance with Non Whole Body Vibration (NWBV) Treatment

Muscle	Mean ± SD			p Value
	Set 1	Set 2	Set 3	
Right Rectus Femoris	384.96 ± 75.5	399.55 ± 71.5	316.51 ± 128.2	0.214
Left Rectus Femoris	339.47 ± 96.08	299.54 ± 90.18	303.11 ± 155.10	0.548
Right Bicep Femoris	145.30 ± 32.95	194.02 ± 157.45	141.45 ± 53.95	0.785
Left Bicep Femoris	123.26 ± 36.69	118.81 ± 17.90	112.55 ± 47.33	0.402

The results shown for all the muscles that p value is greater than 0.05. No significant between the variables within sets as right rectus femoris, left rectus femoris, right biceps femoris and left biceps femoris stated the p value were 0.214, 0.548, 0.785 and 0.402.

DISCUSSIONS

This is the first study that have investigate the effect of using whole-body vibration modality during squat exercise inter-set rest period using a hypertrophy loading parameters. While general assumptions without scientific evidence suggest that WBV might works well as an inter-set rest period recovery, questions arise with one of it is how much it interfere or activate the muscles involved. Too much activation will means it defeat the purpose of recovery, and no significant activation will means no additional training stimulus is provided, which against the main principle of using active recovery.

It has to be remembered that neuronal factors such as motor unit activations by stimulus provided (i.e., external load or vibration) were also one of the factor that will influence kinematics and kinetics output. The more motor unit it innervates, the more force output can be generated, although the muscle fibre recruitment might be less. This is due to high thresholds unit maybe recruited by the nervous system in an effort to maintain force production and resist muscle fatigue, such as recruitment of more powerful fast twitch muscle fibers [34]. Either way (recruitment of fast or slow twitch), both actions can be seen via EMG amplitude assessed, with typically involvement of fast twitch will yields higher amplitude responses [47].

One of the possible reasons of insignificant differences found between WBV and the non-WBV protocol might be able to be attributed to the WBV frequency (Hz) used. However, a current study which also used squat exercise and EMG measurement on similar muscles, has indicated that WBV effect are not frequency dependent (either 20Hz, 40Hz or 60Hz) [38].

Comparison with other study with similar conceptual framework is hard to be made due to no other similar study has been done or widely published. However used of WBV as post-session recovery modality has been investigates in many previous studies. WBV implemented as post-session recovery modality following 3 km time trial and high-intensity interval training (8 x 400m) found insignificant differences between WBV recovery versus non-WBV control group [16]. Another study which compared combinations of WBV and 1 minutes treadmill run recovery;

versus active recovery using 15 minutes treadmill low intensity jogging had also shown no significant differences between the two active recovery method [42]. One study that examined the effect of low-frequency handgrip vibration (not whole body vibration) performed for 9 seconds during the inter-set recovery during rock climbing found no effect of recovery strategy on any measure. In fact the study had suggested that rock climbers and their coaches focus on optimizing body position rather than compromising body position to allow for shaking out during the climb [24].

As a conclusion, WBV implementation as inter-set rest period active recovery modality can be used as an alternative to typically used passive inter-set recovery during strength training. However, it effectiveness in promoting additional stimulus is questionable. Further research should be done by manipulating loading parameters used, WBV amplitude, WBV frequencies or duration of treatment (exposure or longitudinally).

PRACTICAL APPLICATIONS

In accordance with principal of training which emphasize of variety in training, WBV modality can be used inter-changeably with other modalities. Psychologically, it might provide better motivation to the athletes or clients during a strength training session, and thus maintain overall training performance during the session.

APLIKASI PRAKTIKAL UNTUK JURULATIH

Selaras dengan prinsip latihan yang menekankan kepelbagaian dalam latihan, getaran seluruh badan (WBV) modaliti boleh digunakan saling berganti dengan kaedah yang lain. Secara psikologi, ia mungkin dapat memberi motivasi yang lebih baik untuk atlet atau pelanggan semasa sesi latihan kekuatan, dan dapat mengekalkan prestasi latihan secara keseluruhan semasa sesi.

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ANALYZING SPORT SPECIFIC PATTERNS IN COACHING ATHLETES WITH DISABILITIES (AWD)

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INTRODUCTION

Coaching athletes with disabilities is not desperately dissimilar to coaching able-bodied athletes. There are many of the coaching strategies for able-bodied are relevant to AWD. There are few disabilities or medical conditions which completely preclude participation in sport. AWDs play sport for much the same reason as able-bodied athletes such as to improve fitness, develop new skills, increase social contacts and have the chance to achieve and receive new recognition. The level of participation will vary according to the ability of the athlete and the severity of the disability or medical conditions. The emotions, hopes and aspirations of AWDs will generally match of those of able-bodied athletes. Participation and achievement in sporting activities can help enhance their self-confidence and self-esteem, and accomplishments and positive attitudes developed on the playing field can have a positive impact on the quality of daily living of all athletes. Persons with disabilities who participate in sport may be better equipped to cope with pressure and stressful situations and experience less depressions, confusions and anger. Coaching AWDs is not a difficult task. Every athlete is unique. Effective coaches adjust to accommodate individuals. Coaches need to know and understand each of the AWDs conditions/disability then look for their strength, not their weaknesses in order to coach them.

ASSESSING AND ACCOMMODATING FUNCTIONAL ABILITY

Functional ability (residual function) refers to an athlete's ability to perform the skills and movements of a particular sport or activity. In other words, what or how the athlete can:

a. See (predominantly relevant to athletes with vision impairment).
b. Hear (predominantly relevant to athletes with hearing impairment).
c. Move (particularly relevant to athletes with a physical disability).
d. Learn, recall or reproduce skills (predominantly relevant to athletes with an intellectual disability).
e. Perform tasks and activities (relevant to all athletes).

After functional ability has been assessed, instruction should be organized and delivered in accord with the fundamental best practices of coaching. AWDs, provided they do not have any health related complications, generally have the same or very similar response to practice as their non-disabled peers, so the coach should:

a. Set challenging and realistic goals
b. Use tactile feedback to supplement visual and auditory information.
c. Communicate clearly.
d. Provide accurate and constructive feedback in a positive way.
e. Continually reinforce essential components.

IMPORTANT

MEDICAL OR HEALTH RELATED COMPLICATIONS

Coaches have a legal and ethical responsibility to check and monitor the physical well-being of all athletes. Consequently, athletes or caregivers should complete a brief medical report. If there are many medical reasons which would prohibit or restrict an athlete's involvement in a training program a clearance should be sought from a doctor prior to commencement [1].

UNDERSTANDING ATHLETES WITH DISABILITIES IN SPORTS

TO ENHANCE THE UNDERSTANDING OF WHAT IT IS LIKE TO HAVE A DISABILITY, A COACH SHOULD TRY:

a. Perform some of the skills associated with your events while simulating the athlete's ability.
   Example:
   If you are coaching a totally blind athlete to throw a javelin, try to throw while blind folded.
b. Simulate the disability of the athlete while you are moving around your competition/training venue, and/or
c. Play your sport while simulating the athlete's disability.

SOME BASIC HINTS WHEN DEALING WITH AWD:

a. Always ask the athlete if they would like assistance before you help. Your help may not need or wanted.
b. Having a disability does not mean that a person is intellectually inferior. Do not treat an athlete with a disability as if they are simple and avoid using condescending language.
c. Speak directly to the person with the disability, not to someone accompanying them.
d. Treat people with disabilities who participated in sport as athletes.

BASIC HINTS WHEN DEALING WITH WHEELCHAIR USERS

a. Do not lean on or touch a person's wheelchair without their consent. The wheelchair is part of the user's personal space.
b. If a conversation lasts more than a few minutes, consider sitting down or kneeling to get yourself on the same level as the wheelchair user.
c. Do not demean or patronize the athlete by patting them on the head.
d. It is okay to use expressions like 'running along'. It is likely that the wheelchair user expresses things the same way.
e. Do not assume that using a wheelchair is in itself a tragedy. It is means of freedom that allows the user to move about independently.

BASIC HINTS WHEN DEALING WITH ATHLETES WITH DEAF AND HEARING IMPAIRMENT

Athletes who are deaf or who have hearing impairment can participate in sport with few modifications. Some may experience balance problems.

Coaches should be aware the initial slow learning, which sometimes occurs in athletes with hearing impairment, is due to a communication difficulty, so effective communication is very important considerations.

IMPLICATIONS:

a. Position the athlete so he/she can observe the speaker's lips and hands when demonstrating technique.
b. Secure the athlete's attention before talking to them. Consider using a tactile clue, such as a wave, to gain attention.
c. Encourage other members of the team to help with communication- a buddy system may be particularly useful.
d. Provide written details of activities such as practice times, venues and equipment and uniform requirements.
e. Develop a few basic signs for key instructions and questions.
f. During competitions, signs such as flag wave or tap on the shoulder may be required if the athlete is unable to hear a whistle or starter's gun.

BASIC HINTS WHEN DEALING WITH ATHLETES WITH BLIND AND VISUAL IMPAIRMENT

There are varying degrees of vision impairment, ranging from total blindness to difficulties with perception of color, light and/or shadow [2].

IMPLICATIONS:

a. Identify yourself and introduce the athlete with vision impairment to others present.
b. Always tell them when you are leaving the room.
c. There is no need to talk loudly-athletes with a vision impairment are not deaf.
d. Familiarize the athlete with obstacles in the area both at practice and at competition venues.
e. Be articulate and imaginative in describing technique and correcting errors.
f. Correct style manually, but don't push, prod or grab the person unexpectedly.
g. Demonstrate all techniques individually, if necessary breaking down the movements into component parts. Let the athlete feel the coach perform a particular movement.
h. Use buddy system at practice or at during competitions.
i. Give constant feedback of the progress of an activity or game which may naturally observed by people with normal vision.
j. Audible signals may be necessary to ascertain direction or distance.

BASIC HINTS WHEN DEALING WITH ATHLETES WITH INTELLECTUAL DISABILITIES

The causes of an ID are versatile and are not generally significant to coaches. The functional ability of the athlete is far more important. Like all athletes, an athlete with an ID will have many factors affected his/her performance and it is important that the coach assess each individual.

Athletes with an ID will respond to a logical and sequential physical activity program. They will also respond to coaching sessions that are fun and enjoyable. The physical fitness and basic motor skills of athletes with an ID are sometimes poorer than able-bodied athletes, often due to a lack of opportunity to participate in physical activity program rather than physiological factors. Coaches may need to adjust training loads and expectations for beginner athletes.

IMPLICATIONS:

a. Keep instructions short, sequential and concrete. Use simple imagery to get the message across and be prepared to repeat key instructions frequently.
b. Avoid using abstract models such as blackboard diagrams, when introducing skills; teach new skills by showing, so that the athlete has something to copy.
c. Keep practice time on specific activities short to avoid concentration loss and boredom.
d. Break skills into small teaching components, ensuring that each part is learned fully before progressing.
e. Review and repeat skills and drills in different ways. Use drills that do not require elaborate decision making or those which rely heavily on literacy or numeric skills.
f. Move the individual through a desired motion when teaching new skills.
g. Be specific in feedback. Acknowledgement must be spontaneous and immediate.
h. Consider extrinsic reward, such as medals, ribbons, as a motivational tool for special occasions.

BASIC HINTS WHEN DEALING WITH ATHLETES WITH AMPUTEES

Amputees' athletes probably require the least number of special considerations of the major disability groups. It is likely that amputee seeking to be involved in sport will already is well adjusted to the amputation and be able to suggest how activities might be modified to best suit their needs.

IMPLICATIONS:

a. Modify skills and techniques to accommodate individual strengths, especially in relation to starting, turning and twisting with lower limb amputees.
b. Identify and practice safe methods for landing and spreading weight loads.
c. Adopt a 'whole body' approach to a weight training program. Muscle imbalance may lead to poor biomechanics and increased risk of injury.
d. Be conversant with different rules. If the amputee is competing in a competition for disabled athletes, there will be minor differences in rules.

BASIC HINTS WHEN DEALING WITH WHEELCHAIR ATHLETES

There are many disabilities that require the use of a wheelchair. The most common include injury to the spinal cord through trauma, polio or spina bifida [3].

IMPLICATIONS:

a. Try to perform some of the skills associated with the sport from the sitting positions, or borrow a wheelchair to play sport or to experience moving around the practice or competition venues.
b. Ensure the venue has wheelchair access and that there are suitable facilities available.
c. Use varied skills drills and fitness activities to avoid overuse injuries of the upper body.
d. Ensure adequate fluid intake and body cooling in hot conditions. Athletes with spinal injuries have a decreased ability to regulate body temperature.
e. Keep a log of time and distance rather than heart rates to monitor training improvements. Heart rates may not increase with exercise intensity for athletes with spinal cord injuries in the neck area.
f. Maintain the wheelchair in top condition and be sure that it conforms to competition regulations.

BASIC HINTS WHEN DEALING WITH ATHLETES WITH CEREBRAL PALSY (CP)

CP is a congenital neuromuscular condition caused by injury to the brain before, during or immediately after birth. It is not a progressive condition or a disease. Athletes with CP typically have abnormal reflex activity and muscle tone, perceptual-motor problems, visual dysfunction, learning disabilities and other soft sign of neurological damage.

IMPLICATIONS:

a. Many athletes with CP use wheelchair so practice and competitions venues must be wheelchair accessible.
b. Warm-up, stretching and warm-down activities are essential. However, avoid sudden or ballistic stretching for athletes with spasticity as these may trigger a strong muscle contraction (stretch reflex).
c. Program weight training as an off, pre and regular season supplement to training, particularly for athletes with hyper flexibility (extreme flexibility that is detrimental to functional movement).
d. Temperature, body position, type of movement, emotions and fatigue will all influence muscle tone. Discuss with the athlete, parents and doctor the best ways to minimize inappropriate muscle reflexes and tone.
e. Explain the skills and give instructions in clear and simple terms. Use questioning techniques to ensure athletes have understood.
f. Use repetitive drills when teaching new skills.
g. Short practice sessions provide better learning environments than one long practice sessions. Many athletes with CP have short concentrations spans and a high degree of muscle tone.

ANALYZING SPORT SPECIFIC MOVEMENT PATTERNS

The ability to analyze an athlete's sport specific movement patterns has generally been one of the most vital requirements of any coach. The types of strategies which can be used include:

OBSERVATION

Watch the athlete performing and look for any technical faults such as:

a. Running gait
b. Hip height
c. Throwing sequence
d. Run-up in long jump

VIDEO ANALYSIS

Video analysis enables coach to:

a. View the movements of an athlete at a slower rate.
b. See movement patterns clearly
c. Enables repetitive viewing of a particular movement.

SIMULATION

Physically try to simulate the athlete in order to analyze their movement patterns.

a. Sit in a wheelchair /throwing chair and throw a javelin.
b. Run with your limb in a similar posture to the athlete you are coaching.

ADAPTING SPORTS SPECIFIC PATTERNS: SPORTS SCIENCE APPLICATIONS

a. ENERGY EXPENDITURE AND VISUAL IMPAIRMENT- TETHER
Using a long tether will make them drag each other. It will make them slower in terms of time, because running has a negative effect on efficiency and accelerates fatigue.

b. ENERGY EXPENDITURE AND CEREBRAL PALSY- MUSCLE IMBALANCE
For athletes with CP, because of the muscle imbalance, lack of muscle tone and tension, they tend to use double energy than normal athlete. It makes them tired very quickly and fatigue. Provide athlete a longer resting period. Some solutions would be increased rest periods and increased effort intensity. Or increased rest periods and maintained effort intensity, and also maintain rest periods and decreased effort intensity.

c. ENERGY EXPENDITURE AND AMPUTATION – PROSTHETIC
Those who wear lower body prosthetic tend to be more tired than the upper body. This makes them use double energy to do certain skills. Allow them to have longer resting period.

For those using hand prosthetic, balance is very important criteria. Human body divided into 2 segments, has a very balance, unique type of structure (in fact more well balance structure than a building!)

d. POIKILOTHERMY AND WHEELCHAIR USER – SWEAT AND TEMPERATURE REGULATIONS
Normal healthy human are able to maintain constant body temperature 98.6°F despite temperature of the environment. In a hot environment, the body sends a signal to the brain, via spinal cord to say the body is overheating. The brain then sends a signal back via spinal cord and tells the body to cool itself by perspiration which evaporates and cools the skin. During cold weather, the body senses the lower temperature and tells the brain to put more clothes. Most people with spinal cord injury do not sweat below their injury level, because the loss of the ability to sweat. The message blocked at the level of the injury. For this, use cold wet towel wrapped behind the neck- act as an artificial sweat [4]

e. STRENGTH AND CEREBRAL PALSY
Because of the muscle imbalance, gait, posture and etc, it's advisable to avoid use strength training on certain part of the body.

f. AGILITY AND AMPUTATION
Athletes with amputation might have difficulties to move from one place to another in a fast rate. This involves body balance. Make sure before conduct agility or similar, the prosthetic is fitted accordingly. The stump care is very important in order for a comfortable wear. Clean the stump with water and dettol soap, dry it and wear clean socks to cover the stump from bacteria.

g. PRESSURE SORES AND WHEELCHAIR ATHLETES
Pressure sores happens because oxygen and nutrient cuts off, make the area reddish, and no longer receive oxygen. This happens when sitting too long at the same position. It is advisable to move the pressure area to avoid pressure sores. We know that when the injury happened, especially the complete injury, paralyzed the limb, the message blocked at the level of the injury.

h. EFFICIENCY AND FATIGUE

Coaches need to be aware that the mechanical efficiency athletes with disabilities may be inferior to that their able-bodied peers (Shepard, 1990). In other words, some athletes with disabilities will require more energy to perform the same tasks as their able-bodied peers. Example an above knee amputee (AK) will take longer and use more energy to run a 100m than a below knee amputee (BK)

CONCLUSION

Understanding the condition/ disability and their needs make it easier for a coach to know and coach them. This will ensure the athlete will rely on their coach to complete their task in achieving a good performance. Athletes also have confidence in their coaches to fulfill the training time allocated.

PRACTICAL APPLICATION FOR COACHES

Coach need to aware and try to acquire as much information as they can about the condition / disability so that they can adjust the skills / training that is suitable for their athletes regardless of their conditions. Coaches also need to do simulation of the disability of the athlete like sitting on a wheelchair while you are moving around your competition/training venue, so that you will know how the conditions restrict the movement of an athlete. This will make you a better coach.

APLIKASI PRAKTIKAL UNTUK JURULATIH

jurulatih perlu peka and cuba untuk mendapatkan seberapa maklumat mengenai keadaan / kecacatan atlet mereka supaya mereka boleh mengubahsuai kemahiran / latihan mengikut kesesuaian atlet tanpa mengira keadaan / kecacatan. jurulatih juga perlu melakukan simulasi mengenai keadaan / kecacatan atletnya seperti duduk atas kerusi roda dan bergerak sekitar kawasan latihan atau pertandingan, supaya anda tahu bagaimana keadaan / kecacatan menghadkan pergerakan. ini akan menjadikan anda seorang jurulatih yang baik.

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BEING DISABLED DOESNT HAVE TO BE A DISADVANTAGE

THE DIFFERENCE BETWEEN THOSE WHO FAIL AND THOSE WHO SUCCEED IS LARGELY PERSEVERANCE. NEVER QUIT...

PROGRAMMES FOR COACHES FROM JULY – NOV 2013

KE ARAH KECEMERLANGAN SUKAN
Towards Excellence in Sports

1&2. FACE – Functional Training (Basic) in Kota Bahru, Kelantan & UniMAP, Perlis.
3. FACE – Nutrition (Basic) in Sibu, Sarawak.
4,5&6. BCE Courses in IPG Kota Samarahan, Sarawak & KWSP Training Centre, Selangor.


1


2


3


4


5


6

(CONTINUED)

1&2. National Sports Association Coaching Manual Review Workshop Series 1 & 2 in Port Dickson, Negeri Sembilan.
3,4&5. Sports Science Courses.

APPRAISAL, COPING AND EMOTIONS IN PROFESSIONAL SPORT: A CASE STUDY OF AN EXPERIENCED TENPIN BOWLER

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ABSTRACT

The purpose of this article was to examine the appraisal, coping responses and emotions encountered by an athlete to manage the stressors before/during competitions in his career. Adopting an interpretative phenomenological methodology, data was gathered via an in-depth interview with an experienced international tenpin bowler. Findings indicated that stress appraisal was related to the appraisal based on personal experiences. Coping strategies deployed to deal with these stressors were observation, analyses, planning, self talk, breathing and drinking to relax, visualization and blocking. Emotions are positive (happiness) when athlete perceived stressors as challenging rather than threats. Results are discussed in the context of previous situation-specific research on appraisal and coping. Finally, implications for coaches and applied sport psychologists are suggested at the end of this paper.

Keywords: Appraisal, Coping, Emotions

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INTRODUCTION

Sport psychology is now well accepted and plays an important role in performance, particularly in tenpin bowling [33]. One such factor that influences sport performance is the ability of athletes to cope effectively with stress during training and competition [3]. Inability to cope with stressors has been associated with decreased performance [12]. As such, understanding more about the stressors encountered, coping strategies used and their effectiveness will help practitioners especially sport psychologists and coaches to develop better intervention programs for athletes to prepare optimally for competition.

Coping represents an individual's cognitive, affective, and behavioral efforts to manage specific external and/or internal demands [11]. To date, the widely used coping model in sport psychology is based on Lazarus and Folkman's transaction process perspective [21]. The revised transactional model of stress, coping and emotions [11] sees stress, coping and emotions as belonging together forming a conceptual unit. Although Lazarus suggests that these concepts should be examined as a unit but many coping researchers still examined them independently [18]. An important reason is that such research often places undue demands on the athlete which may affect the training/competition schedule and in turn reduces athletes' compliance.

Numerous studies have been conducted examining the stressors encountered by athletes during competition, training or outside the sporting environment. It has indicated that most athletes only report a limited number of stressors which reoccur over time (see [21] for a review). To understand coping as a process, it begins with situational appraisal, which categorized into primary and secondary appraisal. Primary appraisal refers to how an individual evaluates a stressful situation with regard to his/her values, personal beliefs, situational intentions, and goal commitments [9]. If the individual appraises that his/her goals are at stake, an emotional response occurs and the outcomes are perceived in terms of harm/loss (i.e., damage already occurred), threat (i.e., the possibility that damage may occur), or challenge (i.e., where people enthusiastically pit themselves against obstacles). In recent years, challenge and threat have been discussed as motivational states that occur when an individual becomes task engaged in a personally goal-relevant motivated performance situation [2].

Alternately, secondary appraisal refers to a cognitive-evaluative process that focuses on what can be done about a stressful person-environment relationship. Secondary appraisal provides the cognitive underpinning for coping. Individual's appraisal is constantly changing as the situation develops [11]. The person's coping responses also change from situation to situation and it varies depending on how one perceives the encountered stress in general [8]. Giacobbi [6] reported that athletes appeared to be more likely to appraise stressors as challenges rather than as threats, and vice versa. It is important to acknowledge athlete's appraisals as it has direct impact to the stressful event, type of coping strategy selected, and effectiveness of that strategy [7].

In order to maintain high standards of performance under stress athletes require the skills to cope effectively. Strategies to cope with stresses have been classified in three higher order dimensions [22]. Problem focused coping (PFC) refers to those strategies which deal with the problem and include increasing effort, seeking information and goal-setting. Emotion focused coping (EFC) dimension consist of strategies to regulate emotional distress and include strategies like breathing, relaxation and venting emotions. Finally, avoidance coping (AVC) consist of strategies to either cognitively (e.g., blocking) or behaviorally (e.g. walking

away) disengage from the stressor. Although research has examined the coping dimensions and strategies of athletes there is limited information on which coping dimensions or strategies are used when similar stressors are encountered over time.

Coping effectiveness has been defined by Nicholls [16] as 'the degree in which a coping strategy or combination of strategies is or are successful in alleviating stress'. Coping strategies by athletes when dealing with stressors are not necessarily the most effective ones. For example in a study with international cross-country runners Nicholls [18] found that those coping strategies which were reported as the most effective (increasing effort, channel emotions, positive orientation) were only used infrequently (4.8% of the time). In addition, the context also seems to influence coping effectiveness. Nicholls [19] found significant differences in stressors and coping responses during training and competition among a sample of five professional rugby union players, where coping effectiveness was significantly higher during training opposed to competition. Relatively few studies have assessed coping effectiveness this despite the notion that in order to develop effective coping intervention we require information what does and does not work for the athletes when they encounter a specific stressful event [5]. In addition, the influence of the context on coping effectiveness has been largely ignored. Therefore, in the present study we examined the effectiveness of coping strategies used by the athlete during training/competitions and its appraisals. It is also suggested that qualitative research may help provide a basis for understanding coping effectiveness [11, 12, 24, 32].

Adaptive coping responses are most likely to result in positive emotions whereas maladaptive coping responses are more likely to result in negative emotions. Nicholls, Polman and Levy [23] recently showed that positive emotions have a facilitative and negative emotion a detrimental effect on self-rated performance. Again, few studies have examined the emotions and their intensity associated with the stress and coping process and how this might be context dependent (e.g., importance of the competition).

One of the limitations of the present stress, coping and emotions literature in sport is that most studies have been conducted with Caucasian athletes. It is important to examine whether findings are equivalent across different cultures and whether similar intervention have to be applied across athletes of different ethnic background. Therefore the present study was conducted with a sample of elite Malaysian athletes of tenpin bowling. On the other hand, the study of coping is expanding resulting higher quality and more creative studies that have added substantially understanding and contribution to practical application. Polman [26] suggested focusing on qualitative coping research on a specific type of stressor, hence this study has selected coping during competitive gold performance as a specific aspect of life human experience in sport for in-depth phenomenological analysis

METHODOLOGY

In this study, lead researcher who is also the sport psychologist worked with National elite tenpin bowling team, interviewed participant to explore subjective experiences of gain and loss-relational meaning (challenge and threat states). It also further explored individual's experience in managing performance-related stressors and their emotional consequences using the Interpretive Phenomenological Analysis (IPA) method [29, 30].

PARTICIPANT

An international Malaysian tenpin bowler named Andrew (identity is kept anonymous) aged 36 years (male) participated in the study. With phenomenological research it is vital to select an information rich case that can provide adequate depth of information based on his/her experiences [25]. Andrew is a professional bowler and had been representing the country for the past 15 years. He had several international and national titles and successfully managed a professional bowling career for many years. As such, the detail descriptions he provided are considered relevant to the sport, stress and coping.

PROCEDURE

Lead researcher contacted the participant to explain the nature of the study. Inform consent and personal data were obtained, participant was told that information will be kept anonymous and he could withdraw from the study any time if he found himself uncomfortable. Similar to the majority of the IPA studies, data will be collected using a semi-structured interview [29,30]. With semi-structured interviews, researcher would have a set of questions on an interview schedule; interviewer was guided by the schedule rather than dictated by it. Within this approach, the interview (a) attempts to develop rapport, (b) put minimal emphasis on the ordering of questions, (c) probed interesting areas that arise, and (d) followed the respondent' interests or concerns. The aim here was to "try to enter, as far as possible, the psychological and social world of the respondent". Therefore, the respondent was involved in the direction the interview takes, and the respondent could introduce an issue the investigator had not considered [30].

DATA ANALYSIS

Data was transcribed verbatim and read several times. During the reading and rereading, notes were made in the left-hand margin to reflect on interesting or significant comments in relation to stressors and coping. As this process advances, certain blocks of text will be isolated (into 'meaning units') and tentative theme titles were written in the right-hand margin. The titles of themes represent more precise psychological terminology, whereas notes reflect participants' comments in vivo [30]. Each theme was cross-checked by the research supervisor and a coping research expert. Participant was contacted to discuss about his interpretations in a member-checking procedure to enhance data's validity and trustworthiness [15].

RESULTS

Andrew reviewed that bowling full time as a career is not easy, it is his main source of income, and he is doing it for the past 15 years since he joined the national elite squad. He told lead researcher that he loves bowling and he enjoys bowling everyday but it was hard when that he has to handle stress during competitive days. An overview of the stressors reported by Andrew is depicted in Table 1. Table 2 shows summary of themes and subthemes as well as examples of raw data extracts for Andrew's coping.

Table 1:
Stressors reported by participant and cluster themes

Raw Data	Theme	Category
• Prepared well but bowled badly	Expectation	
• Have to be at the top in order to be selected • Worried if not selected [income will reduce]	Evaluation/ Selection	
• Wanted to win back-to-back • Wanted to do well	Push hard	Performance-Related Stressors
• 'Not going to win like this'	Negative thought	
• Opponents were equally good • Opponent was bowling very well	Opponent	

Table 2
Summary of themes and subthemes and examples of raw data extracts for coping

Stressor	n	Selected quotes from participants	Coping (f)	Emotions
Effective coping: challenge				
Expectation	1	"I prepared well but I bowled badly in the first game"	PFC (2) EFC (3)	Happiness
Negative emotion	1	" I am not going to win like this"	AVC (1)	
Opponent	1	" The bowler next to me was bowling 270-280"		
Push hard	1	"I wanted to win back-to-back tournament"		
Ineffective coping: threat				
Evaluation	1	"I was scared and worried if I am not selected"	PFC (1)	Sad
Opponent	1	"I felt challenging as my teammates were all similarly high standard"	EFC (3)	
Push hard	2	"I want to do well" "I have to bowl well everyday to maintain the score"		

COPING APPRAISAL AND EFFECTIVENESS

In the interview, Andrew was asked to describe situations that he perceived as threat and/challenge, where he coping effective/ineffectively. Andrew has given 2 scenarios, one was where he felt challenged and coped well, and another scenario he perceived as threatened but did not do well.

EFFECTIVE COPING: CHALLENGE APPRAISAL AND EMOTION

Andrew described his experience in coping with challenging tournament as very effective.

"I wanted to win back to back tournament. I prepared well before going but I bowled bad [179 pins fall] in first game. I looked at the bowler beside me, who was bowling 250+, 260+, so I started to feel tense. I told myself: 'how are you going to win like this?' I walked outside the lane, sit on audient seat, and tried to relax. I watched the bowler beside my lane; I realized my mistakes where I bowled different lane, and different area. I was using a [bowling] ball that was not suitable. I told myself: 'Simon, no point you play under pressure, if you don't adjust [change ball and lane], you will not have a chance [to win]'. I drank water after 2 strikes, and I breathed before I took the approach [ready line]. I felt that when I breathe, my mind is occupied so I will not think too much. I quickly adjusted, I started to bounce back to 250-260, and I won in the stepladder. I was really happy with my achievement."

In this case, when he was under stress, Andrew took a step back from the shot which appeared to give him an opportunity to analyze the problem (PFC) by observing the opponent; think about the solutions (PFC) and used positive self-talk (EFC) to cope with the situation. He also used blocking (AVC) by drinking water and breathing to manage his negative thought intrusions by occupying his mind. He managed the situation and displayed resilience ability. He felt happiness (positive emotion) in this challenge scenario.

INEFFECTIVE COPING: THREAT APPRAISAL AND EMOTION

Andrew also described his experience as threatening during a roll off (a week-long simulation served as competition selection) where he did not cope well:

"During roll off, it was quite stressful, because we had to compete among each other [teammates]. Our standard was quite high, so each of us also could [have the ability] deliver. You have to make sure you are there [at the top] everyday, that was why the stress came in. [I] Felt threatening because I worried if I was not selected. I felt scared and anxious. I kept thinking: 'I want to bowl well' but actually [we] can't keep thinking about it [outcome], otherwise we will not be able to focus. Usually I will think about that [the outcome], I knew I should think about present. I tried to calm myself down, told myself: 'one ball at a time' and 'slow down' as I had been rushing. [I] just can't perform when I rush, so I [kept] reminded myself to calm down. I also visualized how I release the ball. I decided to change [bowling] ball but things did not went well with me. [I] Felt sad and disappointed that I did not made that decision earlier.

In order to cope, Andrew consciously tried to slow down and reminded (self talk - EFC) himself to take things one at a time and think present. He also seemed to use a combination of EFC (visualization) and PFC (changed equipment and made adjustment) to cope with such situation. By doing these, it appeared to enable him to gain more control of his cognitions, emotions and behaviors.

DISCUSSION

Competitive events that appraised as threatening or challenging were perceived as being stressful and important to athletes [23]. It is argued that both gain (challenge) and loss (threat) relational meanings are stress appraisals that indicate an individual is experiencing stress. In the present study, participant reported expectation (1), opponent (1) and push hard (1) as stressors during challenge scenario where he coped effectively, although it accompanied with negative emotion (1). On the other hand, participant reported he encountered relatively more performance related stressors such as evaluation (1), opponent (1) and push hard (2) for threat relational meanings where he coped ineffectively. Participant further described he did not cope well when he wanted more by pushing too hard for it in threat appraisal. In comparison, participant seemed to cope better with expectation but without evaluation, although he had negative emotion at the same time. Nicholls [17] reported that golfers were found to cope ineffectively when they increased effort and 'forced' their play, speeding up and negative thoughts. In the present study, participant also experienced the above stressors where he named them as push hard and rushing besides feeling threatened by his teammates (opponent). On top of that, participant also experienced stressor of evaluation, where he coped ineffectively. Perhaps having evaluation (roll-off/simulation) had created fear in him if he was not selected for tournament, hence followed by push hard and rushing. This phenomenon has supported Lewthwaite's [14] finding where he found threat appraisals were associated with anxiety. According to Lewthwaite [14], anxiety is a form of stress emotion. This negative emotion potentially could affect athlete's arousal level, which could in turn affect physical (e.g., ball handling), cognitive (e.g., decision making) performance and emotional reaction to a subsequent stressful situation [10].

As for coping strategies, participant revealed that he used different strategies when he encountered different stressors. According to Allen [1], when athletes appraised the situation as threatening, it often leads to lower engagement in competition and increased use of avoidance strategies. Alternatively challenge appraisal leads to greater task engagement and increased use of approach strategies such as PFC. Present research findings showed partial support to the study of Allen's, as athlete demonstrated various coping strategies during threat and challenge states however responded with slightly more EFC instead of PFC during challenge appraisal.

Effective coping often involved the use of different coping strategies, more often in combination [19]. In the present study, participant described that in the event he coped well; he managed it with different coping strategies. For instance during the challenging event, he employed relatively more EFC (3), and slightly lesser of PFC (2) with only 1 AVC. The findings in this section have demonstrated support to Reeves [27] where EFC strategies were found to be more favorable and effective. Nicholls [17] stated, effective coping included reappraising, positive self-talk, and following a pre-shot routine which were regarded as PFC. Whereas breathing exercises, physical relaxation, and seeking on-course social or emotional support were considered as EFC. The finding in present study has supported Nicholls [17] where researchers revealed more EFC were associated with effective coping. This study shows that EFC should be employed more in order to cope better when participant bowled under stress. In threat scenario, though participant in the present study has employed total of 4 times of PFC (2) and EFC (2), with no AVC, he did not cope well. It may reflect that perhaps participant in the present study should consider the use of AVC in threat appraisal scenario in order to coping effectively. On the other note, Nicholls [17] elaborated that EFC strategy (e.g., rationalizing such as acceptance, breathing exercises, physical relaxation, and seeking on-course social support) was employed in order to manage uncontrollable stressors such as weather or an opponent. In this instance, it seemingly that participant appraised stressors that

he encountered during both challenge and threat scenarios as uncontrollable hence he employed equally more EFC, although not effective for the threat event.

In regard of gain or loss relational meanings, participant felt positive (happiness) where he appraised the situation was challenging and coped effectively, and negative (sadness) where he felt threatened and did not cope well. This finding support Nicholls, Polman and Levy [23] where positive emotions are facilitative to performance, and vice versa. According to Blascovich [2], challenge states are typically associated with positive affective states. In contrast, a threat state is associated with negative affective states, poor focus, and approach/avoidance behaviors [2]. Nicholls [20] supported the above theory and claimed that loss relational meanings (threat) generate negative emotions as six of the emotions (e.g., anxiety, anger, shame, guilt, disappointment, and frustration) were negatively toned, whereas, gain were associated with six positively toned emotions (e.g., happiness, relief, pride, excitement, hope and gratitude). Overall, the link between coping effectiveness and emotion provides support for Lazarus [11], who proposed that coping and emotion belong together and form a conceptual unit. Nicholls and colleagues [23] further confirmed this theoretical application with their path analysis that stress appraisal, emotion, and coping are highly related constructs.

In conclusion, it shows Asian athlete demonstrated similar findings as of the western counterpart. More research on Asian athletes in bigger number should be conducted to test this conceptual unit. It is also recommended that future research focus on more competitive stressors taken into account individual differences, to design individual interventions in order to improve coping effectiveness [21]. Finally, coping research should expand into longitudinal-individual research which has the potential to provide researchers with a greater understanding of how these psychological constructs operate and influence each other within an intra-individual format [26].

PRACTICAL APPLICATION FOR COACHES

It is important for coaches to understand athletes' individual appraisal and coping behaviors react to different stressors. It is also suggested that coaches and other applied practitioners to teach their athletes coping strategies to manage stressors according to their individual appraisals, particularly the young athletes, in order to maximize coping effectiveness.

APLIKASI PRAKTIKAL UNTUK JURULATIH

Ia adalah penting untuk jurulatih memahami penilaian atlet secara individu dan tingkahlaku menangani terhadap tekanan yang berbeza. Ia juga mencadangkan bahawa jurulatih dan pengamal lain untuk mengajar atlet mereka strategi menangani untuk menguruskan tekanan mengikut penilaian masing-masing, terutama atlet muda, untuk memaksimumkan keberkesanan cara mengatasi mereka.

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IMAGINE TO SEE RESULTS IN GOLF PUTTING PERFORMANCE FROM THE HARDEST DISTANCE

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ABSTRACT

Psychological Skills Training (PST) particularly imagery is a strategy that can improve the performance of golfers. Additionally, golfers had a problem when putting from a 6-feet distance compared to other distances (3, 12, and 24 feet). This distance was regarded as the hardest distance by the participants in golf putting. The objective of this study was to investigate the effectiveness of PETTLEP imagery on putting performance of the golfers from the 6-feet distance. Forty-two male golfers aged 18 to 25 years with 1 to 3 year playing experiences participated in this study. After screening of imagery ability, all participants were randomly assigned into two different groups (i.e., PETTLEP imagery group and physical practice only (control group). All participants in PETTLEP imagery completed 10 imagery practices together with 10 physical practices. Meanwhile, the control group only performed 10 putting strokes and read a guideline on stretching to improve flexibility in a 6-week programme. Pre and post putting test was conducted from a 6-feet distance. An independent sample t-test after the program results revealed that PETTLEP imagery group improved on putting scores compared to the control group. The finding supports the idea of using PETTLEP imagery to improve golf performance. Research still needs to be conducted particularly in the mediating role of self-efficacy of PETTLEP imagery in golf putting from the 6-feet distance.

Key words: PETTLEP Imagery, Golf putting, hardest distance

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INTRODUCTION

The importance of imagery research for improving sports performance has been emphasized by many authors and considered as one of the most popular techniques used by the athletes. Information regarding the effectiveness of imagery practice has been explained by previous studies. For example athletes must consciously be aware of the actual environment particularly in a competitive setting [1]. Therefore, the actual experiences occur and help the performance during practice [2,3,4]. On the other hand, the term controllability refers to the production of the desired outcome and manipulation in images. In fact, both awareness and vividness need to be combined for a similar condition [5]. Generally, in imagery, you will always get from what have you seen and they should imagine what should be imagined in order to see the result [6,7].

In response to perceived problems in implementing programmes involving motor imagery, the previous researcher proposed the seven 'P.E.T.T.L.E.P' components which model derives from functional equivalence between imagery and physical performance of a motor task [1]. According to this model the 'Physical' component considers the physical condition of imagery reflected during the actual performance, for instance when mentally practicing a putting skill a golfer should assume a body position, grip and stance image. The physical responses would then occur in real performance of the skill [1]. The 'Environment' component is described as the physical environment in which the imagery is performed being similar to the actual performance environment. For example, putting skills should ideally be performed at the real putting grass or on the real course. The 'Task' component refers to the imaged task as closely as the actual task in terms of the thoughts, feelings and actions while the 'Timing' component explains as the same pace as actual performance imagined being performed (i.e., real time). For instance, when performing a successful putting task the timing begins from standing on the green putting surface. Later this is followed by replacing of their marker until finally they can hear people applauding from the successful task. The 'Learning' component describes the imagination when what a person imagines should match the current stage of learning. For example, in golf putting skill, a golfer firstly has to think about the correct movement as in the actual performance. Next, imagery may focus heavily upon the correct technique with elements such as grip positioning and body alignment. Finally, as the skill becomes more familiar, a golfer can make some changes on the scripts as rehearsed in their mind so that the movement becomes more effective. The 'Emotion' component refers to all the emotions and arousal experienced during the imagery as well as in actual performance. Meanwhile, the final component is 'Perspective' which refers to how imagery should be performed from a visual perspective that most closely reflects the view taken by the athlete when actually performing the task (i.e., internal or external).

The previous studies indicate that PETTLEP imagery is helpful to improve athletes' performances [8,9,10]. For instance, Ramsey and colleague attempted to make comparison between components of PETTLEP imagery (i.e., skill-based vs. emotion-based) [8]. Thirty three participants were divided into three different groups; (a) two- PETTLEP imagery groups, and (b) control group, each consisting 11 participants each groups. Both imagery groups in this study were asked to listen to the imagery guideline and mentally practice 10 successful penalties in soccer. They performed the imagery in full dress and stood facing the goal just beyond the penalty spot. Besides, the stimulus proposition script was given to the skill-based imagery group whereas the emotion-based group received the stimulus-response proposition script. However, the control group in this study practiced a series of stretching. The post-test results showed that both imagery groups improved their performance compared to the control group.

Previous studies imply that Psychological Skills Training (PST) particularly imagery is a strategy that can improve the performance of golfers and it is popularly used by researchers [2,11,12,13,14,15,16,17,18]. For instance, Ramsey and colleague modified the concept of imagery direction on golf putting performance [2]. Seventy – five participants were divided into three different conditions group (i.e., facilitative imagery, suppressive imagery, and control group). The post-test results showed that imagery group performed better than the suppressive imagery group. These findings support the effectiveness of facilitative imagery direction while performing the task. The study summarized that the debilitative imagery need not be persuasive to influence motor skill performance.

The effectiveness to use PETTLEP imagery in golf performance is also considered as one of the strategies that have been investigated by researchers [14,19]. As Smith et al applied the PETTLEP imagery and it helped to improve the performance of golfers when taking shot from the bunker [19]. Thirty-two male golfers with different level of skills were assigned into PETTLEP imagery, physical practice, PETTLEP and physical practice, and control group. The imagery groups in this study received the response proposition script (bio-informational theory). In a session, the participants in PETTLEP imagery group had to imagine 15 bunker shots and incorporate PETTLEP components twice a week. The participants were asked to perform by standing and holding the iron (sand wedge) in a tray of sand and wearing the actual golf clothes. They were also reminded not to perform any actual movement except to correct their body position. Furthermore, the participants in PETTLEP imagery group performed at the real time and were asked to feel the emotion based on the script given. They were also advised to make changes on the script given if they felt the scripts were no longer suitable with their technique. The PETTLEP and physical practice group practiced PETTLEP imagery once a week, using the same procedure as the PETTLEP group. They needed to complete 15 bunker shots once a week on a different day from the time they performed the imagery, using the same procedure as the physical practice group [19]. However, the control group only read the performance book by a golf champion. Pre- and post-tests consisting of 15 bunker shots were assessed in this study. Points were awarded according to the ball being closer to the pin. Post-test results showed significant improvement particularly for the PETTLEP imagery when combined with physical practice. However, there was no significant difference between the physical practice and PETTLEP imagery. The study summarized that this finding significantly supported the effectiveness of PETTLEP imagery in enhancing golf performance, especially when combined with physical practice. However, the effectiveness of PETTLEP imagery more specifically the study on golf putting performance still is limit in the literature.

The previous researchers also found that golfers had a problem when putting from a 6-feet distance compared to other distances (i.e., 3, 12, and 24 feet) [20]. The performance was measured from the number of strokes taken until a ball sank into a hole. Additionally, qualitative results disclosed that most of the participants described their psychological states (i.e., anxiety and self-belief) played a big role in influencing their ability to putt. Meanwhile, technically such as the position of the grip and stance alignments are other reasons that make putting in certain distances hardest to execute [20]. The findings were consistent with the objective to reveal the specific distance considered hardest to putt and discovering the causal factors from the golfers' personal opinion. However, are PETTLEP imagery improve golfers' performance when putting from this distance also need to be investigated. Therefore, the main objective of this study is to investigate the effectiveness of PETTLEP imagery on putting performance of the golfers from the 6-feet distance.
There is a need for interested coaches to provide the idea and really understand how to teach this strategy. On top of that, explains the arguments on why some coaches and golfers show little interest in using a psychological technique while practicing putting. Furthermore, coaches also can become involved in exploring the

specific hardest distance rather than emphasizing more on the swing techniques for use. So, they understand that imagery is not simply a psychological practice but it also helps to obtain valuable results particularly when putting from a specific distance.

METHOD

PARTICIPANTS

Forty-two male golfers aged between 18 to 25 years old (M=20.83, SD=1.94) participated in this study. The sample size is based on the number population of golfers at the selected golf club (i.e., golf academy). Male golfers were investigated in this study since the previous researchers only used male golfers as participants in golf putting and found males were better putters than the female golfers [15,17,18,19,21]. All participants had between 1 to 3 years of playing experiences (M=1.40, SD= 0.58) and were considered less skilled golfers. As discussed by the previous studies that psychological skill technique are less used by the unskilled golfers [22,23].

INSTRUMENT

PETTLEP Imagery intervention guides: The researcher developed an imagery script related to facilitative with stimulus–response proposition (Lang's Bio-informational, 1979). Most importantly, the script explored the functions of the seven PETTLEP components (i.e., Physical, Environment, Task, Timing, learning, Emotion, and Perspectives) [1]. The seven components of PETTLEP imagery were used in this study such as the proper golf clothing (Physical component). As in the script, they were instructed to imagine the full routine cognitively and kinesthetically together with stimulus and response propositions to make a successful putting stroke (i.e., from walking to the green until to get a birdie) in real time (Emotion and Timing components). They performed on the artificial putting mat in a standing position by holding the putter 10 meters from the actual green (Environment component). Next, the task should be associated or closely match the actual task consistent with (Task components). The participants listened to their own imagery scripts recorded from the voice recorder (Perspective component). They were also encouraged to do some changes to the general script every each after the imagery sessions (Learning component).

The script also established the cognitive and motivational functions as well as visual and kinesthetic as suggested by previous studies [5,14,18]. In the present study, a digital voice recorder model by Sony ICD-P620 was used since audio aid is an easy tool to bring during the imagery practice [19]. The script was approved by the University of Malaya internal research committee and three professional golfers with Professional Golfers' Association (PGA) teaching certification and who have more than 12 years of competitive experiences.

Putting task performance and scoring: The participants used their own putter in order to make them feel comfortable and be consistent with their own technique during the actual competition and test [15]. Five standard competition balls (Titleist DT) were provided by the researcher. The artificial grass putting mat (25.4x198cm) with a 10 cm diameter hole at the end of the mat was used in this study. The same putting surfaces have been used to investigate the effectiveness of the imagery program on putting performance by the previous studies [2,15].

The participants' were asked to perform 10 putting tasks and the scoring was categorized as 5 points for each ball holed in, 3 points for each ball that did not hole in but stay at the lip of the hole, 2 points for each ball that went over the high side of the hole and 1 point for each ball that did not reach the hole or pull up short. Thus, each participant was awarded a total score out of the maximum of 50 points.

PERFORMANCE SCORING

PROCEDURES

For the purpose of gathering data in this study, the ethical approval letters were obtained from the internal research committee of University of Malaya Sports Centre before personally contacting the person in charge at the selected golf club. During the initial meeting with the golfers and club manager, an informed consent was obtained before explaining the objectives of the study. For the selection of participants, the imagery ability was assessed in this study. The Movement Imagery Questionnaire – Revised (MIQ-R) was used as a screening in this study [24]. This questionnaire was used to assess individual differences in both kinesthetic and visual imagery ability before being engaged with imagery intervention programme. The MIQ-R is an eight-item questionnaire asking participants to first physically perform, and then visually or kinaesthetically imagine four simple movements such as "Raise your right knee as high as possible so that you are standing on your left leg with your right leg flexed (bent) at the knee. Now lower your right leg so that you are again standing on two feet". Following imagery performance, participants rated their ability to visually or kinaesthetically image the movement on a 7-point likert scale ranging from 1 (very hard to see/feel) to 7 (very easy to see/feel). The items were then averaged to form visual and kinaesthetic subscales. According to Smith et al. [19], the Cronbach alpha coefficient for the scale was reported to be .87. In the present study, the Cronbach alpha coefficient was .79 and all participants had acceptable levels of movement imagery ability (i.e., scores 16 or higher). Therefore, nobody was omitted from the experiment besides meeting the following criteria; (a) has been playing golf for a period of more than one year (b) has not been involved in any form of imagery training in golf putting. An independent-samples t-test was conducted to compare the imagery ability scores between the groups. There was no significant difference in scores for imagery ability PETTLEP group (M = 41.52, SD = 2.25) and control group (M=42.05, SD=3.82; t (40) = -.54, p = .06, two tailed). The magnitude of the differences in the means (mean difference =-.52, 95% CI: - 2.48 to 1.43) was very small (.007). It indicated that all participants had equal imagery ability before the intervention programme. They were randomly divided into two different groups (i.e., PETTLEP imagery group (PI) and control group (only physical practice) with 21 participants for each group. As supported by the previous studies less than 21 participants sufficient to conclude the effectiveness of imagery practice in sports performance [8,9,10,23].

Before intervention, all participants performed the 10 putts from a 6-feet distance consistent with the previous study [18] or less than 15 putting tasks [15].The putting test was performed on an artificial putting mat 10 meters from the actual green to obtain the similar environment as the actual putting surface [1, 9]. Participants in PETTLEP imagery group were asked to rate the scale on easiness to visualize; 1=very hard to imagine and feel, 7 = very easy to imagine and on clarity to visualize; 1= extremely unclear, 7=extremely vivid for the first time [8].

During the intervention, all participants were instructed to complete the practices three times a week during the 6-week intervention programme. The participants in PETTLEP imagery group performed 10 imagery practices together with 10

physical practices (actual putting stroke) at the artificial putting mat 10 meter from the actual green. The 10 practice trials were consistent with the previous putting studies [18] or other imagery and task skill studies [8,10]. Finally, they were reminded not to be involved in any tournament or practice during the entire program.

The imagery intervention sessions took place on three alternate days for the PETTLEP imagery group. Each participant in this group received the script developed by the researcher. They were asked to make some changes on the script in each of the sessions based on their own skill to putt. They listened to their personal imagery script from a voice recorder. Overall, the present study covered 24 minutes for the whole sessions including physical practice or approximately 12 minutes was taken for imagery practice.

The participants in the control group also performed 10 physical practices (actual putting strokes) at home or putting green and read stretching guideline to improve flexibility for 3 times a week in 6-week of program. They were asked to report the detail of the programme in a diary other than monitored by the coaches. The researcher also visited all participants in this group at the golf club in order to pay equal attention as to the imagery group.

After 6 weeks of intervention programme, a post- test was conducted and all participants completed the 10 putting tasks from a 6-feet distance for the second time. Besides that the easiness and clarity rating scale was also assessed for the second time in the PETTLEP imagery group. For the purpose of data analysis, an Independent Samples t-Test was used to compare the mean scores on the dependent variable (6-feet putting performance) and an independent variable (golf putting practice method) PETTLEP imagery and physical practice only (control group) [27]. In addition, a Wilcoxan Signed Rank Test (non parametric) was employed to investigate if there was a change in the scores on the easiness and clarity ability to image the script before and after intervention by the participants in PETTLEP imagery group.

RESULTS

Preliminary assumption testing was conducted and the scores are reasonably normally distributed, with most scores occurring in the centre and Levene's test for equality of variances indicated no violation. A pre and post-test was conducted to compare the putting performance from the 6-feet distance scores for PETTLEP imagery group and control group (physical practice alone). An independent – samples t-test post-test showed that there was a significant difference in scores for PETTLEP imagery group ($M = 34.52$, $SD = 4.42$) and control group ($M=24.95$, $SD = 2.85$); $t(40) = 8.33$, $p = .001$, two-tailed). The magnitude of the differences in the means (mean difference = 9.57, 95% CI: 7.25 to 11.89) was very large (eta squared = .55). Summary of the descriptive statistics for pre and post-test on putting performance is given in Table 1.

A non parametric analysis, a Wilcoxan Signed Rank Test revealed a statistically significant increment in easiness ability to image scores following participation in the PETTLEP imagery intervention program, $z = -3.90$, $p < .001$, with a small effect size ($r=.19$). The median score on the easiness ability to image increased from before program ($Md = 5$) to after program ($Md = 7$). Meanwhile, a non parametric analysis, a Wilcoxan Signed Rank Test revealed a statistically significant increment in clarity ability to image scores following participation in the intervention program, $z = -3.60$, $p < .001$, with a small effect size ($r=.17$). The median score on the clarity ability to image increased from before program ($Md = 5$) to after program ($Md = 6$).

Table 1:
Descriptive Statistics for Putting Performance in Pre and Post-Test on PETTLEP group and Control Group

Groups	Pre-test		Post-test	
	Mean	SD	Mean	SD
PETTLEP group	28.86	3.25	34.52	4.42
Control group	27.38	4.31	24.95	2.85

Notes: control group (physical practice only)

DISCUSSION

As outlined previously, the present study supports the idea of using the PETTLEP imagery to improve golf performance. Indeed, effectiveness of PETTLEP imagery in golf putting performance from the hardest distance (6-feet) is confirmed when there was no improvement in performance by control group (physical practice alone). The finding was consistent with previous studies that indicated physical practice alone did not improve their putting performance except when combined with the PETTLEP imagery [9,10]. Similar finding also highlighted by the previous golf studies the PETTLEP imagery helped to improve the performance of golfers from the bunker shot [19]. It is shown that the procedure used in this study was effective for participants in the PETTLEP imagery group. Instead of using video or practicing at the real putting green, standing closer to the actual putting green by holding the putter can also make them feel like the actual environment. However, further investigation may be needed on the environment aspect for practicing imagery such as to compare between performing imagery at the actual putting green vs. practicing imagery at the artificial putting mat closer to the actual putting green (as proposed in this study). The results also supported the effectiveness of using audio aid to practice imagery as to get the similar perspective (internal perspective) other than easy to excess during practice session.

The effectiveness of PETTLEP imagery in the present study may be related to the sessions that were being monitored personally besides listening to their own imagery scripts (internal perspective). Additionally, the kinesthetic imagery used by the participants in the PETTLEP imagery was consistent with the previous study which was found effective in enhancing closed skills performance [26]. Non-parametric results in the present study clearly explained the usefulness to practice PETTLEP imagery for golfers. The manipulation checks results showed the participants in PETTLEP imagery performs better from time to time in easiness and clarity to visualize. As supported by Holmes and Collins [1], imagination should match the current stage of learning. However, the results obtained and the conclusions drawn from this study cannot be taken to represent female golfers. In fact, maybe researchers ought to focus on skilled golfers of different age groups. Finally, the present study contributes to the golf putting literature through the use of PETTLEP imagery to improve putting performance from the specific hardest distance. It warrants that future research needs to be carried out on the efficacy of golfers prior to putting task particularly from the 6-feet distance.

PRACTICAL APPLICATION FOR COACHES

This study provides a guideline to improve the coaching technique, particularly in the golf training. Coaches are encourage to consider the use of psychological technique (i.e., PETTLEP imagery) while practicing putting. Additionally, coaches also need to highlight the power of specific distance in affecting the putting performance besides emphasizing on swing techniques, etc

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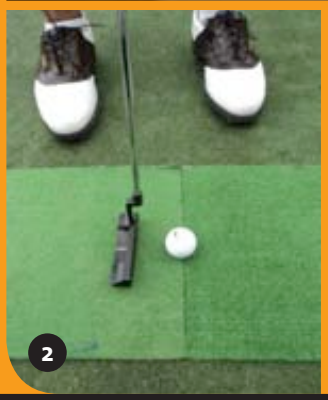
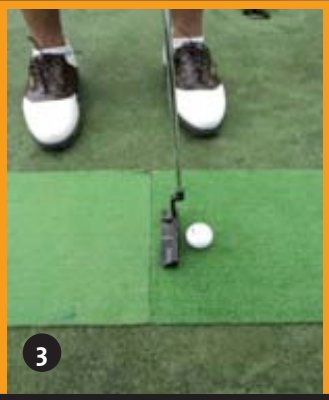
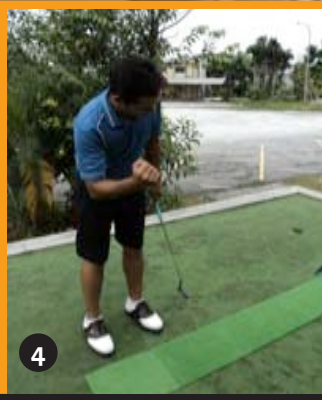
1. "The participants were suggested a simple abdominal breathing technique before the imagery practice"

2&3. "You can image your putter hit the ball"

3. "Yes" is the first word will come out from your mouth and you feel stronger, more confident, and proud of yourself.








THE VALUE OF ROUTINE, TRUSTING YOUR SWING.
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Take a break and pen your thoughts

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